OPENING SESSION/KEYNOTE ADDRESS

On Knowing That You Know—and its Functions
Asher Koriat, University of Haifa
Thursday, November 19, 8:00 p.m., International North and South

2015 EARLY CAREER AWARDS
Sarah Brown-Schmidt, University of Illinois
Daniel Casasanto, University of Chicago
Jessica Payne, University of Notre Dame
Frederick Verbruggen, University of Exeter

WELCOME RECEPTION
Thursday, November 19, immediately following the Keynote Address, Continental ABC
Hosted by: Psychonomic Society Governing Board

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NOTICES
• Designation of Psychonomic Society Early Career Award Winners: An asterisk (*) preceding an author's name indicates that he/she is a recipient of the Psychonomic Society's Early Career Award for 2015.
HOTELS

The Hilton Chicago will serve as our headquarters hotel. All sessions for the 2015 Psychonomic Society Annual Meeting will be held at the Hilton. There are a limited number of rooms available at the Hilton, so please book early to secure your sleeping room reservations.

To maintain our practice of no registration fee for members, it is essential that all rooms reserved for the Annual Meeting be identified as such at the time of booking. To assure you receive the specially negotiated room rate of $199 + tax per night, please make your reservations no later than October 23, 2015. Visit https://resweb.passkey.com/go/Psychonomic2015 to make reservations.

REGISTRATION

Registration is free for members of the Psychonomic Society. Registration fees for non-member PhDs and graduate students are $75.00. There is no registration fee for undergraduate students. This is a new policy effective this meeting. Membership in the Society is inexpensive and strongly encouraged.

Registration will be located at the 8th Street South registration desk on the lobby level of the Hilton during the following times:

Thursday, November 19 ..................10:00 a.m. – 8:00 p.m.
Friday, November 20 ......................7:30 a.m. – 6:00 p.m.
Saturday, November 21 ..................7:30 a.m. – 5:00 p.m.

To avoid lines on site, you are strongly encouraged to preregister through the Psychonomic Society Web site, www.psychonomic.org. Click on the “Annual Meeting” link, then “Registration” to access the online registration form. If you choose not to preregister, please visit our registration desk at 8th St. South on the Hilton lobby level when you arrive in Chicago and complete a registration form so the Society can obtain an accurate count of attendees. All attendees must register.

MEETING ROOMS

All meeting rooms for spoken papers are located in the Hilton Chicago:

- Continental B (Lobby Level)
- Continental C (Lobby Level)
- International North (Second Floor)
- Williford (Third Floor)
- Marquette (Third Floor)
- Waldorf (Third Floor)
- Joliet (Third Floor)

Session Chairs are encouraged to solicit papers from individuals in their sessions prior to the meeting and load presentations onto the laptop computer in the meeting room. This will save time.

TRAVEL TO CHICAGO

Airports:
- Chicago O’Hare International Airport (ORD) and the Hilton Chicago (approximately 19 miles)
- Chicago Midway Airport (MDW) and the Hilton Chicago (approximately 11 miles)

Parking:
- Self-Parking at the Hilton Chicago is $55 per day, and valet parking is $69 per day.

Shuttle Service:
Super Shuttle Chicago offers transportation to and from O’Hare and Midway airports. Shuttle service costs approximately $31 from O’Hare and $26 from Midway.

To book a reservation visit http://www.shuttlefinder.net/airport-shuttles/chicago/

TAXIS

Taxis are available at both airports. They cost approximately $50 from ORD but could be higher based on rush hour/traffic. Taxis from MDW will run around $35.

SUBWAY

Use the following for taking public transportation to the Hilton Chicago:

- O’Hare International Airport: CTA Blue Line train to the Jackson stop. Walk 0.6 miles southeast to 720 S. Michigan Ave.
- Midway Airport: CTA Orange Line train to the Roosevelt stop. Walk 0.5 miles north to 720 S. Michigan.

Approximate cost for subway transportation from both airports is $2.25.

Graduate Student Social

Friday, November 20, 9:00 p.m.-12:00 midnight

Kick back and relax as you meet other graduate students who share the same interests. The event will be held at Cactus Bar & Grill, 404 S. Wells St., Chicago, IL, 312-922-8025, CactusChicago.com. Light hors d’oeuvres and one drink ticket good for beer, wine, soda, or water will be handed out per person.

Please remember to bring appropriate ID, as well as your Psychonomic Society name badge. Illinois law requires that you must be at least 21 years old to enter the establishment.
PROGRAMS

Programs will be available in print, as a PDF at [www.psychonomic.org](http://www.psychonomic.org), and as a mobile app (free download at the Apple App Store and Google Play Store) for all registrants. All versions include the full program as well as a list of posters. Additional or lost copies of the printed program will be available for $20.

POSTER SESSIONS

All poster sessions will take place at the Hilton Chicago in Salon D.

The three evening sessions will be held in conjunction with receptions. Authors of posters are asked to make their posters available for viewing on the following schedule:

<table>
<thead>
<tr>
<th>Session</th>
<th>Viewing Time</th>
<th>Author Present</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thursday Evening</td>
<td>4:00 p.m.–7:30 p.m.</td>
<td>6:00 p.m.–7:30 p.m.</td>
</tr>
<tr>
<td>Friday Noon</td>
<td>10:00 a.m.–1:30 p.m.</td>
<td>12:00 noon–1:30 p.m.</td>
</tr>
<tr>
<td>Friday Evening</td>
<td>4:00 p.m.–7:30 p.m.</td>
<td>6:00 p.m.–7:30 p.m.</td>
</tr>
<tr>
<td>Saturday Noon</td>
<td>10:00 a.m.–1:30 p.m.</td>
<td>12:00 noon–1:30 p.m.</td>
</tr>
<tr>
<td>Saturday Evening</td>
<td>4:00 p.m.–7:30 p.m.</td>
<td>6:00 p.m.–7:30 p.m.</td>
</tr>
</tbody>
</table>

NOTE: Posters must be smaller than 4 ft. x 4 ft. (1.22m x 1.22m). Each poster must fit on one half of the 8 ft. x 4 ft. poster board. You will be sharing a poster board with another presenter. Visit [www.psychonomic.org/2015-posters](http://www.psychonomic.org/2015-posters) for suggestions on preparing your poster.

The extended viewing time will allow all interested persons to see posters of their choice and hopefully reduce the crowded conditions we sometimes have had at the poster sessions. Please do NOT leave your poster behind at the end of your session. All posters must be removed as soon as the poster session is concluded.

The numbering of posters this year uses the same system as last year. Abstract numbers assigned to posters are not in sequence with the numbers assigned to talks. Rather, each poster is assigned a four-digit abstract number. The first digit codes the session to which the poster has been assigned; the last three digits code the location of the poster within its session (i.e., 001–202).

EXHIBITORS

Attendees are encouraged to visit our exhibitors located in Salon D of the Hilton Chicago. Exhibit hours are:

- Thursday, November 19 .......... 5:30 p.m. – 7:30 p.m.
- Friday, November 20 .............. 9:30 a.m. – 2:00 p.m.
- Saturday, November 21 .......... 9:30 a.m. – 2:00 p.m.

RECEPTIONS

Opening Reception
Thursday, November 19
9:00 p.m.–10:30 p.m. in Continental ABC

Friday Reception
Friday, November 20
5:30 p.m.–7:30 p.m. in Salon D

Saturday Reception
Saturday, November 21
5:30 p.m.–7:30 p.m. in Salon D

COFFEE BREAKS

Complimentary coffee and tea will be available from 7:30 a.m. to 10:30 a.m. each morning near the registration area.

JOGONOMICS

Join your fellow Psychonomes on a 5k fun run. The group will meet in the lobby of the Hilton Chicago Hotel at 6:00 a.m. on Saturday, November 21, and the run will leave promptly at 6:15 a.m. Again, this year we have added a low-key route that will run lower mileage at a more relaxed rate. Organizers: Jeff Zacks and Marianne Lloyd. There is no fee, but you will be required to sign a waiver.

PSYCHONOMIC TIME

Persons chairing sessions this year will be asked to keep the spoken papers schedule on time standardized against a clock at the Psychonomic registration desk. All attendees are asked to synchronize their watches with Psychonomic time.

AUDIOVISUAL EQUIPMENT FOR TALKS

LCD projectors (e.g., for PowerPoint presentations) will be provided in all rooms where spoken sessions are scheduled. PC laptop computers will be provided in each meeting room. Please bring your presentation on a USB drive and load it onto the laptop computer in your session room prior to the beginning of that session. Please bring two copies of your presentation in case of media failure. Presenters are strongly encouraged to visit the speaker ready room well in advance of their talks to review their presentations.

THE 2015 PROGRAM

There were 1,306 submissions. Of the 1,304 papers that were placed on the program, 302 are spoken papers and 1,002 are posters. In addition, there were 3 invited symposia and one symposium that resulted from the Psychonomic Society Leading Workshop program.
PROGRAM HISTORY

<table>
<thead>
<tr>
<th>Year</th>
<th>Site</th>
<th>Valid Submissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>Chicago</td>
<td>1,306</td>
</tr>
<tr>
<td>2014</td>
<td>Long Beach</td>
<td>1,300</td>
</tr>
<tr>
<td>2013</td>
<td>Toronto</td>
<td>1,264</td>
</tr>
<tr>
<td>2012</td>
<td>Minneapolis</td>
<td>1,054</td>
</tr>
<tr>
<td>2011</td>
<td>Seattle</td>
<td>1,037</td>
</tr>
<tr>
<td>2010</td>
<td>St. Louis</td>
<td>928</td>
</tr>
<tr>
<td>2009</td>
<td>Boston</td>
<td>1,220</td>
</tr>
<tr>
<td>2008</td>
<td>Chicago</td>
<td>950</td>
</tr>
<tr>
<td>2007</td>
<td>Long Beach</td>
<td>928</td>
</tr>
<tr>
<td>2006</td>
<td>Houston</td>
<td>883</td>
</tr>
</tbody>
</table>

2015 AFFILIATE MEETINGS

Festschrift for Barbara Tversky
Wednesday, November 18, 2015
9:00 a.m.-5:15 p.m.
Marquette
There is no registration fee, but you are required to register by email to cbcasano@wustl.edu

Auditory Perception, Cognition, and Action (APCAM)
14th Annual Meeting
Thursday, November 19, 2015
7:30 a.m.-5:30 p.m.
Astoria
www.apcam.us

Object Perception, Attention, and Memory (OPAM)
23rd Annual Workshop
Thursday, November 19, 2015
7:00 a.m.-5:00 p.m.
Waldorf
www.opam.net
Keynote Speaker: Daniel Simons, University of Illinois at Urbana-Champaign

Society for Computers in Psychology (SCiP)
Thursday, November 19, 2015
8:00 a.m.-5:00 p.m.
Boulevard A, Boulevard B, Boulevard C
www.scip.ws

Society for Judgment and Decision Making Annual Meeting (SJDM)
Friday-Monday, November 20-23, 2015
Salon A
www.sjdm.org

Society for Mathematical Psychology (SMP)
Computational Approaches to Cognition Symposium
Thursday, November 19, 2015
9:00 a.m.-4:30 p.m.
Williford A
www.mathpsych.org

Tactile Research Group (TRG)
Thursday, November 19, 2015
8:00 a.m.-6:00 p.m.
Joliet
http://trg.objectis.net/
Invited speakers include Morton Heller, Sliman Bensmaia, Edward Colgate, and Patrick Cabe.
Contact krista.overvliet@gmail.com or ilja.frissen@mcgill.ca

Women in Cognitive Science 15th Annual Meeting (WICS)
Thursday, November 19, 2015
4:00 p.m.-7:00 p.m.
Marquette
www.womenincogsci.org

PHOTOGRAPHIC RELEASE
As part of your registration for the 2015 Annual Meeting, the Psychonomic Society reserves the right to use photographs and video taken during the meeting for future marketing purposes. If you do not wish to have your photograph or video used for such purposes, please contact us at the registration desk.

PROGRAM AND CONFERENCE ORGANIZATION

The Secretary/Treasurer, Ruth Maki, has the responsibility for organizing the program, the Program Committee reviews the schedule, and the Convention Manager, Andrew Conway, has the responsibility for arranging facilities at the meeting. They do so with the indispensable help of Lou Shomette, executive director of the Society; Annmarie Koory, our meeting planner; Linda Potchoiba and Dennis Choi, our registrars; Kathy Kuehn, our production director; Cynthia Coates, our graphic artist; and John Hofmann, our IT and production guru.

OFFICERS OF THE SOCIETY

Chair Robert Logie,
University of Edinburgh

Past Chair Jeremy M. Wolfe,
Brigham and Women's Hospital & Harvard Medical School

Chair-Elect Cathleen Moore,
University of Iowa

Secretary/Treasurer Ruth Maki,
University of Arizona (2011-2016)
2015 GOVERNING BOARD

- Robert Logie, University of Edinburgh
- Cathleen Moore, University of Iowa
- Teresa Bajo, University of Granada
- Aaron Benjamin, University of Illinois
- John Dunlosky, Kent State University
- Fernanda Ferreira, University of California, Davis
- Colin M. MacLeod, University of Waterloo
- Janet Metcalfe, Columbia University
- Lynne Reder, Carnegie Mellon University
- Patricia Reuter-Lorenz, University of Michigan
- Valerie Reyna, Cornell University
- Ruth H. Maki, University of Arizona, ex officio

The names of two members elected to the Governing Board for 2016-2021 will be announced at the Business Meeting on Saturday, November 21.

2015 PROGRAM COMMITTEE

- Patricia Reuter-Lorenz, Chair, University of Michigan
- Teresa Bajo, University of Granada
- Michael Dodd, University of Nebraska
- Janet Metcalfe, Columbia University
- Russell Poldrack, University of Texas at Austin
- Andrew Conway, Claremont Graduate University, ex officio
- Ruth Maki, University of Arizona, ex officio

Ruth Maki, Secretary/Treasurer
Adjunct Professor, University of Arizona
2785 E. Posse Court
Green Valley, AZ 85614
rmaki@email.arizona.edu
Dr. Brown-Schmidt's research program examines the mechanisms of language use during interactive conversation. Brown-Schmidt combines techniques for studying unscripted conversation with gaze-based measures of online language processing in healthy adults and in individuals with memory impairment. Her work provides novel insights into linguistic processes and provides a test-bed for evaluating whether theories extend to language use in its most basic setting. A key focus of her work is on the role of perspective-taking in dialogue.

Dr. Casasanto's research explores how the diversity of human experience is reflected in our brains and minds: how people with different physical and social experiences come to think, feel, and act differently, in fundamental ways. To study cognitive diversity across cultures, his lab conducts research on five continents, using methods that range from analyzing spontaneous gestures to brain imaging and neurostimulation.

Dr. Payne is the Nancy O'Neill Collegiate Chair and Associate Professor in Psychology at the University of Notre Dame, where she directs the Sleep, Stress, and Memory Lab. Payne's research focuses on how sleep and stress independently and interactively influence learning, memory, and emotion. Her postdoctoral fellowship was split between Harvard University's Psychology Department and Harvard Medical School's Beth Israel Deaconess Medical Center. She holds a PhD in Psychology/Cognitive Neuroscience from the University of Arizona.

Dr. Verbruggen's contributions to psychology are in the study of "executive control" mechanisms. He examines how people withhold inappropriate or risky actions (response inhibition), suppress task-irrelevant information (interference control), and switch between tasks. He also studies how executive control and learning interact. As well as his theoretical and methodological contributions to the field, his work has opened up promising new avenues for treating impulsive disorders.
The Psychonomic Society Announces the Recipients of the

2015 MEMBER SELECT-SPEAKER AWARD

The Member Select-Speaker Awards are designed to showcase exceptional research by Members. Each award recipient will be given the unique opportunity to present his or her research in a spoken session during the conference and will be provided travel funds.

The Program Committee was responsible for the extremely difficult task of selecting the top abstracts submitted for a Member Select-Speaker Award. The main criteria for selection were overall quality of research, theoretical impact, and methodological rigor. This year’s award recipients more than satisfied these criteria and collectively represent an exciting and diverse range of research topics, including attention, memory, judgment and decision making, and language processing.

The Member Select-Speaker Awards is an annual award program. All Members are encouraged to apply for the award next year!

Miri Besken
Bilkent University
Area: Metamemory/Metacognition
Abstract #139: Generating Lies Produces Crossed Double Dissociations Between Metamemory and Memory

Sudeep Bhatia
University of Warwick
Area: Judgment
Abstract #21: A Formal Model and Test of Associative Judgment Strategies

Karl Healey
University of Pennsylvania
Area: Recall
Abstract #30: A Four-Component Model of Age-Related Memory Change

Nina Hsu
University of Maryland
Area: Psycholinguistics
Abstract #59: Real-Time Cognitive Control Engagement Modulates Recovery From Misinterpretation During Language Processing

Daniel Kleinman
University of California, San Diego
Area: Language Production/Writing
Abstract #211: Divided Attention Makes Non-Dominant Responses More Common

Beatrice G. Kuhlmann
University of Mannheim
Area: Metamemory/Metacognition
Abstract #28: If It’s Loud I’ll Remember All About It! Metacognitive Illusions About Volume in Source Monitoring

Jeff Moher
Brown University
Area: Attention: Capture
Abstract #85: Measuring Distractor Interference in Goal-Directed Action on a Trial-by-Trial Basis Reveals Selective Residual Inhibition

Eric Taylor
University of Toronto
Area: Attention: Features and Objects
Abstract #3: Object-Based Selection Is Contingent on Attentional Control Settings

Katarzyna Zawadzka
Cardiff University
Area: Recognition
Abstract #249: Late Consequences of Early Selection: When Successful Monitoring Backfires
New this year, the Psychonomic Society Program Committee selected 15 Graduate Travel Awards based on the quality of the abstracts submitted by Student Members of the Society for the 2015 Annual Meeting in Chicago, Illinois. Each recipient receives a travel stipend of $1,000 and will be recognized at the PS Business Meeting on Saturday, November 21, 2015.

Please join the Program Committee in congratulating these recipients!

Visit www.psychonomic.org/awards for additional information.

Maisy Best
University of Exeter
Abstract #1117: Automatic Stopping When Distracted

Paulo Carvalho
Indiana University
Abstract #2191: Blocked Study Results in Better Encoding of the Frequent (Non-Diagnostic) Properties of the Categories

Katherine Clark
University of Missouri-Columbia
Abstract #5086: Development of Working Memory Capacity and Precision for Tone Pitch

Taylor M. Carley
Villanova University
Abstract #4130: Overcoming Talker Variability When Learning Speech Sound Categories: A Computational Approach

Laura M. Getz
University of Virginia
Abstract #4006: The Correspondence of Pitch and Size Dimensions Is Not Automatic

Kyle Hardman
University of Missouri
Abstract #5199: Testing the Absolute Validity of Mathematical Models Used in Working Memory

Darin Hoyer
George Washington University
Abstract #3029: Distance and Direction Information in Spatial Environments

Karen L. Melrose
University of Warwick
Abstract #5190: How We Compare Our Health to Others: A Rank-Based Model of Social Comparison

Hillary Mullet
Duke University
Abstract #1070: Correcting False Memories

Matthew Kyle Robison
University of Oregon
Abstract #1030: The Neurotic Wandering Mind

Travis Morgan Seale-Carlisle
Royal Holloway, University of London
Abstract #5038: Verbal Descriptions Reduce Discriminability but the Confidence-Accuracy Relationship Is Strong

Cynthia S.Q. Siew
University of Kansas
Abstract #2145: The Influence of Network Density on Spoken Word Recognition

Amy M. Smith
Tufts University
Abstract #1069: Increasing Age-Related Memory Distortion via Stereotype Activation

Kyle Weichman
University of West Florida
Abstract #3091: The Effects of Long-Term Conceptual Knowledge and Categorical Distinctiveness on Object Bindings in Working Memory

Xin Xie
University of Connecticut
Abstract #4133: Perceptual Adaptation to Foreign-Accented Speech Reshapes the Internal Structure of Phonetic Categories
The Psychonomic Society Clifford T. Morgan Best Article Award recognizes the best article published in each of the Psychonomic Society’s journals in 2015. Selections are made by the Editor of each journal. Award recipients (the lead author) will receive a certificate and honorarium of $1,000 and will be recognized at the 56th Annual Meeting in Chicago, IL.

**Attention, Perception, & Psychophysics** (Editors Jeremy M. Wolfe & Mike Dodd)

*John F. Ackermann, Michael S. Landy*

“Suboptimal decision criteria are predicted by subjectively weighted probabilities and rewards”

DOI 10.3758/s13414-014-0779-z

---

**Behavior Research Methods** (Editor Mike Jones)

*Eric Hodgson, Eric R. Bachmann, David Vincent, Michael Zmuda, David Waller, James Calusidian*

“The affective valence of congruency conditions changes following a successful response”

DOI 10.3758/s13428-014-0463-1

---

**Cognitive, Affective, & Behavioral Neuroscience** (Editors Deanna Barch & Marie Banich)

*Nathalie Schouppe and Senne Braem, Jan De Houwer, Massimo Silvetti, Tom Verguts, K. Richard Ridderinkhof, Wim Notebaert*

“No pain, no gain: The affective valence of congruency conditions changes following a successful response”

DOI 10.3758/s13415-014-0318-3

---

**Learning & Behavior** (Editors Geoffrey Hall & Jonathon Crystal)

*Jessie J. Peissig, Y asuo Nagasaka, Michael E. Young, Edward A. Wasserman, Irving Biederman*

“Using the reassignment procedure to test object representation in pigeons and people”

DOI 10.3758/s13420-015-0173-2

---

**Memory & Cognition** (Editors James Nairne and Neil Mulligan)

*Monika Undorf, Edgar Erdfelder*

“The relatedness effect on judgments of learning: A closer look at the contribution of processing fluency”

DOI 10.3758/s13421-014-0479-x

---

**Psychonomic Bulletin & Review** (Editor Gregory Hickok)

*George Cantwell, Matthew J. Crossley, F. Gregory Ashby*

“Multiple stages of learning in perceptual categorization: Evidence and neurocomputational theory”

DOI 10.3758/s13423-015-0827-2

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Visit [http://www.psychonomic.org/clifford-t-morgan-best-article-awards](http://www.psychonomic.org/clifford-t-morgan-best-article-awards) for more information and previous recipients.
BECOMING FLUENT
How Cognitive Science Can Help Adults Learn a Foreign Language
Richard Roberts and Roger Kreuz
Becoming Fluent is written by cognitive psychologists who lucidly demonstrate how adults can successfully learn a foreign language by utilizing strategies based on reliable cognitive science and educational psychology research. The reader will understand now and why he or she can master a new language—an insight unrealized in previous texts.
—Timothy Jay, Massachusetts College of Liberal Arts, author of The Psychology of Language and Why We Curse
Hardcover $24.95 | $17.95

THE MORAL BRAIN
A Multidisciplinary Perspective edited by Jean Decety and Thalia Wheatley
An overview of the latest multidisciplinary research on human morality, capturing moral sensibility as a sophisticated integration of cognitive, emotional, and motivational mechanisms.
Hardcover $35 | $24.55

THE CONCEPTUAL MIND
New Directions in the Study of Concepts edited by Eric Margolis and Stephen Laurence
New essays by leading philosophers and cognitive scientists that present recent findings and theoretical developments in the study of concepts.
Hardcover $38.95

THE HANDBOOK OF ATTENTION edited by Jonathan M. Fawcett, Evan F. Risko, and Alan Kingstone
An authoritative overview of current research on human attention, emphasizing the relationship between cognitive phenomena observed in the laboratory and in the real world.
Hardcover $67 | $44.95

CONSCIOUSNESS, ATTENTION, AND CONSCIOUS ATTENTION
Carlos Montemayor and Harry Haroutunian Haladjian
A rigorous analysis of current empirical and theoretical work supporting the argument that consciousness and attention are largely dissociated.
Hardcover $145 | $122.95

MEMORY AND MOVIES
What Films Can Teach Us about Memory
John Seamon
“From As You Desire Me, through Rashomon, The Boume Identity, and Memento, to Trance, memory and amnesia have been themes and plot devices in films. Sometimes movies get the science right; sometimes they don’t (and sometimes it doesn’t matter). In this book, John Seamon connects science to art in a way that advances both—and suggests new themes and plots for future directors.”
—John F. Kihlstrom, University of California, Berkeley
Hardcover $29.95 | $24.35

PRODUCTIVITY AND REUSE IN LANGUAGE
A Theory of Linguistic Computation and Storage Timothy J. O’Donnell
A proposal for a formal model, Fragment Grammars, that treats productivity and reuse as the target of inference in a probabilistic framework.
316pp, 1 color illus, 41 line illus, 545 cloth

STRUCTURES IN THE MIND
Essays on Language, Music, and Cognition in Honor of Ray Jackendoff edited by Ida Toivonen, Piroksa Csík, and Emilie Van Der Zee
New research on different areas of cognition, focusing on language, with contributions that treat topics explored in Ray Jackendoff’s pioneering research.
Hardcover $59 | $43.95

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Authoritative and unrivaled, MIT CogNet is the essential research tool for scholars in the Brain and Cognitive Sciences. Since its inception in 2000, MIT CogNet has become an essential resource for those interested in cutting-edge primary research across the range of fields that study the nature of the human mind.

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FEATURES INCLUDE:

- DRM-free book, reference, and journal content
- A new, clean, modern design
- Integrated book, reference, and journal search
- New MITECS (The MIT Encyclopedia of the Cognitive Sciences)-based taxonomy for better browsing
- New state-of-the-art server and Drupal-based platform for greatly improved performance and stability

“MIT CogNet is an invaluable resource for all cognitive science research. It provides one-stop access to the best in both reference material and cutting-edge research, and is my starting point for every new project.”

— David Danks, Professor of Philosophy & Psychology, Carnegie Mellon University

cognet.mit.edu
The American Journal of Psychology

Established in 1887 by G. Stanley Hall
Editor: Robert W. Proctor
Associate Editor: Richard A. Carlson
Book Reviews: Dominic W. Massaro
History of Psychology: Katharine Milar

Selected Articles Published in 2015

Local and global task switching costs in bilinguals who vary in second language proficiency
By: Chi-Shing Tse, The Chinese University of Hong Kong and Jeanette Altarriba, University at Albany, State University of New York

Action memory and encoding time:
Evidence for a strategic view of action memory processing
By: Daniel J. Peterson, Knox College and Neil W. Mulligan, University of North Carolina at Chapel Hill

The evolution of The American Journal of Psychology 1887-1903:
A network investigation
By: Christopher D. Green, York University and Ingo Feinerer, Vienna University of Technology

The royal road to time: How understanding of the evolution of time in the brain addresses memory, dreaming, flow, and other psychological phenomena
By: Peter A. Hancock, University of Central Florida

For more information, visit
http://www.press.uillinois.edu/journals/ajp.html
The 15th Annual Meeting of Women in Cognitive Science

Thursday, November 19, 2015
Meeting: 4:00 p.m.-6:00 p.m.; Social Hour: 6:00 p.m.-7:00 p.m.
Hilton Chicago, Marquette Room

The Psychology of Negotiation: When, Why, and How

Panelists:
Randall Engle, Georgia Institute of Technology
Viorica Marian, Northwestern University
Caroline Palmer, McGill University
Suparna Rajaram, Stony Brook University

Organizers:
Natasha Tokowicz, University of Pittsburgh
Debra Titone, McGill University

WICS Officers:
Laurie Feldman lf503@albany.edu
Judith Kroll jfk7@psu.edu
Suparna Rajaram suparna.rajaram@sunysb.edu
Debra Titone dtitone@psych.mcgill.ca
Natasha Tokowicz tokowicz@pitt.edu
Janet van Hell jgv3@psu.edu

For more information, visit: http://www.womenincogsci.org/

Women in Cognitive Science is affiliated with the Psychonomic Society, and its activities are funded by the National Science Foundation’s Perception Action and Cognition program.
Attendees of the Psychonomic Society meeting are invited to attend a one-day festschrift in honor of Barbara Tversky.

What does research on space, gestures, diagrams, events, concepts & categories, and memory have in common? All touch on representations both in the world and in the mind. This connection unifies Barbara Tversky’s work.

Date: Wednesday, November 18, 2015

Time: 9:00 a.m.-5:15 p.m.

Location: Marquette, Hilton Chicago

All are welcome, but please register by emailing cbcasano@wustl.edu.

Organizers:
Holly A. Taylor (holly.taylor@tufts.edu)
Jeff Zacks (jzacks@wustl.edu)
In Memoriam

Psychonomic Society Members
July 2014-August 2015

2014

Harriett Amster (1928-2014)
Thomas K. Landauer (1933-2014)
Patrick Colonel Suppes (1922-2014)
Richard F. Thompson (1930-2014)
Jonathan Vaughan (1944-2014)

2015

George H. Collier (1921-2015)
Nicholas Mackintosh (1935-2015)
Alison Morris (1958-2015)
David Premack (1925-2015)
Keith Rayner (1943-2015)
Janet Taylor Spence (1923-2015)

To read the obituaries of the members above, please visit our website at www.psychonomic.org/obituaries.

The Psychonomic Society would like to honor members by listing obituaries on our website. If you know a member of our community who has recently passed away, please contact Lynne Reder at reder@cmu.edu with the information.

The Society will publish a short obituary of no more than 125 words with a link to a longer obituary.
THURSDAY EVENING, NOVEMBER 19, 2015

Hospitality ..................................................................................................................................................5:30 p.m.-7:30 p.m. Salon D
Poster Session I ........................................................................................................................................4:00 p.m.-7:30 p.m. Salon D

(Author present between 6:00 p.m.-7:30 p.m.)

Vision I (1001-1011) Metamemory/Metacognition I (1083-1100)
Action I (1012-1020) Human Learning and Instruction I (1101-1116)
Action and Perception (1021-1027) Cognitive Control I (1117-1135)
Emotion and Cognition (1028-1039) Attention: Capture I (1136-1148)
Associative Learning I (1040-1053) Letter and Word Processing (1149-1165)
Working Memory I (1054-1067) Bilingualism I (1166-1183)
False Memory I (1068-1082) Decision Making I (1184-1200)

Psychonomic Society Outstanding Early Career Awards .................................................................8:00 p.m. International North and South
Keynote Address ......................................................................................................................................8:00 p.m. International North and South
Opening Reception .................................................................................................................................9:00 p.m.-10:30 p.m. Continental A, B, and C

FRIDAY MORNING, NOVEMBER 20, 2015

Attention: Features and Objects (1-6) .................................................................................................8:00 a.m.-10:00 a.m. Williford
Statistics and Methodology I (7-12) ..............................................................................................8:00 a.m.-10:00 a.m. Waldorf
Letter/Word Processing (13-18) ..................................................................................................8:00 a.m.-10:00 a.m. Continental B
Judgment (19-24) .....................................................................................................................8:00 a.m.-10:00 a.m. Continental C
Metamemory/Metacognition I (25-28) ...................................................................................8:00 a.m.-9:20 a.m. International North
Recall (29-34) ....................................................................................................................8:00 a.m.-10:00 a.m. Continental C
Human Learning and Instruction I (46-50) .............................................................................10:20 a.m.-12:00 noon Continental C
Attention: Capture (51-55)............................................................................................................10:20 a.m.-12:00 noon Williford
Psycholinguistics I (56-60) .........................................................................................................10:20 a.m.-12:00 noon Marquette
Statistics and Methodology II (61-65) ......................................................................................10:20 a.m.-12:00 noon Continental B
Poster Session II ............................................................................................................................10:00 a.m.-1:30 p.m. Salon D

(Author present between 12:00 noon-1:30 p.m.)

Action II (2001-2006) Cognitive Control II (2110-2124)
Associative Learning II (2022-2026) Psycholinguistics I (2136-2148)
Cognitive Aging (2027-2039) Bilingualism II (2149-2160)
Human Learning and Instruction II (2040-2054) Neural Mechanisms of Cognition (2161-2173)
Autobiographical Memory (2055-2070) Reasoning/Problem Solving I (2174-2187)
Recognition (2071-2085) Concepts and Categories I (2188-2197)
Face Processing (2086-2096) Animal Learning and Cognition (2198-2201)
Attention: Capture II (2097-2109)

FRIDAY AFTERNOON, NOVEMBER 20, 2015

Test-Potentiated (New) Learning (66-70) .....................................................................................1:30 p.m.-3:10 p.m. Williford
Reasoning (71-76) ....................................................................................................................1:30 p.m.-3:30 p.m. Marquette
Spatial Cognition (77-82) ........................................................................................................1:30 p.m.-3:30 p.m. Continental B
Meaning/Semantics (83-87) ...................................................................................................1:30 p.m.-3:10 p.m. Continental C
Cognitive Control I (88-93) ......................................................................................................1:30 p.m.-3:30 p.m. Waldorf
Audition (94-97) ....................................................................................................................1:30 p.m.-2:50 p.m. International North
Implicit Learning and Memory (98-102) ..................................................................................3:50 p.m.-5:30 p.m. Continental B
Action (103-108) ..................................................................................................................3:30 p.m.-5:30 p.m. Continental C
Visual Search I (109-114) .........................................................................................................3:30 p.m.-5:30 p.m. Williford
LEADING EDGE WORKSHOP SYMPOSIUM: The Process of Explanation (115-121) .......3:30 p.m.-5:40 p.m. International North
Animal Learning and Cognition (122-126) ........................................................................3:50 p.m.-5:30 p.m. Marquette
Autobiographical Memory (127-131) .........................................................................................3:50 p.m.-5:30 p.m. Waldorf
FRIDAY EVENING, NOVEMBER 20, 2015

Hospitality ................................................................. 5:30 p.m.-7:30 p.m. Salon D
Poster Session III .......................................................... 4:00 p.m.-7:30 p.m. Salon D
(Author present between 6:00 p.m.-7:30 p.m.)

Vision II (3001-3008)
Action and Perception (3009-3017)
Spatial Cognition II (3018-3029)
Recall I (3030-3047)
Recognition II (3048-3060)
False Memory II (3061-3070)
Metamemory/Metacognition II (3071-3081)
Prospective Memory (3082-3089)

Working Memory II (3090-3096)
Visual Search I (3107-3124)
Attention: Features and Objects (3125-3143)
Language Production/Writing I (3144-3154)
Psycholinguistics II (3155-3171)
Reasoning and Problem Solving II (3172-3182)
Decision Making II (3183-3201)

SATURDAY MORNING, NOVEMBER 21, 2015

Vision (132-136) ................................................................. 8:00 a.m.-9:40 a.m. International North
Metamemory/Metacognition II (137-142) ......................... 10:00 a.m.-10:00 a.m. Williford
Automatic Processing (143-148) .................................. 8:00 a.m.-10:00 a.m. Continental C
Event Cognition (149-153) ............................................. 8:00 a.m.-9:40 a.m. Continental C
Neural Mechanisms of Cognition (154-159) ......................... 8:00 a.m.-10:00 a.m. Marquette
Speech Perception (160-165) ........................................ 8:00 a.m.-10:00 a.m. Continental B
SYMPOSIUM III: From Thought to Action:
Cognitive & Neural Mechanisms in Writing (166-172) ... 10:00 a.m.-12:00 noon International North
Working Memory I (173-178) ......................................... 10:00 a.m.-12:00 noon Continental C
Associative Learning (179-183) ..................................... 10:20 a.m.-12:00 noon Williford
Numerical Cognition (184-188) ........................................ 10:20 a.m.-12:00 noon Marquette
Bilingualism I (189-193) ................................................. 10:20 a.m.-12:00 noon Waldorf
Scene Processing (194-198) ............................................ 10:20 a.m.-12:00 noon Continental B
Poster Session IV ............................................................ 10:00 a.m.-1:30 p.m. Salon D
(Author present between 12:00 noon-1:30 p.m.)

Multi-Sensory Integration (4001-4014)
Event Cognition (4015-4020)
Picture and Scene Processing (4021-4028)
Recall II (4029-4044)
Testing Effects (4045-4060)
Implicit Memory (4061-4066)
Recognition III (4067-4080)
Memory and Reward,
Motivation and Emotion (4081-4093)
Consciousness (4094-4102)

Cognitive Control III (4103-4117)
Working Memory III (4118-4127)
Speech Perception I (4128-4136)
Bilingualism III (4137-4147)
Letter and Word Processing III (4148-4157)
Language Production/Writing II (4158-4168)
Neural Mechanisms of Cognition II (4169-4182)
Concepts and Categories II (4183-4194)
Reward, Motivation & Decision Making (4195-4200)

SATURDAY AFTERNOON, NOVEMBER 21, 2015

SYMPOSIUM IV: Enhancing Education Through Cognitive Psychology (199-206) ........ 1:30 p.m.-3:40 p.m. International North
Language/Production and Writing (207-212) .................... 1:30 p.m.-3:10 p.m. Waldorf
Working Memory II (213-218) ........................................ 1:30 p.m.-3:30 p.m. Continental B
Consciousness (219-223) .............................................. 1:30 p.m.-3:10 p.m. Continental C
Perceptual Organization (224-228) ................................. 1:30 p.m.-3:10 p.m. Marquette
Reading Processes (229-234) ........................................ 1:30 p.m.-3:30 p.m. Williford
Cognitive Skill Acquisition (235-240) ............................... 3:30 pm.-5:30 p.m. Continental C
Reasoning and Problem Solving (241-246) ....................... 3:30 p.m.-5:30 p.m. Marquette
Recognition I (247-251) ................................................ 3:50 p.m.-5:30 p.m. Marquette
Visual Search II (252-256) ............................................. 3:50 p.m.-5:30 p.m. Williford
Bilingualism II (257-261) ............................................. 3:50 p.m.-5:30 p.m. Continental B
Cognitive Offloading (262-264) ........................................ 4:10 p.m.-5:10 p.m. International North
Presentation of the Clifford T. Morgan 2015 Best Article Awards and Business Meeting .... 4:10 p.m.-5:10 p.m. Joliet
**SATURDAY EVENING, NOVEMBER 21, 2015**

<table>
<thead>
<tr>
<th>Event</th>
<th>Time</th>
<th>Location</th>
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</thead>
<tbody>
<tr>
<td>Hospitality</td>
<td>5:30 p.m.-7:30 p.m.</td>
<td>Salon D</td>
</tr>
<tr>
<td>Poster Session V</td>
<td>4:30 p.m.-7:30 p.m.</td>
<td>Salon D (Author present between 6:00 p.m.-7:30 p.m.)</td>
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</table>

**SUNDAY MORNING, NOVEMBER 22, 2015**

<table>
<thead>
<tr>
<th>Event</th>
<th>Time</th>
<th>Location</th>
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<tbody>
<tr>
<td>Human Learning and Instruction II</td>
<td>8:00 a.m.-9:40 a.m.</td>
<td>Williford</td>
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<tr>
<td>Discourse Processes</td>
<td>8:00 a.m.-9:40 a.m.</td>
<td>Continental C</td>
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<tr>
<td>Decision Making</td>
<td>8:00 a.m.-9:40 a.m.</td>
<td>International North</td>
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<tr>
<td>Cognitive Control II</td>
<td>8:00 a.m.-10:00 a.m.</td>
<td>Waldorf</td>
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<tr>
<td>Categorization/Conceptualization</td>
<td>8:00 a.m.-10:00 a.m.</td>
<td>Continental B</td>
</tr>
<tr>
<td>Picture Processing</td>
<td>8:00 a.m.-9:40 a.m.</td>
<td>Marquette</td>
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<tr>
<td>Recognition II</td>
<td>10:00 a.m.-12:00 noon</td>
<td>International North</td>
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<tr>
<td>Psycholinguistics II</td>
<td>10:00 a.m.-12:00 noon</td>
<td>Marquette</td>
</tr>
<tr>
<td>Working Memory III</td>
<td>10:00 a.m.-12:00 noon</td>
<td>International North</td>
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<tr>
<td>Emotion and Cognition</td>
<td>10:20 a.m.-12:00 noon</td>
<td>Continental B</td>
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<tr>
<td>Action and Perception</td>
<td>10:00 a.m.-12:00 noon</td>
<td>Continental C</td>
</tr>
<tr>
<td>False Memory/Eyewitness Identification</td>
<td>10:20 a.m.-12:00 noon</td>
<td>Waldorf</td>
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### Condensed Schedule B

<table>
<thead>
<tr>
<th>Williford</th>
<th>Waldorf</th>
<th>Continental B</th>
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<tbody>
<tr>
<td><strong>Thursday Evening, November 19</strong></td>
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<tr>
<td><strong>Friday Morning, November 20</strong></td>
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<tr>
<td>Attention: Features and Objects 8:00 a.m.-10:00 a.m.</td>
<td>Statistics and Methodology I 8:00 a.m.-10:00 a.m.</td>
<td>Letter/Word Processing 8:00 a.m.-10:00 a.m.</td>
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<tr>
<td>Attention: Capture 10:20 a.m.-12:00 noon</td>
<td>Human Learning and Instruction I 10:20 a.m.-12:00 noon</td>
<td>Statistics and Methodology II 10:20 a.m.-12:00 noon</td>
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<td><strong>Friday Noon, November 20</strong></td>
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<td><strong>Friday Afternoon, November 20</strong></td>
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<tr>
<td>Test Potentiated (New) Learning 1:30 p.m.-3:10 p.m.</td>
<td>Cognitive Control I 1:30 p.m.-3:30 p.m.</td>
<td>Spatial Cognition 1:30 p.m.-3:30 p.m.</td>
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<tr>
<td>Visual Search I 3:30 p.m.-5:30 p.m.</td>
<td>Autobiographical Memory 3:50 p.m.-5:30 p.m.</td>
<td>Implicit Learning and Memory 3:50 p.m.-5:30 p.m.</td>
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<td><strong>Friday Evening, November 20</strong></td>
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<tr>
<td><strong>Saturday Morning, November 21</strong></td>
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<tr>
<td>Metamemory/Metacognition II 8:00 a.m.-10:00 a.m.</td>
<td>Automatic Processing 8:00 a.m.-10:00 a.m.</td>
<td>Speech Perception 8:00 a.m.-10:00 a.m.</td>
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<tr>
<td>Associative Learning 10:20 a.m.-12:00 noon</td>
<td>Bilingualism I 10:20 a.m.-12:00 noon</td>
<td>Scene Processing 10:20 a.m.-12:00 noon</td>
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<td><strong>Saturday Noon November 21</strong></td>
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<tr>
<td><strong>Saturday Afternoon, November 21</strong></td>
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<tr>
<td>Reading Processes 1:30 p.m.-3:30 p.m.</td>
<td>Language/Production and Writing 1:30 p.m.-3:30 p.m.</td>
<td>Working Memory II 1:30 p.m.-3:30 p.m.</td>
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<tr>
<td>Recognition I 3:50 p.m.-5:30 p.m.</td>
<td>Visual Search II 3:50 p.m.-5:30 p.m.</td>
<td>Bilingualism II 3:50 p.m.-5:30 p.m.</td>
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<td><strong>Saturday Evening, November 21</strong></td>
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<tr>
<td><strong>Sunday Morning, November 22</strong></td>
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<tr>
<td>Human Learning and Instruction II 8:00 a.m.-9:40 a.m.</td>
<td>Cognitive Control II 8:00 a.m.-10:00 a.m.</td>
<td>Categorization/Conceptualization 8:00 a.m.-10:00 a.m.</td>
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<tr>
<td>Working Memory III 10:00 a.m.-12:00 noon</td>
<td>False Memory/Eyewitness Identification 10:20 a.m.-12:00 noon</td>
<td>Emotion and Cognition 10:20 a.m.-12:00 noon</td>
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<tr>
<td>Time</td>
<td>Location</td>
<td>Activities</td>
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<td>Thursday Evening</td>
<td>Continental B</td>
<td>Keynote Address: On Knowing That You Know- and its Functions</td>
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<td>Asher Koriat, University of Haifa</td>
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<td>Joliet</td>
<td>Hospitality</td>
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<td>5:30 p.m.-7:30 p.m.</td>
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<td>Poster Session I</td>
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<td>6:00 p.m.-7:30 p.m.</td>
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<td>International N</td>
<td>Judgment</td>
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<td>8:00 a.m.-10:00 a.m.</td>
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<td>Metamemory/Metacognition I</td>
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<td>Marquette</td>
<td>Recall</td>
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<td>8:00 a.m.-10:00 a.m.</td>
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<td>Salon D</td>
<td>SYMPOSIUM I: Individual Differences in Executive Function and Related Processes</td>
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<td>9:50 a.m.-12:00 noon</td>
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<td>Psycholinguistics</td>
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<td>Poster Session II</td>
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<td>12:00 noon-1:30 p.m.</td>
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<td>Hospitality</td>
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<td>5:30 p.m.-7:30 p.m.</td>
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<td>Poster Session III</td>
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<td>6:00 p.m.-7:30 p.m.</td>
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<td>Continental C</td>
<td>Meaning/Semantics</td>
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<td>1:30 p.m.-3:10 p.m.</td>
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<td>Action</td>
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<td>3:30 p.m.-5:30 p.m.</td>
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<td>Marquette</td>
<td>Audition</td>
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<td>1:30 p.m.-2:50 p.m.</td>
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<td>Salon D</td>
<td>Reasoning</td>
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<td>1:30 p.m.-3:30 p.m.</td>
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<td>LEADING EDGE WORKSHOP</td>
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<td>SYMPOSIUM: The Process of Explanation</td>
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<td>3:30 p.m.-5:40 p.m.</td>
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<td>Animal Learning and Cognition</td>
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<td>3:50 p.m.-5:30 p.m.</td>
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<td>Poster Session IV</td>
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<td>12:00 noon-1:30 p.m.</td>
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<td>Psycholinguistics</td>
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<td>Hospitality</td>
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<td>5:30 p.m.-7:30 p.m.</td>
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<td>Poster Session III</td>
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<td>6:00 p.m.-7:30 p.m.</td>
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<td>Continental C</td>
<td>Event Cognition</td>
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<td>8:00 a.m.-9:40 a.m.</td>
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<td>Marquette</td>
<td>Vision</td>
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<td>8:00 a.m.-9:40 a.m.</td>
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<td>Salon D</td>
<td>Neural Mechanisms of Cognition</td>
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<td>SYMPOSIUM III: From Thought to Action: Cognitive &amp; Neural Mechanisms in Writing</td>
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<td>Poster Session IV</td>
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<td>12:00 noon-1:30 p.m.</td>
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<td>10:20 a.m.-12:00 noon</td>
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<td>Business Meeting</td>
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<td>5:10 p.m.-6:00 p.m.</td>
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<td></td>
<td>International N</td>
<td>Working Memory I</td>
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<td></td>
<td>10:00 a.m.-12:00 noon</td>
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<tr>
<td></td>
<td>Marquette</td>
<td>SYMPOSIUM IV: Enhancing Education through Cognitive Psychology</td>
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### Emotion and Cognition (1028-1039)

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### Meta-memory/Meta-cognition I (1083-1100)

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### Human Learning and Instruction I (1101-1116)

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### Attention: Capture I (1136-1148)

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### Letter/Word Processing I (1149-1165)

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### Bilingualism I (1166-1183)

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<td>Jared, Xiong, Pan, Jouravlev</td>
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<td>Rickard Liow, Lee</td>
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<td>Michael, Bradley, Hefright, Saner, Mishler, Danks</td>
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<td>Garcia, Heredia, Cieslicka</td>
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<td>Kato, Baese-Berk</td>
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### Decision Making I (1184-1200)

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<tr>
<td>(1184)</td>
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<td>Bunker, Fific, Anasara, Pham</td>
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<td>Smith, Treat, McMurrory, Farmer</td>
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<td>Vanderveldt, Green, Myerson</td>
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FRIDAY, NOVEMBER 20, 2015
8:00 A.M.-12:00 NOON
SPOKEN SESSIONS (1-65)

Attention: Features and Objects (1-6) Williford
8:00 a.m.-8:15 a.m.  Awh, Foster, Serences, Vogel
8:20 a.m.-8:35 a.m.  Franconeri, Xu
8:40 a.m.-8:55 a.m.  Taylor, Rajsic, Pratt
9:00 a.m.-9:15 a.m.  Skarratt, Lindsay, Cole
9:20 a.m.-9:35 a.m.  DiLollo, Anderson
9:40 a.m.-9:55 a.m.  Matuskura, Vecera

Statistics and Methodology I (7-12) Waldorf
8:00 a.m.-8:15 a.m.  Wolfe, Reyna, Widmer, Brust-Renck
8:20 a.m.-8:35 a.m.  Voyer D, Voyer S
8:40 a.m.-8:55 a.m.  Hilbig
9:00 a.m.-9:15 a.m.  Chechile, Barch
9:20 a.m.-9:35 a.m.  Houpert, Perea, Nakayama
9:40 a.m.-9:55 a.m.  Pfennig, Johns

Letter/Word Processing (13-18) Continental B
8:00 a.m.-8:15 a.m.  Gomez, Perea, Jiménez
8:20 a.m.-8:35 a.m.  Chetail
8:40 a.m.-8:55 a.m.  Davis, Rubian, Adelman
9:00 a.m.-9:15 a.m.  Liceralde, Gordon
9:20 a.m.-9:35 a.m.  Lupker, Perea, Nakayama
9:40 a.m.-9:55 a.m.  Pfennig, Johns

Judgment (19-24) Continental C
8:00 a.m.-8:15 a.m.  Treat, Hinkel, Viken, Smith
8:20 a.m.-8:35 a.m.  Nakamura
8:40 a.m.-8:55 a.m.  Bhatia
9:00 a.m.-9:15 a.m.  Anderson, Leventhal, Fasko, Basehore, Zhang, Billman, Gamsby, Branch, Patrick
9:20 a.m.-9:35 a.m.  John, Nguyen
9:40 a.m.-9:55 a.m.  Burns

Metamemory/Metacognition I (25-28) International North
8:00 a.m.-8:15 a.m.  Higham
8:20 a.m.-8:35 a.m.  Scullin, Dasse, Nguyen, Lee, Kuhlmann
8:40 a.m.-8:55 a.m.  Hanczakowski, Beaman, Jones
9:00 a.m.-9:15 a.m.  Kuhlmann

Recall (29-34) Marquette
8:00 a.m.-8:15 a.m.  Polyn, Kragel
8:20 a.m.-8:35 a.m.  Healey, Kahana
8:40 a.m.-8:55 a.m.  Sahakyan
9:00 a.m.-9:15 a.m.  Kahana, Ezzyat, Burke
9:20 a.m.-9:35 a.m.  Farrell
9:40 a.m.-9:55 a.m.  Mulligan, Susser, Smith

SYMPOSIUM I: Individual Differences in Executive Function and Related Processes (35-40) International North
9:50 a.m.-9:55 a.m.  Banich
9:55 a.m.-10:20 a.m.  Vogel, Adam
10:25 a.m.-10:50 a.m.  Engle
10:55 a.m.-11:20 a.m.  Braver
11:25 a.m.-11:50 a.m.  Banich

Risk Taking (41-45) Continental C
10:20 a.m.-10:35 a.m.  Johnson, Busemeyer
10:40 a.m.-10:55 a.m.  Weldon, Reyna, Corbin, Setton, Blansky
11:00 a.m.-11:15 a.m.  Gloeckner, Hilbig, Henninger, Fiedler
11:20 a.m.-11:35 a.m.  Pachur, Kellen, Hertwig
11:40 a.m.-11:55 a.m.  Kusev, Love, Van Schaik

Human Learning and Instruction I (46-50) Waldorf
10:20 a.m.-10:35 a.m.  Ellefson, Ng, Wang, Hughes
10:40 a.m.-10:55 a.m.  Delaney, King, Chang, Ventura, Nelson-Gray
11:00 a.m.-11:15 a.m.  Del Missier, Sassano, Coni, Mäntylä
11:20 a.m.-11:35 a.m.  Carvalho, Braithwaite, Goldstone
11:40 a.m.-11:55 a.m.  Callender

Attention: Capture (51-55) Williford
10:20 a.m.-10:35 a.m.  Leonard, Hahn, Robinson, Luck, Gold
10:40 a.m.-10:55 a.m.  Tsal
11:00 a.m.-11:15 a.m.  Belopolsky
11:20 a.m.-11:35 a.m.  Roper, Vecera
11:40 a.m.-11:55 a.m.  Moher, Anderson, Song

Psycholinguistics I (56-60) Marquette
10:20 a.m.-10:35 a.m.  Henderson, Choi, Lowder, Ferreira
10:40 a.m.-10:55 a.m.  Feldman, Marelli, Amenta, Cho, Milin
11:00 a.m.-11:15 a.m.  Almor, Boiteau, Bennett, Peh
11:20 a.m.-11:35 a.m.  Hsu, Novick
11:40 a.m.-11:55 a.m.  Lowder, Ferreira

Statistics and Methodology II (61-65) Continental B
10:20 a.m.-10:35 a.m.  Vandekerckhove, Guan
10:40 a.m.-10:55 a.m.  Morey R, Morey C
11:00 a.m.-11:15 a.m.  Rotello, Heit, Dube
11:20 a.m.-11:35 a.m.  Rotello, Heit, Kelly
11:40 a.m.-11:55 a.m.  White

Lunchtime Workshop
National Science Foundation and European Research Council: Domestic Funding Opportunities and Support for International Collaborations Boulevard
12:00 noon-12:30 p.m.  Dissard, Logie
12:30 p.m.-1:00 p.m.  Arrington, Heit
Attention: Capture II (2097-2109)
(2097) Lutfi-Proctor, Elliott
(2099) Naylor, Lien, Ruthruff
(2100) Obana, Lim, Asplund
(2101) Buetti, Lleras
(2102) Jardim, Lien, Allen
(2103) Terzyan, Haerich
(2104) Raymond, Fitzgibbon
(2105) Barnhart, Costela, McCamy, Martinez-Conde, Macknik, Goldinger
(2106) Gaspelein, Leonard, Luck
(2107) Roach, Fraser, Kryklywy, Mitchell, Wilson
(2108) Murphy, Dalton
(2109) Huffman, Rajacic, Pratt

Bilingualism II (2149-2160)
(2149) Sullivan, Bogulski, Kamani, Bialystok
(2150) Yeh, Lu
(2151) Penalver, Francis, Rosales
(2152) Wang, Malins, Wang
(2153) Zhou, Yao, Christianson
(2154) Francis, Liao, Taylor
(2155) Fernandez, Van Hell
(2156) Eriksson Sörman, Hansson, Korning Ljungberg, Adolfsson, Nilsson
(2157) Griffin, Peña, Bedore, Hixon, Chacartegui
(2158) Link, Golonka, Michael, Richardson, Bonilla, Howell
(2159) Rochanavibhata, Atagi, Schonberg, Sandhofer
(2160) Schempp, Jackson, Van Hell

Cognitive Control II (2110-2124)
(2110) Hirsch, Goodwin
(2111) Koch C, Koch MK
(2112) Von Muhlenen, Bellaera, Srinivasan, Singh
(2113) Bangert, Espanhar, Montellano, Vera
(2114) Behmer, Crump
(2115) Sackur
(2116) Dreisbach, Fröber
(2117) Fischer, Dreisbach
(2118) Nishimura, Kuratomi
(2119) Teng, Sohn
(2120) Grundy, Keyvani, Bialystok
(2121) Wang, Vong
(2122) Tsai, Patel, Jaeggi
(2123) Tomko, Proctor
(2124) Keller, Burgard, Decurtis, Santistevan-Andrews, Keller C, Keller P, Ruthruff

Neural Mechanisms of Cognition I (2161-2173)
(2161) Mathias, Gianferrara, Gehring, Palmer
(2162) Jones, Goldinger
(2163) Felton, Chiarello
(2164) McDowell, Chiarello
(2165) Wilson, Ross, Yeung, Barense, Cowell
(2166) Klos, Nusbaum
(2167) Scolaro, Spooner
(2168) Diez, Gomez-Ariz, Diez, Alonso, Fernandez
(2169) Phillips-Meek
(2170) Lin, Li, Yu, Hung, Lin, Wu
(2171) Hoonakker, Doignon-Camus, Bacon, Bonnefond
(2172) Tiernan, Anaya
(2173) Bailey, McCarthy, Bartholow

Reasoning/Problem Solving I (2174-2187)
(2174) Cushen, Wiley
(2175) Koppel, Wiley, Storm
(2176) George, Wiley
(2177) Chrysikou, Morrow
(2178) Danek
(2179) DeWolf, Bassok, Holyoak
(2180) Frank, Touron
(2181) Jarosz, Wiley
(2182) Helder Babcock, Walsh, Wieth
(2183) Estabrook, Kershaw
(2184) Grunewald, Beeman
(2185) Jaeger, Wiley
(2186) Hinault, Badier, Baillet, Lemaire
(2187) Hannon, Daneman

Letter and Word Processing II (2125-2135)
(2125) Smith, Azzolina, Cenin, Palinski, Rotuno, Waltonen
(2126) Ferrand, Méot, Spinelli, Pallier, New, Bonin, Mathôt, Dufau, Grainger
(2127) Wear, Gorfein
(2128) Pedersen, Lien, Allen
(2129) Xiong, Proctor
(2130) Bai, Wang, Zang, Yan
(2131) Zang, Zhang, Bai, Yan, Angele, Liversedge
(2132) Drabs, Chetail, Content
(2133) Morris, Przewloka
(2134) Blazej, Cohen-Goldberg
(2135) Rice, Tokowicz, Fraudorf, Liburd

Concepts and Categories I (2188-2197)
(2188) Olcaysoy Okten, Moskowitz
(2189) Clapper, Myer
(2190) Graham, Little
(2191) Carvalho, Goldstone
(2192) Boomer, Church, Smith
(2193) Conaway, Kurtz
(2194) Landrigan, Mirman
(2195) Szymula, Hutchinson, Heikkenen, Helie, Ell
(2196) Austerweil, Qian
(2197) Sana, Yan, Kim, Bjork E, Bjork R

Psycholinguistics I (2136-2148)
(2136) Galinsky, Berkhound, Stokes
(2137) Kemp, McDonald
(2138) Cohen-Shikora, Balota
(2139) Heyman, Hutchison, Storms
(2140) Sneljella, Kuperman
(2141) Folk, Toscano
(2142) Sidhu, Saint-Aubin, Pexman
(2143) Preziosi, Coane
(2144) Yip, Zhai
(2145) Siew, Vitevitch
(2146) Park, Gagne, Spalding
(2147) Li, Slev
(2148) Yee, Molnar
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<th>Time</th>
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<tr>
<td>1:30 p.m.</td>
<td>Test-Potentiated (New) Learning (66-70)</td>
<td>Williford</td>
<td>Szpunar, Jing, Schacter</td>
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<td>1:50 p.m.</td>
<td>Implicit Learning and Memory (98-102)</td>
<td>Continental B</td>
<td>Hall, Eigsti, Bortfeld, Lillo-Martin</td>
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<td>2:10 p.m.</td>
<td>Reasoning (71-76)</td>
<td>Marquette</td>
<td>Arnold, Vozzo, Welch, McCann, Prike</td>
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<td>2:10 p.m.</td>
<td>Action (103-108)</td>
<td>Continental C</td>
<td>Bridgeman</td>
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<td>2:30 p.m.</td>
<td>Spatial Cognition (77-82)</td>
<td>Continental B</td>
<td>Ruginski, Stefanucci, Creem-Regehr</td>
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<td>2:30 p.m.</td>
<td>Visual Search I (109-114)</td>
<td>Williford</td>
<td>Cain, Wolfe</td>
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<td>2:50 p.m.</td>
<td>Spatial Cognition (77-82)</td>
<td>Continental B</td>
<td>Ruginski, Stefanucci, Creem-Regehr</td>
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<td>3:10 p.m.</td>
<td>Meaning/Semantics (83-87)</td>
<td>Continental C</td>
<td>Westbury, Garcia</td>
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<td>3:10 p.m.</td>
<td>Animal Learning &amp; Cognition (122-126)</td>
<td>Marquette</td>
<td>Miller, Polack, O’Hara</td>
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<td>3:50 p.m.</td>
<td>Cognitive Control I (88-93)</td>
<td>Waldorf</td>
<td>Verbruggen, Logan</td>
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<td>4:10 p.m.</td>
<td>Autobiographical Memory (127-131)</td>
<td>Waldorf</td>
<td>Conway, Sauer</td>
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<td>4:30 p.m.</td>
<td>Audition (94-97)</td>
<td>International North</td>
<td>Hickok, Farahbod, Saberi, Bowers, Kazana, Andermane, Greenlee, Boles</td>
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<td>4:30 p.m.</td>
<td>Audition (94-97)</td>
<td>International North</td>
<td>Lima, Lavan, Evans, Agnew, Halpern, Shannmugalingam, Meekings, Boebinger, Ostawek, McGettigan, Warren, Scott</td>
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<td>5:10 p.m.</td>
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**FRIDAY, NOVEMBER 20, 2015**

**1:30 P.M.-5:30 P.M.**

**SPOKEN SESSIONS (66-131)**

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**xxix**
Vision II (3001-3008)
(3001) Caparos, Linnell, Blanchette
(3002) Tokita, Ishiguchi
(3003) Schramski, Newell, Ziat
(3004) Sutter, Schulte, Granowski
(3005) Wagman, Schloesser, Stoffregen
(3006) Yokosawa, Harada, Asano
(3007) Sweeny, Mihalache
(3008) Adkins, Norman

Action and Perception II (3009-3017)
(3009) Slifkin, Dey, Summers
(3010) Suh, Abrams
(3011) Caputo, Stoffregen, Wagman
(3013) Sim, Wu, Klatzky
(3014) Miles, Lee, Vu
(3015) Demos, Wanderley, Palmer
(3016) Rand, Creem-Regehr, Thompson
(3017) Kumar, Masson, Bub

Spatial Cognition II (3018-3029)
(3018) He, McNamara, Kelly
(3019) Fu, Roskos, Sickler
(3020) Galeucia, Adams, Carlson, Miller, Tenbrink
(3021) Sjolund, Kelly, McNamara
(3022) Blacker, Weisberg, Newcombe, Courtney
(3023) Mou, Zhang
(3024) Roskos, Whitham, Steele
(3025) Sargent, Kellis, Richmond, Zacks
(3026) Richmond, Sargent, Flores, Zacks
(3027) Carlson, Kolesari, Galeucia, Adams
(3028) Zhou, Mou
(3029) Hoyer, Dopkins

Recall I (3030-3047)
(3030) Divis, Benjamin
(3031) Wammes, Fernandes
(3032) Hupbach, Scully
(3033) Wilson, Criss
(3034) Pettijohn, Radvansky
(3035) Rummel, Marevic, Kuhlmann
(3036) Aguierre, Gómez-Ariza, Bajo
(3037) Soares, Strom
(3038) Migueles, Garcia-Bajos, Aizpurua
(3039) Liu, Clark, Edgin
(3040) Wahlheim, Huff, Richmond
(3041) Schute, Degirolamo
(3042) Corina, Hickok, Pedersen, Farnady, Bellugi
(3043) Sederberg, Smith
(3044) Jonker, Schacter, MacLeod
(3045) Leppanen, Lyle
(3046) Dianiska, Meissner
(3047) Colyn, Anderson

Recognition II (3048-3060)
(3048) Rhoten, Destefano, Curran, Totfely, Wetmore, Gronlund, Wenger
(3049) Rollins
(3050) Morcom, Affleck-Brodie, Keating
(3051) Kantner, Grybinas, Dobbins
(3052) Annis, Dube, Malmberg
(3053) Malejka, Bröder
(3054) Åffalg, Bernstein, Hockley
(3055) Guevara Pinto, Papesh
(3056) McCurdy, Leach, Leshikar
(3057) Burke, Williams, Kent
(3058) Shi, Brown
(3059) Freeman, Tillman
(3060) Fallow, Rabe, Lindsay

False Memory II (3061-3070)
(3061) Calvillo, Parong, Peralta, Ocampo, Van Gundy
(3062) Olszewska, Ulatowska
(3063) Tat, Soonsawat, Nagle, Vassey, Soloman, Hudson
(3064) Ulatowska, Olszewska
(3065) Huff, Umanath, Balota
(3066) Numbers, Meade, Barnier
(3067) Moore, Lampinen, Freund
(3068) Jones, Eakin
(3069) Arndt, Valle Flores, Goodfriend, Rea
(3070) Schnyer, Griffin

Metamemory/Metacognition II (3071-3081)
(3071) Cleary, Staley
(3072) Claxton, Cleary
(3073) Hausman, Kernell
(3074) Witherby, Tauber
(3075) Griffiths, Higham
(3076) De Jonge, Van Eersel, Pecher, Verkoeijen, Tabberson
(3077) Fenn, Abed, Pedzdek
(3078) Susser, Jim, Mulligan
(3079) Tones, Miller
(3080) Noh, Kerr, Blake, Castel
(3081) Cohen, Rissman, Castel, Hovhannisyan, Knowlton

Prospective Memory (3082-3089)
(3082) Reese-Melancon, Hancock, Kytola, Kominsky
(3083) Spitter, Cohen, Hicks
(3084) Dasse, Scullin
(3085) Underwood, Guyan
(3086) Brunsmann, Smith, Hunt
(3087) Conte, McBride, Abney
(3088) Cook, Rummel, Dummel
(3089) Williams, Adams
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<td>(3144) Pivnev, Free, Titone</td>
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<td>(3091) Weichman, Blacock</td>
<td>(3145) Vaughn, Baese-Berk, Idemaru</td>
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<td>(3092) Tsubomi, Fukuda, Kikumoto, Vogel</td>
<td>(3146) Li, Wang, Kronrod, Davis</td>
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<td>(3093) Scott, Rouddenrys, Miller</td>
<td>(3147) Navarro-Torres, Dussias, Kroll</td>
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<td>(3094) Rhodes, Parra, Cowan, Logie</td>
<td>(3148) Shiramizu, Terai, Wang, Nakagawa</td>
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<td>(3095) Isingrini, Doiseau, Angel, Fay, Bouzzaoui</td>
<td>(3149) Schmidtke, Kuperman</td>
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<td>(3096) Stephenson, Jaeggi, Buschkuhl</td>
<td>(3150) Weekes, Kuzmina</td>
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<td>(3097) Sandry</td>
<td>(3151) Ostrand, Bergen, Ferreira</td>
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<td>(3098) Dixon</td>
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<td>(3153) Lau, Kong, Law</td>
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<td>(3100) Kazanas, Van Valkenburg, Altarriba</td>
<td>(3154) Warker, Fischer-Baum, Della Posta, Rodemann</td>
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<td>(3101) Gunseli, Fahrenfort, Daoulitzis, Olivers, Meeter</td>
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<td>(3102) Bhandari, Fugate, Badre</td>
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<td>(3103) Mizrak, Singmann, Östekin</td>
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<td>(3104) Lillenthal, Myerson, Abrams, Hale</td>
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<td>(3105) Miller, Donaghy, Rouddenrys</td>
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<td>(3106) Yonehiro, Shipstead</td>
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<td><strong>Visual Search (3107-3124)</strong></td>
<td><strong>Psycholinguistics II (3155-3171)</strong></td>
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<td>(3107) Hahn, Buttaccio</td>
<td>(3155) Tao, Healy</td>
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<td>(3108) Tan, Mueller</td>
<td>(3156) Leinenger</td>
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<td>(3109) Chan, Rajscie, Pratt</td>
<td>(3157) Abbott, Staub</td>
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<td>(3110) Schubö, Feldmann-Wüstefeld</td>
<td>(3158) Breen, Kniefel</td>
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<td>(3111) Zhang, Onypper</td>
<td>(3159) Choi, Lowder, Henderson</td>
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<td>(3112) Peltier, Becker, Wilutis</td>
<td>(3160) Vinson, Dale</td>
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<td>(3113) Reimer, Schubert, Stobach</td>
<td>(3161) Pancani, Gordon, Hoedemaker, Lowder, Moore</td>
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<td>(3114) Walenchok, Godwin, Houpt, Hout, Goldinger</td>
<td>(3162) Maionchi-Pino, Carmona</td>
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<td>(3115) Tellinghuisen, Lewis</td>
<td>(3163) Brehm, Goldrick</td>
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<td>(3116) Burnham</td>
<td>(3164) Jones, Foster, Kim</td>
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<td>(3117) Ericson, Winkle, Mitroff</td>
<td>(3165) Rommers, Dickson, Norton, Wlotko, Federmeyer</td>
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<td>(3118) Byrne, Wesner</td>
<td>(3166) Christianson, Luke, Hussey</td>
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<td>(3120) Semizer, Michel</td>
<td>(3168) Lorimor, Jackson, Domke, Spalek, Van Hell</td>
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<td>(3169) Ryskin, Qi, Brown-Schmidt</td>
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<td>(3122) Patten, Spalek</td>
<td>(3170) Tanner, Bulkes</td>
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<td>(3123) Godwin, Menneer, Liversedge, Cave, Holliman, Donnelly</td>
<td>(3171) Schwartz, Schleicher</td>
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<td>(3124) Robbins, Hout, Fitzsimmons, Menneer, Godwin</td>
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<td><strong>Attention: Features and Objects (3125-3143)</strong></td>
<td><strong>Reasoning and Problem Solving II (3172-3182)</strong></td>
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<td>(3125) Takeno, Ueno, Suzuki, Kitagami</td>
<td>(3172) Swan, Hill, Revlin</td>
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<td>(3126) Lindsey, Logan</td>
<td>(3173) Michal, Shah, Franconeri</td>
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<td>(3127) Chen, Wyble</td>
<td>(3174) Wiemer, Asiala, Neal</td>
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<td>(3128) Vanaelst, Spruyt, Everaert, De Houwer</td>
<td>(3175) Taylor, Young</td>
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<td>(3129) Greenberg, Nicora</td>
<td>(3176) Ramey, Durbin</td>
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<td>(3130) Harding, Shiffrin, Bertenthal</td>
<td>(3177) Thorstad, Wolff</td>
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<td>(3131) Kendall, Kingstone, Todd</td>
<td>(3178) Atchley, Bailey</td>
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<td>(3132) Young, Carlson, Weatherford, Carlson, Bednarz, Mayberry, Wooten</td>
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<td>(3133) Murchison, Proctor</td>
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<td>(3134) Rosen, Mills, Dodd</td>
<td>(3181) Prike, Arnold, Williamson</td>
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<td>(3135) Dopkins, Hoyer</td>
<td>(3182) Langston, Hubbard</td>
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<td>(3136) Niimi</td>
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<td>(3137) Lunau, Habekost</td>
<td><strong>Decision Making II (3183-3201)</strong></td>
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<td>(3138) Lagroix, Di Lollo, Spalek</td>
<td>(3183) Buttaccio, Dougerty, Thomas, Hamovitz</td>
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<td>(3139) Constable, Welsh, Pratt</td>
<td>(3184) Ploran, Trasciatti, Farmer</td>
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<td>(3140) Ishikawa, Okubo</td>
<td>(3185) Joslyn, Grounds</td>
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<td>(3141) Purcell, Stewart</td>
<td>(3186) Meek, Wortman</td>
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<td>(3142) Mitsuda, Yamamoto</td>
<td>(3187) Isham, Wulf</td>
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<td>(3143) Malcolm, Nah, Sheremata, Shomstein</td>
<td>(3188) Taddese, Fournier</td>
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<td>(3189) Voskuilen, Ratcliff</td>
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<td>(3190) Potter, Van Zandt</td>
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<td>(3192) Trueblood, Holmes, Heathcote</td>
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<td>(3196) Kleitman, Jackson, Aidman</td>
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<td>(3197) Hart, Avrahami, Kareev</td>
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<td>(3198) Pang, Blanco, Maddox, Worthy</td>
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<td>(3199) Freund, Berkowitz, Loftus, Fenn</td>
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<td>(3200) Schloss, Heck, Nelson</td>
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<td>(3201) Henninger, Fiedler, Gloeckner, Hilbig</td>
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</tbody>
</table>
### SATURDAY, NOVEMBER 21, 2015
8:00 A.M.-12:00 NOON
SPOKEN SESSIONS (137-198)

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<tr>
<th>Time</th>
<th>Session</th>
<th>Location</th>
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<tbody>
<tr>
<td>8:00 a.m.</td>
<td><strong>Metamemory/Metacognition II (137-142)</strong></td>
<td>Williford</td>
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<tr>
<td>8:00 a.m.</td>
<td><strong>Automatic Processing (143-148)</strong> Waldorf</td>
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<td>8:00 a.m.</td>
<td><strong>Event Cognition (149-153)</strong> Continental C</td>
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<td>8:00 a.m.</td>
<td><strong>Neural Mechanisms of Cognition (154-159)</strong></td>
<td>Marquette</td>
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<td>8:00 a.m.</td>
<td><strong>Speech Perception (160-165)</strong> Continental B</td>
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<tr>
<td>10:00 a.m.</td>
<td><strong>Working Memory I (173-178)</strong> Continental C</td>
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<td>10:00 a.m.</td>
<td><strong>Associative Learning (179-183)</strong> Williford</td>
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<tr>
<td>10:00 a.m.</td>
<td><strong>Numerical Cognition (184-188)</strong> Marquette</td>
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<tr>
<td>10:00 a.m.</td>
<td><strong>Bilingualism I (189-193)</strong> Waldorf</td>
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<tr>
<td>10:00 a.m.</td>
<td><strong>Scene Processing (194-198)</strong> Continental B</td>
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<tr>
<td>10:00 a.m.</td>
<td><strong>Psychonomics and Social Media</strong> Joliet</td>
<td></td>
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</tbody>
</table>

**Metamemory/Metacognition II (137-142) Williford**
- 8:00 a.m.-8:15 a.m. Etchison, Oppenheimer
- 8:20 a.m.-8:35 a.m. Akdogan, Izaute, Bacon
- 8:40 a.m.-8:55 a.m. Besken
- 9:00 a.m.-9:15 a.m. Chua, Solinger
- 9:20 a.m.-9:35 a.m. Muntean, Kimball, Bobbit
- 9:40 a.m.-9:55 a.m. Ackerman, Parush, Nassar, Shhtub

**Automatic Processing (143-148) Waldorf**
- 8:00 a.m.-8:15 a.m. Logan
- 8:20 a.m.-8:35 a.m. Yamaguchi, Logan
- 8:40 a.m.-8:55 a.m. Schneider
- 9:00 a.m.-9:15 a.m. Thomaschke, Hoffmann, Haering, Kiesel
- 9:20 a.m.-9:35 a.m. Besner, White
- 9:40 a.m.-9:55 a.m. Kinoshita, Norris

**Event Cognition (149-153) Continental C**
- 8:00 a.m.-8:15 a.m. Huff, Vanes, Meyerhoff
- 8:20 a.m.-8:35 a.m. Kersten, Earles, Negri
- 8:40 a.m.-8:55 a.m. Cutting, Armstrong
- 9:00 a.m.-9:15 a.m. Rendell, Pedder, Labuschagne, Terrett, Bailey, Henry
- 9:20 a.m.-9:35 a.m. Graf

**Neural Mechanisms of Cognition (154-159) Marquette**
- 8:00 a.m.-8:15 a.m. Kiat, Belli
- 8:20 a.m.-8:35 a.m. West, Bailey, Huet
- 8:40 a.m.-8:55 a.m. Tsukahara, Harrison, Engel
- 9:00 a.m.-9:15 a.m. Durgin, Tawa, Sikos, Thibodeau
- 9:20 a.m.-9:35 a.m. Dunbar, Forster
- 9:40 a.m.-9:55 a.m. Casasanto Brookshire

**Speech Perception (160-165) Continental B**
- 8:00 a.m.-8:15 a.m. Caselli, Cohen-Goldberg
- 8:20 a.m.-8:35 a.m. Keetels, Stekelenburg, Schakel, Bonte, Vroomen
- 8:40 a.m.-8:55 a.m. Ingvalson, Nowicki, Zong, Wong
- 9:00 a.m.-9:15 a.m. Dilley, Pitt, Viswanathan, Sanders
- 9:20 a.m.-9:35 a.m. Baese-Berk, Samuel
- 9:40 a.m.-9:55 a.m. Mattys, Strori, Zaar

**SYMPOSIUM III: From Thought to Action: Cognitive & Neural Mechanisms in Writing (166-172) International North**
- 10:00 a.m.-10:10 a.m. Rapp
- 10:10 a.m.-10:25 a.m. Damian
- 10:30 a.m.-10:45 a.m. Rapp
- 10:50 a.m.-11:05 a.m. Treiman, Kessler, Decker, Pollo
- 11:10 a.m.-11:25 a.m. James
- 11:30 a.m.-11:45 a.m. McCloskey
- 11:50 a.m.-12:00 p.m. Rapp
### Condensed Schedule C

**SATURDAY, NOVEMBER 21, 2015**

**POSTER SESSION IV (4001-4200)**

**SALON D**

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<td>(4002) Martínez-Valdes, Baroja-Manzano, Tover y Romo, Palafoux</td>
<td>(4046) Jing, Schacter, Szpunar</td>
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<td>(4003) Kunz, O’Mera</td>
<td>(4047) Pan, Gopal, Rickard</td>
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<td>(4004) Higashiyama</td>
<td>(4048) Avci, Woods, Cameron, Sheppard, Sumowski, Chiaravalloti, DeLuca</td>
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<td>(4005) Kanaya, Ueda, Tochiya, Yokosawa</td>
<td>(4049) Pan, Pashler, Rickard</td>
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<td>(4006) Getz, Shanahan, Kubovy</td>
<td>(4050) Waddill, Lee</td>
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<td>(4007) Asano, Takahashi, Yokosawa</td>
<td>(4051) Soderstrom, Seneviratna, Kerr, Bjork</td>
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<td>(4008) Greenspon, Pfordresher, Halpern</td>
<td>(4052) Pirozzolo, Foss</td>
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<td>(4009) Dias, Rosenblum</td>
<td>(4053) Huff, Hutchison, Balota</td>
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<td>(4010) Wendorf, Lupyan</td>
<td>(4054) Stanley, Benjamin</td>
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<td>(4011) Hagnann, Russo</td>
<td>(4055) Cho</td>
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<td>(4012) Misceo</td>
<td>(4056) Neill, Kleinsmith</td>
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<td>(4013) Caissie, Naefgen, Janczyk</td>
<td>(4057) Bates, Delosh</td>
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<td>(4014) Kumakura, Muto, Yokosawa</td>
<td>(4058) Pierce, Hawthorne, McCain, Gallo</td>
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<td><strong>Event Cognition (4015-4020)</strong></td>
<td>(4059) Sparck, Bjork E, Bjork R</td>
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<td>(4015) Yang, Gelman</td>
<td>(4060) Aue, Criss, Spangler, Karpicke, Mehanovic</td>
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<td>(4016) Bezdek, Keilholz, Schumacher</td>
<td><strong>Implicit Memory (4061-4066)</strong></td>
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<td>(4017) Kim, Hommel</td>
<td>(4061) Held, Coutinho, Hoelter, Greene</td>
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<td>(4018) Maurer, Huff, Brich</td>
<td>(4062) Tane, Michimata</td>
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<td>(4019) Hall, Peck, Gaston, Dickerson</td>
<td>(4063) Shin</td>
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<td>(4020) Magliano, Clinton, Winer, Young, Ackerman, Kurby</td>
<td>(4064) Hubbard, Federmeier</td>
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<td><strong>Picture and Scene Processing (4021-4028)</strong></td>
<td>(4065) Ueda</td>
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<td>(4021) Inomata, Kitagami, Hayashi</td>
<td>(4066) Ragó, Czet, Somos, Varga</td>
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<td>(4022) Lindell</td>
<td><strong>Recognition III (4067-4080)</strong></td>
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<td>(4067) Sabia, Hupbach</td>
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<td>(4024) Mamus, Boduroglu, Guthchess</td>
<td>(4068) Popov, Hristova, Anders</td>
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<td>(4025) Didierjean, Thomas</td>
<td>(4069) Lloyd, Ngo</td>
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<td>(4026) Matsuda, Kuroda, Kusumi, Tsuji</td>
<td>(4070) Gloede, Paulauskas, Gregg</td>
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<td>(4027) Caulfield, Foundas, Joshi, Barrett</td>
<td>(4071) Meyerhoff, Huff</td>
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<td>(4028) Gora, Myers</td>
<td>(4072) Jones, Pyc</td>
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<td><strong>Recall II (4029-4044)</strong></td>
<td>(4073) Cao, Shiffrin, Nosofsky</td>
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<td>(4029) Diez, Alonso, Diez, Fernandez</td>
<td>(4074) Quamme, Marks, Kurby</td>
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<td>(4030) Zeelenberg, Pecher</td>
<td>(4075) Meade, Fernandes</td>
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<td>(4031) Brown, Baldwin, Fields</td>
<td>(4076) Kilic</td>
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<td>(4032) Sebrechts, Freedman</td>
<td>(4077) Forrin, MacLeod</td>
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<td>(4033) Jacobs, Dell, Bannard, Benjamin</td>
<td>(4078) Curl, Sloane, White</td>
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<td>(4034) Palmer, Goodwin</td>
<td>(4079) Gomez, Brainerd</td>
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<td>(4035) Johnson, Dygacz, Moss, Miles</td>
<td>(4080) Kuhn, Mickes, Wixted</td>
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<td>(4036) Maxwell, Engle, Shipstead</td>
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<td>(4037) Sahakyan, Kwapil</td>
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<td>(4038) Cantor, Marsh</td>
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<td>(4039) Kelley, Neath, Suprenant</td>
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<td>(4040) Williams, Harris, Barnier</td>
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<td>(4041) Schroeder, Marian</td>
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<td>(4042) Holmes, Marchette, Newcombe</td>
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<td>(4043) Zhao, Tomm, Fung</td>
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<td>(4044) Kelley, Komsky, Negley</td>
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</table>
### Memory & Reward, Motivation & Emotion (4081–4093)

| Course          | Authors                                                                 
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<tr>
<td>(4081)</td>
<td>Hwang, Liu, Lai, Hsu</td>
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<td>(4082)</td>
<td>Lin, Reuter-Lorenz</td>
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<td>(4084)</td>
<td>Van Dessel, DeHouwer, Gast, Smith, de Schryver</td>
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<td>Mason, Ludwig, Farrell</td>
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<td>Emery, Pechanek, Falceto, Lippard, Long</td>
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### Working Memory III (4118–4127)

<table>
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<tr>
<td>(4118)</td>
<td>Maraver Romero, Olivencia, Bajo, Rueda, Gomez-Ariza</td>
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<td>(4119)</td>
<td>Cooke, Katz, Moored, Buschkuehl, Jaeggi, Peltier, Polk, Jonides, Reuter-Lorenz</td>
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<td>(4120)</td>
<td>Harbison, Dougherty, Colflesh</td>
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<td>Shelton, Christopher</td>
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<td>Jantz, Festini, Reuter-Lorenz</td>
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<td>Chalmers, Freeman, Pritchard</td>
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<td>(4125)</td>
<td>Adam, Vogel</td>
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### Speech Perception I (4128–4136)

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<tr>
<td>(4128)</td>
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<td>Meza-Gonzalez, Myers</td>
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<td>Chan, Jalil, Dailey, Mathers</td>
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### Cognitive Control III (4103–4117)

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<tr>
<td>(4103)</td>
<td>Steele, Intraigo, Stenborg, Roper, Pennington, Vettorazzi</td>
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<td>Chein, Wilmer</td>
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<td>Ashitaka, Shimada</td>
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<td>(4106)</td>
<td>Atalay, Misirlisoy</td>
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<td>(4107)</td>
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<td>(4108)</td>
<td>Ferlazzio, Pecchinenda, Sdoia</td>
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<td>(4110)</td>
<td>Han, Viau-Quesnel, Xi, Schweickert, Fortin</td>
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<td>(4111)</td>
<td>Thomson, Besner, Smilek</td>
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<td>Wimers, Redick</td>
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<td>Bernhardt, Salomon, Lindberg, Baumler, Poolman, Ferraro</td>
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<td>Koshino, Clapper, Sierra, Alderson, Buitron, Harmony</td>
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### Consciousness (4094–4102)

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<th>Course</th>
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<tr>
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<td>Fisk, Haase</td>
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<td>Klein, Stolz</td>
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<td>Sherman, Greenberg</td>
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### Bilingualism III (4137–4147)

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<tr>
<td>(4137)</td>
<td>Jackson, Hotchner, Gredinus, Gullberg</td>
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<td>Comeux, McDonald</td>
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<td>Bice, Weekes, Zirnstein, Kroll</td>
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<td>(4140)</td>
<td>Vaid, Lopez</td>
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<td>Foucart, Romero Rivas, Gort, Costa</td>
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<td>(4142)</td>
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<td>Von Bastian, De Simoni, Kane, Carruth, Miyake</td>
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<td>Wodniecka, Bobb, Szewczyk, Zeelenberg, Timmer, Marzecová, Taft, Green, Kroll</td>
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<td>(4145)</td>
<td>Mallikarjun, Newman, Novick</td>
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<td>(4146)</td>
<td>Hughes, Schnur</td>
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### Letter/Word Processing III (4148–4157)

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<tr>
<td>(4148)</td>
<td>Yap, Lim, Pexman</td>
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<td>Harris, Perfetti</td>
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<td>Martin</td>
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<td>Eskenazi, Folk</td>
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<td>Barrington, Drieghe, Liversedge, Kirkby</td>
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<td>Ashby, Pagan, Gagnon, Agauas</td>
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<td>(4155)</td>
<td>Hino, Kusunose, Lupker</td>
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<td>(4156)</td>
<td>Kovaz, Wilson, Rogers, Dahlke, Black, Sable, Kreuz</td>
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<td>Nadler, Pardo, Minda</td>
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Language Production/Writing II (4158-4168)
(4158) Ivanova, Ferreira
(4159) Frazer, O'Seaghdha
(4160) Oliver, Humphreys
(4161) James, Metz
(4162) Goring, James
(4163) Anderson, Holmes, Dell
(4164) Roomers, Meyer, Praamstra
(4165) Nozari, Freund, Breining, Rapp, Gordon
(4166) Kaschak, Kutta, Porcellini
(4167) Krause, Kawamoto
(4168) Wei, Schnur

Neural Mechanisms of Cognition II (4169-4182)
(4169) Callahan-Flintoft, Wyble
(4170) Rogers, Drummey, Kan
(4171) Kawasaki, Miyauichi
(4172) Sutterer, Foster, Serences, Vogel, Awh
(4173) McCoy, Young
(4174) Gokce, Geyer, Finke, Müller, Töllner
(4175) Eghbalzad, Deocampo, Conway
(4176) Morales, Hubbard, Kikumoto, Mayr
(4177) Ross, Daltrozzo, Conway
(4178) Smith, Conway
(4179) Kim, Shikareva, Wedell
(4180) Bolger, Feola, Hamovitz, Atkins, Sprenger, Dougherty
(4181) Meyering, Rose, Dang, Buchsbaum, Baker, Rosenbaum, Postle
(4182) Hogeveen, Grafman, David, Bikson, Hauner

Concepts and Categories II (4183-4194)
(4183) Heffner, Idsardi, Newman
(4184) Corral, Healy, Jones
(4185) Noll, Vlach, Kalish
(4186) Byrne Davis, Worthy
(4187) Neal, Wiemer, Asiaia
(4188) Lancaster, Homa
(4189) Dieciuc, Folstein, Kaschak
(4190) Humel, Gray
(4191) Wölters, MacPherson, You, Jin, Baek, Park
(4192) Yamakawa, Kiyokawa
(4193) Nisbet, Chamberlain, Gagne, Spalding
(4194) Galotti, Schneekloth, Mansour, Wheatman

Reward, Motivation and Decision Making (4195-4200)
(4195) Ballard, Neal, Farrell
(4196) Williams, Nesbitt, Heathcote, Eidels
(4197) Yee, Braver
(4198) Tardiff, Thompson-Schill
(4199) Schomaker, Einhäuser, Wittmann
(4200) Kwak, Yun, Kwon, Jeong, Huettel
## SYMPOSIUM IV: Enhancing Education Through Cognitive Psychology (199-206) International North

<table>
<thead>
<tr>
<th>Time</th>
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<tr>
<td>1:30 p.m.</td>
<td>Healy</td>
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<tr>
<td>1:35 p.m.</td>
<td>Jones, Healy, Tack, Corral, Lalchandani, Rozbruch</td>
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<tr>
<td>1:50 p.m.</td>
<td>Bjork, Soderstrom, Little, Sparck</td>
</tr>
<tr>
<td>2:10 p.m.</td>
<td>Goldstone, Landy, Ottmar, Weitnauer, Bailey</td>
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<tr>
<td>2:30 p.m.</td>
<td>Gureckis, Chan, Markant, Lake</td>
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<tr>
<td>2:50 p.m.</td>
<td>McDaniell, Frey, Cahill, Zhao, Ruvolo, Rauch</td>
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<tr>
<td>3:10 p.m.</td>
<td>Metcalfe</td>
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<td>3:30 p.m.</td>
<td>Mozer</td>
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## Language/Production and Writing (207-212) Waldorf

<table>
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<tr>
<td>1:30 p.m.</td>
<td>Fink, Goldrick</td>
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<td>Dumay, Aristei</td>
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<td>2:10 p.m.</td>
<td>Redick</td>
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<td>2:30 p.m.</td>
<td>Kleinman, Gollan, Ferreira</td>
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<td>2:50 p.m.</td>
<td>White, Hohlt, Hsi, Abrams</td>
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## Working Memory II (213-218) Continental B

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<tr>
<td>1:30 p.m.</td>
<td>Lewandowsky, Oberauer</td>
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<td>Vandierendonck</td>
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<td>2:10 p.m.</td>
<td>Redick</td>
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<td>2:30 p.m.</td>
<td>Oberauer, Lewandowsky</td>
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<td>2:50 p.m.</td>
<td>Morey, Miron</td>
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<tr>
<td>3:10 p.m.</td>
<td>Osaka, Yao, Minamoto, Osaka</td>
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## Consciousness (219-223) Continental C

<table>
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<td>1:30 p.m.</td>
<td>Lappin, Morse, Seiffert</td>
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<td>Hyman, Jallbert, Blythe</td>
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<td>Ma, Zhang, Hommel</td>
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<td>2:30 p.m.</td>
<td>Dulaney</td>
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<td>Stevenson, Carlson</td>
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## Perceptual Organization (224-228) Marquette

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<td>1:30 p.m.</td>
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<td>Eidelis, Hawkins, Houpt, Townsend</td>
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<td>Reeves, Lei</td>
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<td>Overvliet, Plaisier</td>
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## Reading Processes (229-234) Williford

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<td>Blythe, Dickins, Kennedy, Liversedge</td>
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<td>Angele, Slattery, Rayner</td>
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## Cognitive Offloading (262-264) International North

<table>
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<tr>
<td>4:10 p.m.</td>
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<td>Storm, Stone, Benjamin</td>
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<td>Gilbert</td>
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## Business Meeting Joliet

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<tr>
<td>5:10 p.m.</td>
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<td>5:20 p.m.</td>
<td>Logie</td>
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SATURDAY, NOVEMBER 21, 2015
6:00 P.M.-7:30 P.M.
POSTER SESSION V (5001-5200)
SALON D

Audition (5001-5007)
(5001) Irsik, Snyder
(5002) Dickerson, Gaston, Hartmann, Nagel, Mermagen
(5003) Chandrasekaran, Smayda, Maddox
(5004) Gordon, Hall, Suwangbutra, Gaston, Bryson
(5005) Gaston, Foots, Mermagen Dickerson
(5006) Morton, Sommers
(5007) Cabe, Neuhoff

Music Cognition (5008-5015)
(5008) Ogg, Okada, Slevc
(5009) Dowling Raman, Ramesh, Tillmann
(5010) Mandart, Romero, Merklen
(5011) Van de Cavey, Hartsuiker, Kourtis
(5012) Bi, Peynircioglu, Brent
(5013) Pruitt, Prfordscher, Mantell, Wright
(5014) Gabriel, Justus
(5015) Ting, Beck, Jackson, McQueen, Van Hell

Numerical Cognition (5016-5025)
(5016) Huang, Voyer
(5017) Hebik, Cohen
(5018) Canty, Pellegrino, Goldman, DiBello
(5019) Au, Jaeggi, Bunarjo, Quintanilla, Arakelian, Buschkuehl
(5020) Chen, Campbell
(5021) Geye, Faulkenberry
(5022) Goldman, Tzelgov
(5023) Dickson, Federmeier
(5024) Moore, Allred, An, Ashcraft
(5025) Ford, Reynolds

Embody Cognition (5026-5031)
(5026) Halvorson, Hazeltine
(5027) Mioni, Stablum, Zakay, Grondin
(5028) Loeffler, Canal-Bruland, Raab
(5029) Dunn, Risko
(5030) Skowronski, Clinton, Wiemer
(5031) Clement, Brockmole

Cognitive Skill Acquisition (5032-5037)
(5032) Swaminathan, Schellenberg
(5033) Van Hedger, Heald, Wu, Nusbaum
(5034) Chrabaszcz, Bolger, Kayes, Feola, Atkins, Sprenger, Harbison, Hatfield, Dougherty
(5035) Kranz, Kramer, Hussey
(5036) Lacroix, Brown, Grant, Hernandez, Morgan, Walsh
(5037) Seycom, Goodman

Eyewitness Identification (5038-5051)
(5038) Seale-Carlisle, Mickes
(5039) Nguyen, Pezdek
(5040) DeFranco, Zaragoza, Riccio
(5041) Bednarz, Carlson C, Carlson, M. Wooten, Young, Mayberry
(5042) Malavanti, Kurinec, Neshitt, Weaver
(5043) Kurinec, Tran, Malavanti, Weaver
(5044) Murphy, Greene
(5045) Bennett, Steyvers
(5046) Key, Neuschatz, Cash, Wetmore, Gronlund
(5047) Goodsell, Gronlund, McAdoo, Neuschatz, Wetmore
(5048) McAdoo, Gronlund
(5049) Terrell, Dasse
(5050) Wilson, Fantino, Mickes
(5051) Stepah, Dehnk, Fenn

Human Learning and Instruction III (5052-5071)
(5052) Donovan, Theodosis, Rapp
(5053) Van Den Broek, Segers, Van Rijn, Takashima, Verhoven
(5054) Ketels, Healy, Jones, Sasnett-Martichuski, Lalchandani, Guhl
(5055) van Eersel, Verkoeijen, Rikers
(5056) Davis, Chan
(5057) Friedman, Moulton, Oppenheimer
(5058) Nunes, Whiffen, Blunt, Karpicke
(5059) Coane, Carrigan, Glaisher, Strage
(5060) Kuepper-Tetzel, McDaniel
(5061) McCabe
(5062) Rahman, Lund, Coffman, Armstrong, Lamm, Reason, Carpenter
(5063) Paneerselvam, Callender
(5064) Bobbit, Kimball
(5065) Wissman, Rawson
(5066) McCabe, Braash, Daniel
(5067) Abel, Bäuml
(5068) Noh, Kerr, Maddox
(5069) Kiyokawa
(5070) Yeo, Koedinger, Fazio
(5071) Saucedo, Louden, Gorczynski, Latif, Camacho, Church, Rueckert
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<tr>
<th>Course</th>
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<tbody>
<tr>
<td><strong>Discourse Processes (5116-5134)</strong></td>
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<td>(5116) Kopp, Dmello</td>
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<td>(5117) Schutzenhofer, Virtue</td>
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<td>(5118) Steffens, Yeagle, Britt, Millis</td>
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<td>(5119) Shears, Smith, Amirazizi, Ariza, Bond, Cohen</td>
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<td><strong>Speech Perception I (5135-5145)</strong></td>
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<td><strong>Psycholinguistics III (5146-5156)</strong></td>
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Cognitive Control IV (5157-5176)
(5157) Scholz, Prittmann, Krems
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(5160) Wynn, Sohn, Hitchins
(5161) Emmert, Toscano, Cushing, Kan
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(5164) Elchlepp, Lavric, Verbruggen, Chambers
(5165) Marsh, Ball, Threadgold
(5166) Pilgrim, Marsh
(5167) Schulz, Dshemuchadse, Hämmerer, Goschke, Ruge, Bolte, Scherbaum
(5168) Ward, Hussey, Gaspar, Kramer
(5169) Hollins, Walters
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(5174) Gibson, Sztybel, Pauszek, Ralph, Nguyen
(5175) Proctor, Xiong
(5176) Hall-Ruiz, Jonides

Automatic Processing (5177-5182)
(5177) Max, Lagroix, Spalek, Tsal, Di Lollo
(5178) Seibold
(5179) Houston, Pollock, Lien, Allen
(5180) Maranges, Baumeister, Schmeichel
(5181) Prasad, Sake, Mishra
(5182) Dillon, Loschky, Brase

Judgment (5183-5194)
(5183) Hernandez, Gorges
(5184) Brashier, Mullet, Newman, Marsh
(5185) Swagman, Rouder
(5186) Lamotte, Izaute, Droit-Volet
(5187) Park, Lee
(5188) Herzog, Unkelbach, Hertwig
(5189) Cooke, Kusev
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(5192) Stevens, Soh
(5193) Kleiman-Weiner, Gerstenberg, Levine, Tenenbaum
(5194) Mikels, Shuster

Statistics and Methodology (5195-5200)
(5195) Kim, Pitt, Myung
(5196) Liddell, Kruschke
(5197) Fox, Houpt
(5198) Omasta, Bertsch
(5199) Hardman, Vergauwe, Ricker
(5200) Hoekstra, Wagenmakers, Morey
### Human Learning and Instruction II (265-269) Williford
- **8:00 a.m. - 8:15 a.m.** Hopper, Huber
- **8:20 a.m. - 8:35 a.m.** Miyake, Von Bastian, Smeekens, Lurquin, Carruth, Phillips, Kane
- **8:40 a.m. - 8:55 a.m.** Finn
- **9:00 a.m. - 9:15 a.m.** Byron, Little
- **9:20 a.m. - 9:35 a.m.** Neely, Cho, Brennan

### Psycholinguistics II (303-308) International North
- **10:00 a.m. - 10:15 a.m.** Meyer, Shao, Van Paridon
- **10:20 a.m. - 10:35 a.m.** Mishra, Prasad
- **10:40 a.m. - 10:55 a.m.** Pardo, Urmanche, Wilman, Wiener
- **11:00 a.m. - 11:15 a.m.** Luke, Christianson
- **11:20 a.m. - 11:35 a.m.** Perea, Abu Mallouh, Carreiras
- **11:40 a.m. - 11:55 a.m.** Berent, Bat-El, Vaknin-Nusbaum

### Discourse Processes (270-274) Continental C
- **8:00 a.m. - 8:15 a.m.** Borrie, Lubold, Pon-Berry
- **8:20 a.m. - 8:35 a.m.** Kaiser
- **8:40 a.m. - 8:55 a.m.** Singer, Solar, Spear
- **9:00 a.m. - 9:15 a.m.** Lev-Ari
- **9:20 a.m. - 9:35 a.m.** Heredia, Cieslicka, Gonzalez, Garza

### Working Memory III (309-314) Williford
- **10:00 a.m. - 10:15 a.m.** Camos, Mora, Loaiza
- **10:20 a.m. - 10:35 a.m.** Cowan, Hardman, Sauls, Blume, Clark, Sunday
- **10:40 a.m. - 10:55 a.m.** Fougnie, Kanabar, Brady, Alvarez
- **11:00 a.m. - 11:15 a.m.** Miller, Vlach, Simmering
- **11:20 a.m. - 11:35 a.m.** Minda, Nadler, Rabi, Nielsen
- **11:40 a.m. - 11:55 a.m.** Martin, Dial, Yue, Hamilton

### Decision Making (275-279) International North
- **8:00 a.m. - 8:15 a.m.** Bixter, Johnson, Rajaram, Luhmann
- **8:20 a.m. - 8:35 a.m.** Wang, Garelik
- **8:40 a.m. - 8:55 a.m.** Pleskac, Cesario
- **9:00 a.m. - 9:15 a.m.** Fific
- **9:20 a.m. - 9:35 a.m.** Palada, Neal, Vuckovic, Martin, Heathcote

### Emotion and Cognition (315-319) Continental B
- **10:20 a.m. - 10:35 a.m.** Bernstein, Kumar, Birmingham, Iarocci
- **10:40 a.m. - 10:55 a.m.** Kuperman, Imbault, Shore
- **11:00 a.m. - 11:15 a.m.** Laurent, Marx, Noiret
- **11:20 a.m. - 11:35 a.m.** Sakaki, Ponzio, Ueno, Mather
- **11:40 a.m. - 11:55 a.m.** Martin, Dial, Yue, Hamilton

### Cognitive Control II (280-285) Waldorf
- **8:00 a.m. - 8:15 a.m.** Watson, Coleman, Strayer
- **8:20 a.m. - 8:35 a.m.** Bugg, Scullin, Rauvola
- **8:40 a.m. - 8:55 a.m.** Weissman, Hawks, Egner
- **9:00 a.m. - 9:15 a.m.** Heyman
- **9:20 a.m. - 9:35 a.m.** Castro, Wasserman
- **9:40 a.m. - 9:55 a.m.** Stephan, Koch

### Action and Perception (320-325) Continental C
- **10:00 a.m. - 10:15 a.m.** Ziat, Konieczny, Park, Kakas, Rosenbaum
- **10:20 a.m. - 10:35 a.m.** Bertenthal, Barton, Harding
- **10:40 a.m. - 10:55 a.m.** Quinn, Honisch, Fraser, Elliott, Cacioppo
- **11:00 a.m. - 11:15 a.m.** Bach
- **11:20 a.m. - 11:35 a.m.** Witt, King, Tenhundfeld
- **11:40 a.m. - 11:55 a.m.** Areshenkoff, Bub, Masson

### Categorization/Conceptualization (286-291) Continental B
- **8:00 a.m. - 8:15 a.m.** Davis, Goldwater, Giron
- **8:20 a.m. - 8:35 a.m.** Nosofsky, Sanders, Gerdom, Miyatsu, McDaniel
- **8:40 a.m. - 8:55 a.m.** Roads, Mozer
- **9:00 a.m. - 9:15 a.m.** Slouf, Rong, Deng
- **9:20 a.m. - 9:35 a.m.** Hampton, Passanisi
- **9:40 a.m. - 9:55 a.m.** Shepard, Wolff

### False Memory/Eyewitness Identification (326-330) Waldorf
- **10:00 a.m. - 10:15 a.m.** Howe, Garner
- **10:20 a.m. - 10:35 a.m.** Franklin, Miller
- **11:00 a.m. - 11:15 a.m.** Dodson
- **11:20 a.m. - 11:35 a.m.** Wixted, Mickes, Dunn, Clark, Wells
- **11:40 a.m. - 11:55 a.m.** Mickes
Attention: Features and Objects
Williford, Friday Morning, 8:00-10:00
Chaired by Edward Awh, University of Chicago

8:00-8:15 (1)
Time-Resolved Tracking of Covert Spatial Attention Using Rhythmic Brain Activity, EDWARD AWH and JOSHUA FOSTER, University of Chicago, JOHN T. SERENCES, University of California, San Diego, EDWARD K. VOGEL, University of Chicago. — Rhythmic brain activity in the alpha (8-12 Hz) frequency band covaries with the deployment of covert spatial attention. For instance, when attention is deployed to one visual field, alpha power over the contralateral hemisphere declines. Here, we examined whether this link between the topography of alpha power and the locus of covert spatial attention could be used to obtain temporally- and spatially-precise measurements of where and when covert attention was deployed in response to symbolic orienting cues. A linear classification analysis showed that information regarding the covertly attended location was restricted to the alpha frequency band. Next, we used a forward encoding model of location selectivity to obtain channel tuning functions (CTFs) that reflected the population-level neural representation of the attended position. CTFs emerged approximately 500 ms following the onset of the central cue, and they offer a powerful approach for obtaining time-resolved measurements of voluntary attention.
Email: Edward Awh, awh@uchicago.edu

Mental Rotation Capacity Is Limited to a Single Feature Binding, STEVEN FRANCONERI, Northwestern University, YANGQING XU, Lake Forest University. — Although mental rotation is a core component of scientific reasoning, we still know little about its underlying mechanism. For instance - how much visual information can we rotate at once? Participants rotated a simple multi-part shape, requiring them to maintain bindings between features and moving parts. The capacity of this operation was strikingly low – only one feature could remain bound to one part. Behavioral and eyetracking data showed that this single feature remained ‘glued’ via a singular focus of attention, typically on the object's top. We argue that the architecture of the human visual system is not suited for keeping multiple features bound to multiple parts during mental rotation. Such measurement of the capacity limits may prove to be a critical step in dissecting the suite of visuospatial tools involved in mental rotation, leading to insights for improvement of pedagogy in science education.
Email: Steven Franconeri, francoeneri@northwestern.edu

8:40-8:55 (3)
Object-Based Selection Is Contingent on Attentional Control Settings, ERIC TAYLOR (Member Select-Speaker Award Recipient), JASON RAJSIC and JAY PRATT, University of Toronto. — The visual system allocates attention in object-based and location-based modes. However, the question of when attention selects objects and when it selects locations remains poorly understood. In this paper, we present variations on two classic paradigms from the object-based attention literature, where object-based effects are observed only when the object feature matches the task goal of the observer. In Experiment 1, covert orienting was influenced by task-irrelevant rectangles, but only when the target colour matched the rectangle colour. In Experiment 2, the region of attentional focus was adjusted to the size of task-irrelevant objects, but only when the target colour matched the object colour. These demonstrations of contingent object-based attention suggest that object-based selection is neither mandatory nor default, as is commonly believed, and that object-based effects are contingent on simple, top-down, attentional control settings.
Email: Eric Taylor, j.eric.t.taylor@gmail.com

9:00-9:15 (4)
Biasing Free Choice Decisions With Inhibition of Return. PAUL A. SKARRATT and SHANE LINDSAY, University of Hull, GEOFF G. COLE, University of Essex. — When visual targets occupy the same location as a prior event, responses are slower than when targets appear in a new location. This effect, long known as inhibition of return (IOR), reflects a biasing of limited visuomotor resources away from previously inspected locations in favour of more efficient processing in novel locations. In the present study, we examined the extent to which IOR can affect cognitive processes beyond those involved in visual search. Participants indicated their subjective preferences between pairs of everyday consumer products, choosing items they liked or disliked. Results showed that irrespective of their choice valence, participants avoided items appearing in previously selected locations. The strength of their avoidance was such that participants would choose inferior items over their more expensive counterparts, and subjective and even objective judgements were affected equally. Results will be discussed in the context of IOR and competing theories.
Email: Paul A Skarratt, p.skarratt@hull.ac.uk

9:20-9:35 (5)
What Does Attention Explain? VINCENT DI LOLLO, Simon Fraser University, BRITT ANDERSON, University of Waterloo. — William James defined attention as a process: “…the taking possession by the mind…of one out of… several simultaneously possible objects or trains of thought…” Since then, attention has been reified; it has become many things: a filter (e.g., Broadbent, 1958), a limited resource (e.g., Lavie & Tsal, 1994), a spotlight (e.g., Posner, Snyder, & Davidson, 1980), a zoom lens (e.g., Eriksen & St. James, 1986), a glue (e.g., Treisman & Gelade, 1980). A major drawback of these metaphors is that they do not specify what underlying mechanisms mediate the purported function: they are intuitively appealing vernacular terms as distinct from scientific explanations. To be sure, there are many empirical findings
that can be legitimately labeled as attentional. But such labeling does not further our understanding of the phenomenon at hand. What is needed is a description of the mechanisms that mediate the behavioural performance, as distinct from an appeal to the vague and ill-defined concept of attention. Email: Vincent Di Lollo, enzo@sfu.ca

9:40-9:55 (6)
Memory-Level Attentional Control: When a To-Be-Redirected Location Is Uncertain. MICHI MATSUKURA and SHAUN P. VECERA, University of Iowa. — How does attention select items already stored in visual short-term/working memory (VSTM/VWM)? Some studies pursue this question by examining the fate of “never attended” items. Other studies tackle this question by occasionally probing the observers’ ability to remember the “initially unattended but later attended” items. Yet, unlike the former method, the findings with the latter method derived from a particular paradigm that allows the observers to predict the region that attention can be later re-directed to. In the present study, we investigated whether and how the observers’ ability to remember the “initially unattended but later attended” item is modulated by keeping a possible location that attention may be re-directed in the dark. Contrary to popular assumptions, the results consistently indicated that the observed modulations in memory-level attentional control are not driven by the act of grabbing the items located near the initially attended item and subsequently retaining them in VSTM. Email: Michi Matsukura, michi-matsukura@uiowa.edu

Statistics and Methodology I
Waldorf, Friday Morning, 8:00-10:00
Chaired by Christopher Wolfe, Miami University of Ohio

8:00-8:15 (7)
Optimizing Gist Explanations for Learning and Transfer About Breast Cancer and Genetic Risk. CHRISTOPHER WOLFE, Miami University of Ohio, VALERIE REYNA, Cornell University, COLIN L. WIDMER, Miami University, PRISCILA G. BRUST-RENNCK, Cornell University. — The BRCA Gist Intelligent Tutoring System implements principles of fuzzy-trace theory. To determine the best strategy for optimizing tutorial dialogues in BRCA Gist, 415 women were randomly assigned to a control group or one of four BRCA Gist versions differing only in the type of responses given in gist explanation tutorial dialogues. Two groups provided gist explanations in their own words and two were prompted to use verbatim (exact) tutorial wording. Crossed with this, two groups received general prompts whereas two groups were prompted for specific content. The gist general and verbatim specific groups performed better than the other groups on a declarative knowledge test. On a cancer risk-assessment task, the two gist groups performed significantly better than the verbatim groups. General prompts for gist explanations in tutorial dialogues yielded superior transfer without diminishing declarative knowledge. Implications for learning and memory are discussed applying fuzzy-trace theory. Email: Christopher Wolfe, wolfecr@MiamiOH.edu

8:20-8:35 (8)
Psychology: The Science of Undergraduate Women. DANIEL VOYER and SUSAN D. VOYER, University of New Brunswick. — We examined reporting practices for participants involved in psychology research in a representative high profile journal from 1952 to 2012. All issues of the Journal of Experimental Psychology: General for the years 1952, 1972, 1992, and 2012 were examined with a resulting data set of 296 different experiments. Gender composition, age, source of the sample, and recruitment incentives were the variables that received close scrutiny. Results showed an improvement in reporting practices from 1952 to 2012 for age, incentives, and source of the sample. However, report on gender composition was better in 1952 and 2012 than in 1972 and 1992. Furthermore, 61% of samples were formed of undergraduate students. A positive correlation (r = .52) between year and female-to-male ratio was found, reflecting the change from 28.2% females in 1952 to 63.7% females in 2012. Results are interpreted in terms of their implication for interpretation and generalizability of results in psychology. Email: Daniel Voyer, voyer@unb.ca

8:40-8:55 (9)
Reaction Time Effects in Lab- Versus Web-Based Research: Experimental Evidence. BENJAMIN HILBIG, University of Koblenz-Landau. — Although research conducted via the internet has become commonplace, it still spurs occasional skepticism. In particular, there is a persistent preconception that web-experiments may be ill-suited to investigate relatively small response time effects. To critically test this presumption, participants were randomly assigned to complete a lexical decision task either (a) online (at any computer they chose) or (b) via the internet but in the lab using the same browser, or (c) in the lab using standard-software for creating experiments (E-Prime). All three conditions revealed a large and typical word frequency effect – that frequent words are recognized faster (over pseudowords) than infrequent words. Most importantly, there was no indication that web-based data collection was in any way inferior in detecting the effect. As such, the current findings contradict the preconception that reaction time effects of only a few hundred milliseconds will be less reliably detected in browser-based-experiments. Email: Benjamin Hilbig, hilbig@allgemeine-psychologie.de

9:00-9:15 (10)
Using the Logarithmic Derivative Function to Identify the Risky Weighting Function. RICHARD CHECHILE and DANIEL H. BARCH, Tufts University. — In cumulative prospect theory (Tversky & Kahneman, 1992) probabilities for outcomes of a lottery are nonlinearly transformed to a risky weighting function in order to account for the Allais (1953) paradox. There are many proposals in the economic and psychological literature for the form of the risky weighting function. In this experiment the logarithmic derivative of the weighting function is estimated for both positive and negative lotteries. Only the Chechile and Barch (2013) exponential-power model fit
for both positive and negative gambles. These results lead to a novel interpretation of the context effect for lotteries. Email: Richard Chechile, richard.chechile@tufts.edu

9:20-9:35 (11)
Analyzing Thresholds With Hierarchical Bayesian Logistic Regression. JOSEPH HOUP'T, Wright State University. — Ideal observer analysis is one of the fundamental tools in perception research. A particularly fruitful application of the ideal observer is to account for the task relevant information available in the stimulus. The ratio of a participant's threshold to the ideal observer's threshold, known as efficiency, is used to quantify the human performance across conditions. The effects of conditions on efficiency are usually analyzed with ANOVAs or non-parametric tests (e.g., Friedman). In this work, we present a model that combines Bayesian estimates of psychometric functions with hierarchical logistic regression for inference based on threshold data and efficiencies. Our approach improves upon the existing statistical methods by constraining the model based on a standard model connecting stimulus intensity to participant accuracy, by accounting for variability in the estimates of individual and ideal observer thresholds, and allowing for both individual and group level inferences. Email: Joseph Houpt, joseph.houpt@wright.edu

9:40-9:55 (12)
How We Make Forced-Choice Decisions. D. J. K. MEWHORT, Queens University, ELIZABETH E. JOHNS, Queen's University. — Forced-choice tests composed of a target and lure derived from the same studied item (A-A') were compared to tests composed of a target and lure from different studied items (A-B'). Signal-detection theory for forced-choice decisions claims that subjects choose the most familiar of the test alternatives, an algorithm that predicts an A-A' advantage. We confirmed the A-A' advantage when the stimuli were sentences, but it reversed when the stimuli were mixed-plurality nouns. We propose a two-factor approach. (1) The A-A' advantage occurred because the pertinent details distinguishing the alternatives were clear. It vanished when the pertinent details could be identified in both conditions. (2) The A-B' advantage occurred because a decision can be made either by endorsing a target or rejecting a lure: the chance of remembering one of two items (A or B) is higher than of remembering only one. Our two-factor account predicted comparable results in semantic-memory experiments. Email: D. J. K. Mewhort, mewhortd@queensu.ca

Letter/Word Processing
Continental B, Friday Morning. 8:00-10:00
Chairred by Pablo Gomez, DePaul University

8:00-8:15 (13)
Perceptual Uncertainty in Non-Readers. PABLO GOMEZ, DePaul University, MANUEL PEREA, Universitat de València and BCBL, MARÍA JIMÉNEZ, Universitat de València. — Recently, considerable attention in the areas of visual-word recognition and reading has been devoted to cracking the orthographic code. One of the leading explanations of letter position encoding is consistent with models of visual attention: there is location uncertainty at assigning positions to “objects” (letters). For instance, the letters G and D in JUGDE would activate not only their respective letter positions, but also neighboring positions, as “locations are not points but distributions in 1-D, 2-D, and 3-D space” (Logan, 1996). Hence, the transposed-letter nonword JUGDE is more similar to JUDGE than the replaced-letter nonword JUPTE. Indeed, most current mathematical models of visual word recognition include a parameter of “position uncertainty” in letter position coding. An alternative explanation for letter position coding posits that it is based on a reading-specific mechanism. Hence, exploring the performance of pre-reading children and illiterate adults has become an important source of evidence within this theoretical debate. In the present work, we argue that the data from both of these groups of participants can be perfectly accommodated by the perceptual uncertainty account. Email: Pablo Gomez, pgomez1@depui@gmail.com

8:20-8:35 (14)
What Do We Do With What We Learnt? The Case of Orthographic Regularities in Visual Word Recognition. FABIENNE CHETAIL, Universite Libre de Bruxelles-LCLD. — Readers rapidly become sensitive to regularities present in scripts. However, the role of orthographic regularities receives a peripheral status in current theories of visual word recognition. In the present study, we examined to what extent regularities influence letter identification and lexical access of written words. In Experiment 1, participants performed a forced-choice task to measure their sensitivity to regularities. In Experiment 2, they did a letter detection task, with letters belonging to bigrams of high or low frequency. Finally, in Experiment 3, they performed a lexical decision task with items entailing bigrams of high or low frequency. Overall, participants were highly sensitive to the distribution of bigram frequencies. Furthermore, bigram frequency impacted letter string processing, both during letter detection and lexical access. Critically, the effect varied according to the task (facilitative in Experiment 2, detrimental in Experiment 3). We discussed the implications of such results for models of orthographic encoding. Email: Fabienne Chetail, fchetail@ulb.ac.be

8:40-8:55 (15)
Investigating the Locus of the Mixed-Case Effect: Evidence From Masked Priming. COLIN DAVIS and MICHELE GUBIAN, University of Bristol, JAMES ADELMAN, University of Warwick. — The cost of mIxEd-cAse presentation on visual word recognition is well-established, but the locus of this effect remains unclear. The present investigation involves a series of masked priming experiments that sought to shed light on this issue. Experiment 1 factorially varied prime case (lowercase, uppercase, mixed case) and target case (lowercase and mixed case). The results replicated previous research in showing equivalent identity priming for upper and lower case primes. However, no priming was
observed for mixed case primes; there were no interactions with target case. Experiment 2 tested mixed case, uppercase and mixed size primes, with targets presented exclusively in lowercase. Here the results showed equivalent priming across the three prime conditions. Experiment 3 was therefore an attempt to replicate Experiment 1 with a refined set of targets. Once again, uppercase and lowercase primes resulted in significantly faster reaction times than mixed case primes; however, there was a small, but significant priming effect for mixed case primes. Overall, the results indicate that the processing of mixed case stimuli is a function of the stimulus environment. Theoretical implications will be considered. Email: Colin Davis, pscjd@bristol.ac.uk

9:00-9:15 (16)
**Individual Differences and Corpus-Driven Differences in Frequency Effects on Word Recognition.** VAN RYNALD T. LICERALDE and PETER C. GORDON, University of North Carolina (presented by Peter C. Gordon). — Word frequency (WF) obtained from corpus counts has strongly and consistently predicted word recognition time, indicating that WF provides a reasonable proxy for variation in the degree of experience that individuals have with different words. WF estimates from the Subtlex corpus (transcripts of spoken language from TV shows and movies) have recently been the most successful in accounting for variation in word recognition times. Here, WF from Subtlex and from the 1-gram counts in the Google Terabyte Corpus were compared for lexical-decision times on two sets of words, half with higher relative frequency in Subtlex than in 1-gram (e.g., darling) and half with the opposite pattern (e.g., glossary). Response times were better predicted by WF in Subtlex than in 1-gram. However, ART scores – a measure of print exposure – interacted more strongly with 1-gram frequency than with Subtlex frequency suggesting that the impact of reading experience on word recognition depends selectively on WF in writing. Email: Peter C. Gordon, pcg@email.unc.edu

9:20-9:35 (17)
**Conceptual and Phonological Priming in the Masked Prime Same-Different Task.** STEPHEN LUPKER, University of Western Ontario, MANUEL PEREA, Universitat de València and BCBL, MARIKO NAKAYAMA, Waseda University. — Recently, the masked prime same-different task has been increasingly used in investigations of orthographic processing. The task involves presenting a lower-case reference stimulus, followed by a masked prime, followed by an upper-case target (e.g., word-cord-WORD). The subjects’ job is to indicate whether the reference and target match. Task proponents (e.g., Kinoshita & Norris, 2008) claim that the task “holds considerable promise as a tool for examining the nature of prelexical orthographic representations. The task appears to tap into the same representations that support word recognition but not to be influenced by the lexical retrieval processes.” This claim was examined in experiments with Japanese-English bilinguals. Reference and target stimuli were in English whereas primes were in Japanese scripts. Thus, primes were orthographically unrelated to their reference/target stimuli. Both conceptual priming (from translation equivalents) and phonological priming were observed, demonstrating that the task is sensitive to relationships beyond those at the orthographic level. Email: Stephen Lupker, lupker@uwo.ca

9:40-9:55 (18)
**Parsing Printed Words: Interference to Nonword Classification From the Presence of Embedded Words.** MARCUS TAFT, University of New South Wales. — If the classification of a nonword in a lexical decision experiment is delayed by the presence of a real word embedded within it, this indicates that the letters forming that word were fed into the lexical processing system. So, by manipulating the position of the embedded word, it can be established how letter-strings are parsed during word recognition. The sparse literature that exists on this question is inconsistent with regard to whether the position of embedding makes a difference. Based on a carefully selected set of materials, the present study provides evidence of greater interference from an initial embedding (e.g., faird vs taird; cf. fair) than a final embedding (e.g., fripe vs frike; cf. ripe). In addition, an outer embedding (e.g., florm vs blorm; cf. form) generates significant interference. The results are interpreted within a model of word parsing and lexical access that incorporates onsets and rimes; a model that predicts the further finding that an initially embedded word interferes more when it ends in a consonant (e.g., the fair of faird) than with a vowel (e.g., the tree of treep). Email: Marcus Taft, m.taft@unsw.edu.au

**Judgment**
**Continental C, Friday Morning, 8:00-10:00**
**Chaired by Teresa Treat, University of Iowa**

8:00-8:15 (19)
**Men’s Contextualized Perceptions of Women’s Sexual Interest.** TERESA TREAT and HANNAH M. HINKEL, University of Iowa, RICHARD J. VIKEN, Indiana University, JODI R. SMITH, University of Iowa. — When judging women’s sexual interest in full-body photographs, college men focus not only on women’s nonverbal affective cues (facial expression and body posture), but also on non-affective cues like the provocativeness of their clothing style and their normative attractiveness. Moreover, men at greater risk of sexual aggression rely less on affective cues and more on non-affective cues. In the current study, 216 undergraduate men judged the sexual interest of 173 women superimposed on scenes that varied in sexual relevance (e.g., bar or bedroom vs office or library); the stimuli varied orthogonally along sexual-interest, clothing-style, attractiveness, and sexual-relevance dimensions. Participants then completed a measure of rape-supportive attitudes, a correlate of sexual aggression. As expected, college men relied on the sexual relevance of the social environment when judging sexual interest, in addition to the other dimensions. Reliance on context and other non-affective cues also increased as endorsement of rape-supportive attitudes increased. These findings suggest the potential utility of cognitive-training programs designed to enhance men’s focus on affective cues and decrease focus on non-affective cues. Email: Teresa Treat, teresa-treat@uiowa.edu
8:20-8:35 (20)

A Closer Look at the Foreign Language Effect: Investigation With Japanese Participants. KUNINORI NAKAMURA, Seijo University. — The foreign language effect (Costa et al., 2014) refers to a phenomenon in which the response to a moral dilemma depends on whether it is asked in a native or second language. This study explored this effect with Japanese participants using various types of moral dilemmas. Study 1 adopted twelve variations of trolley dilemmas from Mikhâi (2007). Study 2 used seven types of moral dilemmas from Greene et al. (2001). The dilemmas required permisibility and understandability judgments. Results of the two studies demonstrated the following two points. (1) Interactions between types of dilemmas (switch/footbridge) and language (native/foreign) were significant in both studies, indicating that the foreign language effects were replicated consistent with Costa et al. (2014). (2) Evidence that contradicts the theoretical explanation of the foreign language effect was also found. Email: Kuninori Nakamura, knaka@seijo.ac.jp

8:40-8:55 (21)

A Formal Model and Test of Associative Judgment Strategies. SUDEEP BHATIA, University of Warwick (Member Select-Speaker Award Recipient). — I present a computational model of associative judgment. The model is trained using singular-value decomposition applied to word co-occurrence on the English language Wikipedia corpus, and is able to answer natural language questions spanning a very large domain of knowledge. I find that the model achieves a high accuracy rate across a range of experimenter-generated, participant-generated, and real-world question datasets. The model also accurately predicts human responses on these datasets. Finally, the model is able to respond with high accuracy in the city-size judgment task, and generate the conjunction fallacy in the Linda problem. These results suggest that associative judgment provides a powerful account of not only human error, but also human intelligence. In doing so, they illustrate a new way of formally studying heuristic processes, and ultimately a new way of constructing and testing models of judgment and decision making.
Email: Sudeep Bhatia, bhatia.sudeep@gmail.com

9:00-9:15 (22)

A Form of Belief Bias in Judgments of Bayesian Rationality. RICHARD ANDERSON, LAURA LEVENTHAL, DANIEL FASKO, ZACHARIAH BASEHORE, DON ZHANG, ADAM BILLMAN, CHRISTOPHER GAMSBY, JARED BRANCH, and TIMOTHY PATRICK, Bowling Green State University. — Researchers investigated a form of belief bias using a task that asked people to assess the rationality of another person. Participants saw information about base rates, the accuracy of a diagnostic test, a physician’s diagnosis, and whether the diagnosis was consistent with reality (factual) or inconsistent (counterfactual). The independent variables were participants’ ratings of the physician’s rationality, a number of measures related to a signal detection (SDT) model, and several individual-difference scales. The results indicated belief bias in the rationality ratings: Diagnoses were judged to be more rational when they were reality consistent (factual) than when they were counterfactual, and this effect was greater for irrational than for rational diagnoses. In addition, the SDT measures indicated that, relative to factual diagnoses, counterfactual diagnoses led to greater theoretical ability to discriminate signal from noise (i.e., rational from irrational diagnoses, respectively), and to a stricter decision criterion for classifying diagnoses as rational. Email: Richard Anderson, randers@bgsu.edu

9:20-9:35 (23)

Bayesian Analysis of the Prior Probability of Guilt and the Presumption of Innocence. RICHARD JOHN and KENNETH NGUYEN, University of Southern California; NICHOLAS SCURICH, University of California, Irvine. — The presumption of innocence is sacrosanct in American legal doctrine, yet its precise meaning is controversial and how jurors interpret it remains unknown. A total of 379 US jury eligible respondents recruited from Amazon Mechanical Turk and given a summary of a felony rape case. Using a Bayesian framework, respondents were asked to provide judgments of Prior Odds of guilt based on a mug shot of the defendant only, Bayes Factor and/or Posterior Odds of guilt following description of admissible evidence, using assessment procedures adapted from Martin & Schum (1987). Median Prior Odds of guilt are 2:1 favoring guilt, based only on the mug shot provided, suggesting a lack of presumption of innocence. Bayes Factor judgments (median=10) indicated that the evidence was quite probative, and not related to Prior Odds of guilt, suggesting that that evidence was evaluated independently of prior beliefs about guilt. Posterior Odds of guilt were moderately related to Prior Odds of guilt, indicating that prior beliefs about guilt have some impact on beliefs about guilt following evaluation of evidence. Binary logistic regression analyses indicate that the Prior Odds of guilt are predictive of the final verdict in the expected direction.
Email: Richard John, richardj@usc.edu

9:40-9:55 (24)

Exploring Benford’s Law and Estimation. BRUCE BURNS, University of Sydney. — Benford’s Law is the phenomenon that the first digit of many natural and human quantities are not uniformly distributed, instead they follow a log distribution in which the digit one is most common and the digit nine least. In earlier work I demonstrated that people’s estimation of unknown quantities is a reasonable fit to Benford’s Law, though not a perfect one. This raises three questions regarding Benford’s law and its fit to human estimation: 1) Is there a function that is a better fit? 2) What affects the degree of fit? 3) Why do people approximately fit? Progress on each of these questions will be reported, in particular the finding that people’s belief in the meaningfulness of the process generating the data is
critical. This work has implications both for how people make estimates and the use of Benford’s Law for fraud detection. Email: Bruce Burns, bburns@psych.usyd.edu.au

Metamemory/Metacognition I
International North, Friday Morning, 8:00-9:20
Chaired by Philip Higham, University of Southampton

8:00-8:15 (25)
New Improved Gamma: Using the Area Under the ROC Curve to Indirectly Compute a More Accurate Goodman-Kruskal Gamma Coefficient. PHILIP HIGHAM, University of Southampton. — For decades, theorists have debated how best to measure relative metacognitive accuracy. Most metacognition researchers continue to use Goodman-Kruskal’s gamma, an ordinal measure of association calculated by taking the difference in the proportions of concordant and discordant pairs in a sample. However, tied pairs can seriously distort gamma computed in this way, and ties are inevitable with most metacognitive scales. As an alternative, signal detection measures such as Area Under the ROC Curve (AUC) have been proposed. However, this debate has overlooked a simple fact: true gamma = 2(true AUC) – 1. In this talk, I will demonstrate why this relationship exists and present simulations showing that far better gamma estimates result if gamma is estimated indirectly via AUC. Even the trapezoidal rule, the crudest method to estimate AUC, substantially reduces distortion in gamma compared to the concordance/discordance formula, and it is just as simple to work with. Email: Philip Higham, higham@soton.ac.uk

8:20-8:35 (26)
About the Encoding of Prospective Memory Intentions. MICHAEL SCULLIN and MICHELLE N. DASSE, Baylor University, KHUYN NGUYEN and JI HAE LEE, Washington University in St. Louis, COURTNEY KURINEC, Baylor University, MARK MCDANIEL, Washington University in St. Louis. — Prospective memory (PM) refers to the ability to remember to perform a future intention. The Multiprocess Framework contends that reliance on spontaneous retrieval versus effortful monitoring depends on the use of specific (focal) and non-specific (nontarget) cues, respectively. Across five laboratory-based PM experiments (N=457), we had participants encode non-specific, “categorical” PM cues (e.g., animals). Immediately following encoding, we asked participants whether they thought about animals as a general, non-specific category (predicted outcome) or generated specific animal words. Interestingly, 25-50% of participants generated specific animal words. In Experiment 4, we observed that initial-letter cues (relative to categorical cues) significantly decreased the proportion of specific words encoded. In our capstone Experiment 5, specific-example encoders showed significantly greater PM performance and reliance on spontaneous retrieval (lower ongoing task cost) than general-category encoders. These findings demonstrate substantial inter-individual variability in PM encoding and the critical role of spontaneous retrieval even in categorical PM tasks. Email: Michael Scullin, Michael_Scullin@Baylor.edu

8:40-8:55 (27)
Metacognitive Control Over Encoding Under Auditory Distraction. MACIEJ HANCZAKOWSKI, Cardiff University, PHILIP BEAMAN, University of Reading, DYLAN JONES, Cardiff University. — Auditory distraction at encoding impairs memory performance. Unlike visual distraction, auditory distractors cannot be avoided by simple perceptual means (e.g., gaze aversion). This does not, however, preclude the possibility that the negative effects of auditory distraction may be mitigated by exercising metacognitive control. The present study looked at whether people compensate for distraction by extending study time. When presented with lists of words accompanied by auditory distraction, participants not only failed to extend study to compensate for the harmful effects of distraction but actively curtailed study compared to lists of words presented in a quiet control condition. This pattern emerged independently of the level of materials organization (categorized and uncategorized words) and the expected memory test (free, cued, serial recall). Further, curtailed study times exaggerated the effects of distraction on performance. We conclude that auditory distraction not only reduces memory performance but also interferes with metacognitive control processes. Email: Maciej Hanczakowski, hanczakowski@cardiff.ac.uk

9:00-9:15 (28)
If It’s Loud I’ll Remember All About It! Metacognitive Illusions About Volume in Source Monitoring. BEATRICE G. KUHLMANN, University of Mannheim, Germany (Member Select-Speaker Award Recipient). — People falsely believe they will remember loudly-spoken words better than quietly-spoken words (Rhodes & Castel, 2009). Two experiments (n=64 each) examined whether this metacognitive illusion extends to source memory. Participants heard words spoken loudly or quietly, further varying in speaker-gender (E1) or screen-position (E2), and judged their probability of remembering each word (Judgments-of-Learning [JOLs]; only half of participants) and of remembering its volume and gender/position (Judgments-of-Source [JOSs]). Volume did not affect source memory. Independent of making a JOL first, JOSs for both volume and gender/position were higher for loud words. Volume-effects on JOLs and JOSs were of similar sizes (ηp2=.40-.60). Multinomial modeling revealed that these illusory metacognitive beliefs biased participants’ source guesses, making them more likely to guess that a word had been spoken quietly when they could not remember its volume. This guessing-bias resulted in better source-attrition performance for quiet than loud words, a pattern opposite to participants’ predictions. Email: Beatrice G. Kuhlmann, kuhlmann@psychologie.uni mannheim.de
Recall
Marquette, Friday Morning, 8:00-10:00
Chaired by Sean M. Polyn, Vanderbilt University

8:00-8:15 (29)
Dynamics of Large-Scale Cortical Networks Reveal the Cognitive Control of Episodic Memory. SEAN M. POLYN, Vanderbilt University, JAMES E. KRAGEL, University of Pennsylvania. — Distributed large-scale brain networks are thought to exert cognitive control to flexibly guide episodic memory, but the specific functions of these networks remain unclear. We estimated large-scale network activity using independent component analysis of fMRI data as participants performed a memory search task. A short delay following a study list was either unfilled, encouraging the maintenance of episodic information, or contained disruptive math distraction, encouraging reinstatement of the target episodic context. A computational model was used to formalize hypotheses linking large-scale network activity to cognitive control mechanisms supporting maintenance or contextual reinstatement. In the absence of distraction, dorsal attention network activity signaled contextual reinstatement, but after distraction, a frontoparietal control network was linked to this process, showing functional coupling with other large-scale networks, and with posterior medial temporal lobe. These novel behavioral correlates to large-scale brain activity provide insight into the mechanisms facilitating the cognitive control of human memory. Email: Sean M. Polyn, sean.polyn@vanderbilt.edu

8:20-8:35 (30)
A Four-Component Model of Age-Related Memory Change. KARI HEALEY (Member Select-Speaker Award Recipient) and MICHAEL JACOB KAHANA, University of Pennsylvania. — We develop a novel computational theory of age-related memory change within the framework of the context maintenance and retrieval (CMR2) model of memory search. We fit individual older and younger adult participants’ free recall data yielding parameter distributions for each age group. Four model mechanisms showed significant age differences: 1) the ability to sustain attention across an encoding episode, 2) the ability to retrieve contextual representations for use as retrieval cues, 3) the ability to monitor retrievals and reject intrusions, and 4) the level of noise in retrieval competitions. Without fitting any additional parameters, the model developed with free recall data also predicts the magnitude of age differences on a recognition memory task. Confirming a prediction of the model, free recall intrusion rates correlate positively with recognition false alarm rates. Thus we provide a four-component theory of a complex pattern of age differences across two key laboratory tasks. Email: Karl Healey, healeym@sas.upenn.edu

8:40-8:55 (31)
Age-Related Deficits in Context Processing. LILI SAHAKYAN, University of Illinois at Urbana-Champaign. — It is widely accepted that older adults have deficient processing of context (e.g., Spencer & Raz, 1995; Naveh-Benjamin, 2000). The evidence comes partly from dissociations between item recognition and source identification (e.g., Johnson, Hashtroudi, & Lindsay, 1993), and also from studies with associative recognition tasks (Naveh-Benjamin, 2000). In contrast, free recall tasks have received relatively little attention in the aging literature despite the fact that older adults show much larger deficits on such production tasks compared to recognition or cued-recall. Because free recall relies heavily on contextual information in initiating the search processes and also in response transitions, I report two studies examining the retrieval dynamics of free recall as reflected in response latencies, response transitions, first response probabilities, and serial position effects. In addition, I report an experiment utilizing a list-strength effect paradigm to infer about the strength of context encoding. Collectively, the results indicate that older adults have a deficit in storing contextual information, which could explain their deficits in contextual processing during retrieval. Email: Lili Sahakyan, l_sahaky@uncg.edu

9:00-9:15 (32)
Electrophysiological Biomarkers of Episodic Memory Formation. MICHAEL JACOB KAHANA, YOUSSEF EZZYAT, and JOHN BURKE, University of Pennsylvania. — Human memory is highly variable across items and lists. To uncover the neural correlates of this variability we examine recordings from indwelling electrodes as neurosurgical patients studied and subsequently recalled word lists. These data have revealed that both narrow-band brain oscillations and broad-band power fluctuations recorded during study predict subsequent recall. Here we report new multivariate analyses that reveal a widely distributed topography of high-frequency activity (70-100Hz) during memory encoding that accurately predicts subsequent recall (>50% boost in recall between bottom and top biomarker quartile). To determine the functional role of medial temporal lobe (MTL) and cortical electrophysiology in memory formation we electrically stimulated MTL structures during the encoding of some items. Overall, stimulation produced a very broad range of outcomes along the axis from impairment to facilitation. However, we were able to use the biomarkers to reliably predict the facilitatory or inhibitory effects of stimulation. Stimulation was most effective at improving memory when the biomarker signaled poor memory; it produced the greatest impairments when the biomarker signaled good memory. Email: Michael Jacob Kahana, kahana@psych.upenn.edu

9:20-9:35 (33)
How Do People Sample Memory to Simulate Novel Events? SIMON FARRELL, University of Western Australia. — A popular view amongst memory theorists is that episodic memory plays an adaptive role in allowing people to recombine past memories to make predictions about novel events. This works focuses on explaining how people sample from past memories to simulate new events, using contemporary models of episodic retrieval. Participants completed a standard laboratory memory task in which they were shown sequences of words, and were cued to retrieve sequences they had seen, or to generate (simulate) new sequences from the presented information. The results
show that episodic simulation produces similar patterns of retrieval to standard episodic memory tasks, and I show that they can be explained by Farrell’s (2012) model of the free recall of structured sequences. One important implication of the results is that output interference is a limitation in generating new sequences, so that simulations may be based on limited information from the past. Farrell, S. (2012). Temporal clustering and sequencing in working memory and episodic memory. Psychological Review, 119, 223–271. Email: Simon Farrell, simon.farrell@uwa.edu.au

9:40—9:55 (34)
The Testing Effect and Experimental Design. NEIL MULLIGAN, JONATHAN SUSSER, and S. ADAM SMITH, University of North Carolina at Chapel Hill. — A number of encoding variables are moderated by experimental design, such that the effect of the variable (e.g., the generation effect) on free recall is larger in a mixed-list than pure-list design. Research on the testing effect has produced contradictory results with regard to design effects. Four experiments examined this issue, consistently finding that the testing effect is moderated by experimental design across differences in materials, list structure, list length, presence of feedback, and rates of retrieval-practice success. The results are discussed in terms of theoretical accounts of design effects, and represent an important similarity between the testing effect and a number of other encoding variables that exhibit design effects. More specifically, with respect to the generation effect, the results suggest an important parallel between the mnemonic effects of retrieving information from episodic (testing effect) and semantic (generation effect) memory. Email: Neil Mulligan, nmulligan@unc.edu

Symposium I: Individual Differences in Executive Function and Related Processes
International North, Friday Morning, 9:50–12:00
Chairied by Marie Banich, University of Colorado, and Randy Engle, Georgia Institute of Technology

9:50—9:55 (35)
Introduction. MARIE BANICH, University of Colorado

9:55—10:20 (36)
Lapses in Attentional Control Drive Individual Differences in Working Memory Capacity. EDWARD K. VOGEL and KIRSTEN ADAM, University of Chicago. — Working memory (WM) is restricted and varies considerably across individuals. In previous work, we and others have found that low capacity individuals are poorer at exerting attentional control than high capacity individuals. However, the aggregate nature of most attention and memory measures leaves a basic question untested. Do low capacity individuals have a consistently reduced attentional capacity or is their poorer performance a mixture of “normal” capacity trials with trials in which they were completely disengaged from the task? Using both behavioral and EEG approaches we examined trial by trial fluctuations in WM success. While we found that low capacity individuals had roughly double the frequency of complete attentional lapses, this factor was insufficient to account for the extent of the differences between subjects. Instead, our results suggest that these individual differences are primarily driven by periodic lapses in the successful implementation of attentional control over working memory storage. Email: Edward Vogel, edvogel@uchicago.edu

10:25—10:50 (37)
Ability Differences in the Triage of Speed, Accuracy, and Error. RANDY ENGLE, Georgia Institute of Technology. — I have a rather unconventional way of thinking about executive functions. I think of them as mental behaviors or procedures which can vary greatly across the individual as to how automatized or proceduralized they are. Functions rely more or less on control and to the extent that control is important for their execution, they will demand limited-capacity attention. I will discuss several lines of work that suggest that one very important function is the ability to make adjustments as tasks become more difficult or complex. We have found that individuals who would be classified as high ability (WMC/Gf) are more likely to make these adjustments than are low ability individuals. This is demonstrated in task switching studies where high ability individuals slow down but maintain high accuracy. One feature of this way of thinking about executive functions is that it may make them more amenable to the effects of training. Email: Randy Engle, randall.engle@gatech.edu

10:55—11:20 (38)
Double Dissociations, Individual Differences, and Neural Endophenotypes of Proactive and Reactive Cognitive Control. TODD BRAVER, Washington University in St. Louis. — I will describe a large and on-going project we are conducting to establish the construct validity of the Dual Mechanisms of Control (DMC) framework. The project has five components. First, develop a battery of cognitive control tasks (Stroop, AX-CPT, cued task-switching, Sternberg item recognition), that each provide selective proactive and reactive control indices. Second, demonstrate within-subject double dissociations in the proactive and reactive indices to establish their independence. Third, estimate the relevant psychometric properties of each measure and its utility for individual difference studies (via test-retest reliability analyses). Fourth, determine the degree to which the different task indices reflect unified latent proactive and reactive control constructs. Fifth, identify potential neural endophenotypes via a large fMRI study (linked to the Human Connectome Project) of genetic and individual differences. The talk will provide an update on our current progress, next steps, and the overall timeline of the project. Email: Todd Braver, tbraver@artsci.wustl.edu

11:25—11:50 (39)
Measures of Brain Anatomy and Resting State Properties Associated With Individual Differences in Executive Function. MARIE BANICH, University of Colorado. — In this talk, I will present recent evidence from our laboratory supporting the idea that individual differences in the three components of executive function (EF, common EF,
updating-specific EF, switching-specific EF) proposed by Miyake, Friedman and colleagues are associated in individual differences in brain anatomy and function. In particular, our results, as discerned from neuroanatomical and resting state studies, demonstrates that higher levels of common EF are associated with extensions of the executive control network beyond the fronto-parietal regions typically identified in group studies. Moreover, individual differences in updating-specific EF and switching-specific EF are each associated with unique neuroanatomical and functional characteristics that are distinct from each other as well as those associated with common EF. In addition to shedding light on the neural underpinnings of individual differences in EF, these findings also provide converging evidence for the psychological structure of EF proposed by Miyake and colleagues. Email: Marie Banich, marie.banich@Colorado.Edu

11:55-12:00 (40)
Discussion, SYMPOSIUM SPEAKERS

Risk Taking
Continental C, Friday Morning, 10:20-12:00
Chaired by Joseph Johnson, Miami University of Ohio

10:20-10:35 (41)
A Computational Model of Decision Weighting in Risky Choice. JOSEPH JOHNSON, Miami University, JEROME BUSEMEYER, Indiana University. — A key component of most decision making theories is the decision weight that reflects the importance of consequences when evaluating an action. In algebraic models such as prospect theory or configural weighting, these are explicit multipliers with functional forms fit to empirical data. In process models such as decision field theory, elimination-by-aspects, or decision-by-sampling, they represent the distribution of attention about which simplifying assumptions are often made. Still, little is known about the cognitive processes that produce these weights. The current work presents a computational model that derives decision weights from elementary attention processing mechanisms. The basic idea is that a decision weight corresponds to the proportion of times an outcome is predicted to occur when an action is mentally simulated. We demonstrate the model's success by: 1) coherently explaining several robust phenomena with a single set of parameters, including some that utility theories cannot; 2) fitting common functional forms used in algebraic utility models, allowing for cognitive processing reinterpretations of their parameters; and 3) quantitatively fitting the model to extensive data sets on choice and pricing. Email: Joseph Johnson, johnsoje@miamioh.edu

10:40-10:55 (42)
Young, Hungry, and Risky: A Fuzzy Trace Theory of Reward Representation and Risk Taking. REBECCA B. WELDON, VALERIE REYNA, JONATHAN C. CORBIN, RONI A. SETTON, and DEANNA. BLANSKY, Cornell University (presented by Valerie Reyna). — Traditional theories of adolescent risk taking emphasize dual systems of reward sensitivity and cognitive control. However, dual-systems theories have been criticized for failing to account for contradictory results. Fuzzy-trace theory integrates dual systems with mental representations to explain risk taking. We tested explanations of contradictory results for reward sensitivity and predictions about inducing verbatim vs. gist processing (e.g., gist processing would reduce risk taking for gains). Adolescents and adults rated money and candy rewards in small, medium, and large amounts, and completed risky-choice tasks that induced verbatim vs. gist processing. Adolescents gave smaller rewards lower ratings than adults. Subjects assigned to a “hungry” condition (fasting) showed a similar pattern, giving lower ratings to smaller rewards. Risky choices differed for adolescents and adults depending on reward amounts. Finally, cueing gist processing reduced risky choices. Being an adolescent resembled being hungry, implicating mechanisms of reward sensitivity. However, risky choices could be altered by inducing verbatim as opposed to gist processing, and these effects interacted with reward, supporting fuzzy-trace theory. Email: Valerie Reyna, vr53@cornell.edu

11:00-11:15 (43)
The Reversed Description-Experience Gap: Disentangling Sources of Presentation Format Effects in Risky Choice. ANDREAS GLOECKNER, Max Planck Institute for Research on Collective Goods, BENJAMIN HILBIG and FELIX HENNINGER, University of Koblenz-Landau, SUSANN FIEDLER, Max Planck Institute for Research on Collective Goods. — Previous literature has suggested that risky choice patterns in general – and probability weighting in particular – are strikingly different in experience-based as compared to description-based formats. In two reanalyzes and three new experiments, we investigate differences between experience-based and description-based decisions using a parametric approach based on Cumulative Prospect Theory (CPT). Once controlling for sampling biases, we consistently find a reversal of the classic Description-Experience gap, that is, a reduced sensitivity to probabilities and increased overweighting of small probabilities in decisions from experience as compared to decisions from descriptions. This finding supports the hypothesis that regression to the mean effects in probability estimation are a crucial source of differences between both presentation formats. Further comparison with previously published data identified information asymmetry prevalent in gambles involving certainty as a third source of differences. We discuss methodological implications of this finding and suggest a multiple-source conceptualization of the Description-Experience gap. Email: Andreas Gloeckner, gloeckner@coll.mpg.de

11:20-11:35 (44)
Variants and Invariants in Description-Based Versus Experience-Based Decisions Under Risk. THORSTEN PACHUR, Max Planck Institute for Human Development, DAVID KELLEN, University of Basel, RALPH HERTWIG, Max Planck Institute for Human Development. — In decisions under risk, people choose systematically differently when information about the probabilistic structure of the world is gathered through experience than when it is symbolically
represented. The extent to which the psychological processes underlying this description-experience gap differ is little understood. Furthermore, it is unknown whether individual differences between decision makers on classic constructs of risky choice such as loss aversion and nonlinear probability weighting are stable across both contexts. We conducted a thorough comparison of subjective representations of outcomes and probabilities in decisions from description and decisions from experience. Formal modeling based on cumulative prospect theory revealed that, relative to decisions from description, decisions from experience showed (i) reduced sensitivity to information about probabilities, (ii) increased sensitivity to information about outcomes, and (iii) a stronger focus on extreme outcomes. At the same time, (iv) individual differences in loss aversion and properties of probability weighting persisted across contexts. Email: Thorsten Pachur, pachur@mpi-b-berlin.mpg.de

11:40-11:55 (45) Decision Context, Associative Learning and Preference Formation in Risky Choice. PETKO KUSEV, Kingston University London/City University London, BRADLEY LOVE, University College London, PAUL VAN SCHAIK, Teesside University. — Despite all the differences offered in theories of utility formation and decisions from experience/ descriptions, they share common assumption – decision makers have stable and coherent preferences, informed by consistent use of psychological strategy/processing (computational or sampling) that guide their choices between alternatives varying in risk and reward. In contrast, we argue for the non-existence of stable risk preferences; we propose that risk preferences are constructed dynamically based on strategy selection as a reinforcement-learning model. Accordingly, we found that decision context and associative learning predict strategy selection and govern risky preferences; rather having fixed preferences for risk, people select decision strategies from current context and learn to select decision strategies that are most successful (in terms of effort and reward) for a given context. Email: Petko Kusev, p.kusev@kingston.ac.uk

Human Learning and Instruction I Waldorf, Friday Morning, 10:20-12:00 Chaired by Michelle Ellefson, University of Cambridge

10:20-10:35 (46) How General Are Domain-General Thinking Skills? MICHELLE ELLEFSON, University of Cambridge, FLORRIE FEI-YIN NG and QIAN WANG, The Chinese University of Hong Kong, CLAIRE HUGHES, University of Cambridge. — Executive functions (EFs) are usually defined as a set of domain-general higher-order processes involved in goal-directed behaviours (e.g., inhibitory control, working memory, cognitive flexibility, and planning). Despite a growing number of studies charting EF-development across different cultures and linking EF skills to academic achievement, little is known about whether EF skills for older children and adults follow similar patterns. In the current project, a large sample of parents and their 10- to 13-year-olds from the United Kingdom and Hong Kong completed tasks measuring four EF skills: inhibition, working memory, cognitive flexibility, and planning. In addition, we included assessments of general cognitive ability and academic achievement in literacy and numeracy. Our dataset allows us to uniquely examine three core questions: (1) Do the early differences in EF seen across cultures persist into late childhood and adulthood?; (2) What are the relations among parental EF, child EF, and academic achievement?; and (3) Are these links consistent between the two countries in our study? The findings help inform the debate about the development of domain-general thinking skills across cultures. Email: Michelle Ellefson, mre33@cam.ac.uk

10:40-10:55 (47) Encoding Strategies and Trait Conscientiousness. PETER F. DELANEY, JAKE S. KING, and YOOJIN CHANG, University of North Carolina-Greensboro, JUAN A. VENTURA, Louisiana State University, ROSEMERY O. NELSON-GRAY, University of North Carolina-Greensboro. — The “Big Five” personality traits are well-accepted in personality theory as universal and stable descriptors of personality. We propose that conscientiousness predicts memory by increasing self-reflective encoding strategy changes. For example, in directed forgetting, Sahakyan and Delaney (2003) proposed that a forget cue increases the chances people will switch to better encoding strategies. We found that post-cue memory correlated with trait conscientiousness following a forget instruction, but not following a remember instruction. Similarly, when people study several word lists, inserting free recall tests after each list reduces buildup of proactive interference (Szpunar, McDermott, & Roediger, 2008) and produces opportunities for feedback-driven reflective encoding strategy changes (Delaney & Knowles, 2005; Sahakyan, Delaney, & Kelley, 2004). More conscientious people recalled more words on the final list with interspersed tests but not without them. Conscientiousness appears to be a small but reliable predictor of who switches encoding strategies with practice. Email: Peter F. Delaney, p_delaney@uncg.edu

11:00-11:15 (48) Blocked Versus Interleaved Presentation and Proactive Interference in Episodic Memory. FABIO DEL MISSIER, ALESSIA SASSANO, and VALENTINA CONI, University of Trieste, TIMO MÄNTYLÄ, Stockholm University. — Although proactive interference (PI) in episodic memory has been extensively studied, its relation to presentation schedule of materials has been almost neglected. In two experiments, we investigated how blocked vs. interleaved presentation of word lists belonging to different categories affected PI development and recall. We observed a clear buildup of (and release from) PI in the blocked condition, in which all the lists of the same category were clustered together. In the interleaved condition, alternating lists of different categories, there was a more gradual and smoother buildup of PI. When participants were left free to choose their presentation schedule, they spontaneously interleaved the study lists, resulting again in more gradual PI. However, only a small advantage for the interleaved condition was observed in cumulative immediate recall, with strong variations between the conditions at the list level. After 5- and 20-minute delays, we observed retroactive interference effects in the interleaved condition and PI-related effects in the
blocked condition. We conclude that different presentation schedules lead to the development of different PI profiles in episodic memory, strongly affecting what is remembered. Email: Fabio Del Missier, delmisfa@units.it

11:20-11:35 (49)
The Right Sequence for the Right Learning: Blocked and Interleaved Study Differences in the Study of Mathematical Concepts. PAULO CARVALHO, Indiana University, DAVID BRAITHWAITE, Carnegie Mellon University, ROBERT GOLDSTONE, Indiana University (presented by Robert Goldstone). — The sequencing of information not only has a large impact on learning, but can also be easily manipulated to promote learning in educational contexts. For example, educators can opt to introduce examples of different concepts separately (blocked study) or interleaved together. In an inductive category learning task, learners studied more or less discriminable mathematical concepts using either a blocked or an interleaved sequence. Subsequently, learners were tested on their ability to categorize new examples of the concepts. For more discriminable concepts, blocked study led to higher test accuracy, while for less discriminable concepts, interleaved study led to higher accuracy. These results are consistent with different sequences resulting in better encoding of different properties of studied examples. Sequences emphasizing within-concept comparison (blocking) promote acquisition of features held in common by members of the concept, while sequences emphasizing between-concept contrast (interleaving) promote acquisition of features that effectively differentiate between the concepts. Email: Robert Goldstone, rgoldsto@indiana.edu

11:40-11:55 (50)
Deconstructing Self-Explanation to Improve Comprehension of Text. AIMEE CALLENDER, Auburn University. — Self-explanation is an effective way to learn. Previously, we showed that prompted self-explanation can improve comprehension (Callender & Widder, 2013). To further investigate how comprehension monitoring and repair strategies contribute to comprehension, participants read a text and then were prompted to make inferences, elaborations, and predictions (3 strategy group) or comprehension monitoring statements (CM group) after each paragraph. Final performance in the 3 strategy group was superior to both the read-only control and CM group. Analyses of the self-explanations showed that low ability readers made more paraphrases than high ability readers, which correlated with poorer performance. For lower ability readers to benefit from self-explanation, more scaffolding is necessary to change online processing from paraphrasing to more elaborative methods. For high ability readers, generating large numbers of elaborations correlated with the highest performance suggesting that this is a simple strategy that high ability readers can implement during independent study. Email: Aimee Callender, aac0005@auburn.edu

10:20-10:35 (51)
Atypical Interaction of Spatial and Feature-Based Attentional Guidance in People With Schizophrenia. CARLY J. LEONARD, University of California, Davis, BRITTA HAHN and BENJAMIN M. ROBINSON, Maryland Psychiatric Research Center, University of Maryland School of Medicine, STEVEN LUCK, University of California, Davis, JIM G. GOLD, Maryland Psychiatric Research Center, University of Maryland School of Medicine. — Schizophrenia entails a wide range of general deficits, creating a strong need to understand what basic mechanisms underlie such dysfunction. Although attentional impairments have long been implicated, the current study aims to more precisely isolate impairments in specific factors that influence attentional allocation. People with schizophrenia (PSZ) and matched controls monitored a rapid serial visual presentation stream at fixation for a letter target of an attended color and were occasionally presented with peripheral distractors at varying eccentricities. Leonard et al. (2015) showed that this spatial manipulation interacts with the feature relevance of distractors in typical individuals, modulating the magnitude of capture. The present results show that compared to controls, PSZ have enhanced capture for distractors of the attended color near the spatially attended location but not at more distant locations. These results are discussed in conjunction with other evidence suggesting a tendency for PSZ to hyperfocus. Email: Carly J. Leonard, cleonard@ucdavis.edu

10:40-10:55 (52)
Allocating Attention Outside the Focus of Attention. YEHO SHUA TSAL, Tel Aviv University. — I propose that the system of focused attention is heavily influenced by phylogenetic mechanisms favored by natural selection, as well as by ontogenetic mechanisms developed and shaped by life experience. Hence, allocating all resources for the performance of the central task is inefficient. I propose an alternative system that allocates substantial resources for task performance but at the same time preserves necessary attention for monitoring the environment for potentially relevant objects. Peripheral allocation is carried out in a dynamic self-regulated fashion. An initial level of minimal attention, just necessary for detecting significant variations in the environment (e.g., static and dynamic discontinuities) and coarse identification of potentially significant objects is always allocated. Upon a crude identification of impending relevance, more attention is recruited as necessary to prepare for possible action. Peripheral allocation is prioritized; it is granted all resources necessary for the optimal monitoring of the environment. At the same time the system is flexible in adjusting resources needed for the periphery to avoid unnecessary waste of attention and maximize resources for the performance of the central task. Email: Yehoshua Tsal, jehoshua@freud.tau.ac.il
Selection History Determines Visual Salience. ARTEM BELOPOLSKY, Vrije Universiteit. — It has been proposed that selection history constitutes a separate form of attentional control. The present study compared attentional orienting guided by selection history and by physical salience. Participants searched for an odd colored diamond (red or green) and responded to its shape. The search display was preceded by a cue display that also contained a color singleton unpredictable of the target location. The results showed that the cueing effect was larger when the cue singleton matched the color of the previous target. Interestingly, both cues with target-related color showed a larger and earlier cueing effect than an equally salient cue with a target-unrelated color. Similar effects were observed when the color cue was made non-salient. Salient color singleton also failed to capture attention when the distractors in the cue display had target-related color. The results suggest that selection history determines visual salience and speeds up attentional orienting.

Email: Artem Belopolsky, a.belopolsky@psy.vu.nl

Value-Driven Attentional Capture by Images of Money. ZACHARY J. J. ROPER and SHAUN VECERA, University of Iowa (presented by Shaun Vecera). — We examined whether value-driven attentional capture can be induced by images of U.S. bills as secondary reinforcers. Our reward stimuli, $5 and $20 bill images, were thus dissociated from any practical utility. Strikingly, we observed a reliable attentional capture effect for the mere images of bills. Moreover, this finding generalized to images of Monopoly money, but not when the bills were cropped to remove the defining physical features of bills. This challenges the idea that a monetary payout has to be employed in order to observe value-driven attentional capture effects. In contrast, our results suggest that the mere visual presentation of reward-associated stimuli can produce value-driven attentional capture. We argue that a lifelong learning history is responsible for a strong association of bills to reward.

Email: Shaun Vecera, shaun-vecera@uiowa.edu

Measuring Distractor Interference in Goal-Directed Action on a Trial-by-Trial Basis Reveals Selective Residual Inhibition. JEFF MOHER (Member Select-Speaker Award Recipient), Williams College, BRIAN A. ANDERSON, Johns Hopkins University, JOO-HYUN SONG, Brown University. — Salient distractors sometimes capture attention. However, although the magnitude of capture varies from trial-to-trial (Anderson & Folk, 2010), capture is typically quantified by aggregating an observer’s performance over an entire experiment. We used a novel visually-guided reaching approach to assess capture on a trial-by-trial basis. Observers reached to a shape singleton target. When a color singleton distractor was present, hand movements typically deviated towards the distractor, revealing capture. However, a subset of trials revealed suppression, with movement deviation away from the distractor’s location. Importantly, whether capture or suppression occurred on one trial predicted whether hand movements were biased towards or away from that location on the subsequent trial. These results uncover a novel mechanism of residual spatial inhibition that is dependent on the initial behavioral response to a distractor, and more broadly highlight the value of goal-directed action as an empirical tool to behaviorally quantify moment-to-moment cognition.

Email: Jeff Moher, jeff.moher@williams.edu

Psycholinguistics 1
Marquette, Friday Morning, 10:20-12:00
Chair: John M. Henderson, University of California, Davis

Searching for Syntax in the Brain: Evidence From Fixation-Related fMRI. JOHN M. HENDERSON, WONIL CHOI, MATTHEW W. LOWDER, and FERNANDA FERREIRA, University of California, Davis. — Are there domain-specific cortical systems specifically dedicated to computing syntactic representations during language comprehension? We combined methods from computational linguistics, eyetracking, and fMRI to address this question. Subjects read passages of text in an MRI scanner while their eye movements were recorded. We used fixation-related fMRI to look for neural activity associated with syntactic surprisal for each fixated word. Words were controlled for length and frequency, and syntactic surprisal was distinguished from lexical surprisal. We observed syntactic surprisal activity in two cortical regions previously identified with syntactic computations: left inferior frontal gyrus (LIFG) and left anterior superior temporal lobe (LATL). A third predicted region, posterior superior temporal gyrus/sulcus, did not produce surprisal-associated activity. The results are consistent with previous literature suggesting the LIFG and LATL play a critical role in syntactic computations during comprehension.

Email: John M. Henderson, johnhenderson@ucdavis.edu

Do Semantic Contributions to Early Morphological Processing Vary With Target Semantic Density and Reading Skill? LAURIE BETH FELDMAN, SUNY, Albany, MARCO MARELLI, University of Trento, SIMONA AMENTA, Università degli Studi di Milano-Bicocca, KIT CHO, SUNY, Albany, PETAR MILIN, University of Novi Sad. — We test the claim inherent to many models of word recognition, that processing proceeds sequentially from analysis of form to analysis of meaning, by examining patterns of morphological facilitation, from affixed English verb form primes to their stem targets, where these pairs vary in semantic transparency. Patterns of facilitation are examined with forward masked primes at a 48ms SOA. Results reveal significantly faster target latencies for semantically similar/transparent (tester-TEST) than for dissimilar/opaque (testify-TEST) pairs and these early semantic change the claim for sequential analysis based on form devoid of semantic contributions. Novel in the present study, the specification of an appropriate random effects structure controlled for differences between targets including frequency as well as orthographic density measures. Effects of target semantic
density and participants’ reading and spelling skill failed to interact with differences due to semantic transparency. Email: Laurie Beth Feldman, lfeldman@albany.edu

11:00-11:15 (58)
Semantic Alignment Shifts Differently in Conversations With Friends and Strangers. AMIT ALMOR, TIMOTHY WOOD BOITEAU, AMANDA BENNET, and ALAN PEH, University of South Carolina. — We had previously shown that different aspects of conversation (speech planning and monitoring, talking, and listening) interfere with concurrent visuomotor tasks to different degrees and that the familiarity of conversation partners modulates this interference. Here we report the results from a Latent Semantic Analysis (LSA) of the changes in semantic alignment during conversations with friends and strangers over time. Undergraduate participant triads, each consisting of two friends and one stranger, were recruited for the experiment. The main participant was asked to perform a ball-tracking task while communicating with a friend as well as with a stranger during different blocks. We had previously reported the differences in ball-tracking performance in the different conditions. Here we focus on the content of the contributions to the conversation by both the participant and the other person by looking at the semantic alignment between them as gauged by LSA. We found differences in how semantic alignment shifts over time during conversations between friends and conversations between strangers, and, importantly, an interaction between interlocutor familiarity and ball-tracking performance on LSA scores. Email: Amit Almor, almor@sc.edu

11:20-11:35 (59)
Real-Time Cognitive Control Engagement Modulates Recovery From Misinterpretation During Language Processing. NINA HSU (Member Select-Speaker Award Recipient) and JARED NOVICK, University of Maryland. — That people occasionally misunderstand what a speaker says is not newsworthy — but how do they revise promptly to avoid comprehension errors? After all, listeners interpret language input moment-by-moment despite the hurtling rate of speech; sometimes initial interpretations turn out wrong, requiring quick correction before communication hits an impasse, and fails. Though cognitive control may support revision, no research has investigated a cause-and-effect interplay between cognitive control engagement and overriding erroneous interpretations in real-time. Using a novel cross-task paradigm, we show that conflict detection on a Stroop trial, which mobilizes cognitive control procedures, subsequently facilitates listeners’ incremental processing of temporarily ambiguous spoken instructions that induce brief misinterpretation. When the instructions followed Stroop-incongruent versus -congruent items, listeners’ eye-movements to objects in a scene reflected more transient consideration of the false interpretation and earlier recovery of the correct one. Cognitive control engagement therefore accelerates sentence re-interpretation processes, as linguistic input is still unfolding. Email: Nina Hsu, ninahsu@umd.edu

11:40-11:55 (60)
Prediction in the Processing of Repair Disfluencies. MATTHEW W. LOWDER and FERNANDA FERREIRA, University of California, Davis (presented by Fernanda Ferreira). — Two visual-world eye-tracking experiments investigated the role of prediction in the processing of repair disfluencies (The chef reached for some salt, uh I mean some ketchup…). Experiment 1 showed that listeners were more likely to fixate a critical distractor item (pepper) during the processing of repair disfluencies compared to the processing of coordination structures (…some salt, and also some ketchup…). Experiment 2 replicated the findings of Experiment 1 for disfluency versus coordination constructions and also showed that the pattern of fixations to the critical distractor for disfluency constructions was similar to the fixation patterns for sentences employing contrastive focus (…not some salt, but rather some ketchup…). The results suggest that similar mechanisms underlie the processing of repair disfluencies and contrastive focus, with listeners generating sets of entities that stand in semantic contrast to the reparandum in the case of disfluencies or the negated entity in the case of contrastive focus. Email: Fernanda Ferreira, fferreira@ucdavis.edu

Statistics and Methodology II
Continental B, Friday Morning, 10:20-12:00
Chairied by Joachim Vandekerckhove, University of California, Irvine

10:20-10:35 (61)
Mitigation of Publication Bias Through Behavioral Process Models. JOACHIM VANDEKERCKHOVE and MAIME GUAN, University of California, Irvine. — The reliability of published research findings in psychology has been a topic of rising concern. Publication bias, or treating positive findings differently from negative findings, is a contributing factor to this “crisis of confidence,” in that it likely inflates the number of false positive effects in the literature. We demonstrate a Bayesian model averaging approach that takes into account the possibility of publication bias and allows for a better estimate of true underlying effect size. The effects of publication bias are modeled through a censoring model that is based on behavioral characteristics of the publication process. Accounting for the possibility of bias leads to a more conservative interpretation of published studies as well as meta-analyses. We provide details of the method and examples in clinical and social psychology. Email: Joachim Vandekerckhove, joachim@uci.edu

10:40-10:55 (62)
Open Science: Practical Guidance for Psychological Scientists. RICHARD DONALD MOREY, Cardiff University, CANDICE COKER MOREY, University of Edinburgh. — Although openness is a considered a core scientific value, and scientists generally are excited about the possibilities of open science, uptake of open practices in the published literature tends to be low. Given the great benefits of openness in science, including greater transparency, faster error detection and correction, faster replications, easier collaboration,
and more permanent records of scientific activities, it may seem strange that uptake is slow. Modern tools available on the internet allow for any degree of openness from simple data sharing to radical transparency, but because scientific training is largely based on an apprentice model, older less open practices tend remain in place for longer than necessary. We offer a short guide to increasing openness in psychological science, with helpful ideas for everyone, from graduate students just beginning their training to senior researchers who cannot radically change their practices but nonetheless wish to contribute to changing scientific culture toward openness. An emphasis is placed on practical guidance that can be implemented with minimal disruption to one’s research flow, but with great benefits to research quality. Email: Richard Donald Morey, moreyr@cardiff.ac.uk

11:00-11:15 (63)

**Replications With the Wrong Dependent Measure Perpetuate Erroneous Conclusions.** CAREN M. ROTELLO, University of Massachusetts, EVAN HEIT, University of California, Merced, CHAD DUBE, University of South Florida (presented by Evan Heit). — There is a replication crisis in psychological science: Many effects have proven uncomfortably difficult to reproduce. Still, there is a deeper and more insidious problem in the field: the persistent and dramatic misinterpretation of empirical results that replicate easily and consistently. Using a series of highly studied textbook examples from different research domains (eyewitness memory, deductive reasoning, social psychology, and child welfare), we show how simple unrecognized incompatibilities among dependent measures, analysis tools, and the properties of data can lead to fundamental interpretive errors (Rotello, Heit, & Dube, PB&R, 2015). These errors, which may increase rather than decrease with additional data collection, can lead to incorrect theoretical conclusions and unsupported policy recommendations. We conclude with a set of recommended strategies to reduce the probability of these persistent and largely unrecognized errors. The use of receiver operating characteristic (ROC) curves is highlighted as one such recommendation. Email: Evan Heit, gheitt@ucmerced.edu

11:20-11:35 (64)

**Accuracy Differences for Congruent and Incongruent Belief Bias Problems Reflect Response Bias.** CAREN M. ROTELLO, University of Massachusetts, EVAN HEIT and LAURA J. KELLY, University of California, Merced. — The behavioral literature on the belief bias effect has focused on explaining the observed interaction between conclusion believability and validity. Dube, Rotello, and Heit (2010) used ROC analysis to show that reasoning accuracy does not vary with believability, but subjects’ response bias does. In neuroscientific studies of belief bias, analyses compare decision accuracy on problem conclusions that are congruent (Valid and Believable or Invalid and Unbelievable) with those that are incongruent (Valid but Unbelievable or Invalid but Believable). This, too, turns out to be a response bias effect: Rotello and Heit (2014) showed mathematically that the apparent accuracy difference occurs because participants make more valid decisions to believable than unbelievable problems. We report two behavioral studies that directly assess the response-bias interpretation of the congruency effect on accuracy. In both experiments, individual participants’ tendency to say “valid” for believable conclusions perfectly predicted their accuracy differences as a function of congruency. Email: Caren M. Rotello, caren@psych.umass.edu

**11:40-11:55 (65)**

**Extraneous Factors Influence Measures of Attention in the Attentional Networks Task.** COREY WHITE, Syracuse University. — The Attention Networks Task (ANT) is commonly employed to assess function of attention networks involving orienting, alerting, and selective attention. The task involves flanker stimuli (<<><>) and different types of cues before the stimulus, and attentional processing is assessed by response time differences between conditions. However, previous work in other domains shows that RTs are affected by multiple processes and decision criteria, suggesting that the measures of attentional processing might be confounded by other processes. To test this possibility, we analyzed data from a large set of participants performing the ANT and found that a participant's overall response speed is significantly correlated with their attention scores. A follow-up experiment was performed in which participants were instructed to focus on speed or accuracy in different blocks of trials. The speed/accuracy manipulation resulted in differences in attention scores, namely that alerting and orienting scores were larger in accuracy vs. speed blocks. This suggests that factors like response caution can contaminate measures of attentional processing. Implications for analysis of individuals and group differences are discussed. Email: Corey White, cnwhite@syr.edu

**National Science Foundation and European Research Council: Domestic Funding Opportunities and Support for International Collaborations**

Boulevard, Friday Noon, 12:00-1:20

Chaired by Robert Logie, University of Edinburgh

Speakers: PASCAL DISSARD, Scientific Officer for European Research Council and ROBERT LOGIE, Panel Chair for European Research Council Advanced Grants.

CATHERINE M. ARRINGTON, NSF Behavioral and Cognitive Sciences Division, and EVAN HEIT, NSF Division of Research on Learning.
Test-Potentiated (New) Learning
Williford, Friday Afternoon, 1:30-3:10
Chaired by Jason Chan, Iowa State University

1:30-1:45 (66)
Interpolated Testing Improves Attention, Learning, and Integration of Information Presented in Video-Recorded Lectures. KARL SZPUNAR, University of Illinois at Chicago, HELEN JING and DANIEL SCHACTER, Harvard University. — Prior work has consistently demonstrated that interpolating a long study sequence with brief memory tests can serve to substantially enhance learning of new information presented after testing. However, most studies typically assess learning in terms of rote recall and little is currently known about whether interpolated memory tests can improve the quality of the associated learning. In a new set of experiments, students learned from a 40-minute public health lecture. We showed that interpolated memory tests could not only enhance the amount of information that students learned about the lecture, but also the extent to which they meaningfully integrated their knowledge about the lecture. Measures of mind wandering were also acquired in the context of these studies and revealed patterns of results that further broaden our current understanding of the relation between interpolated testing and gains in attention during lectures. We discuss the implications of our results for educational practice. Email: Karl Szpunar, szpunar@uic.edu

1:50-2:05 (67)
Not all Retrieval During Learning Facilitates Subsequent Memory Encoding. YANA WEINSTEIN, University of Massachusetts-Lowell. — Retrieving a list after studying it serves to eliminate proactive interference (PI) on subsequent lists. Can retrieval of unrelated information do the same? Pastötter, Schicker, Niedernhuber, and Bäuml (2011, JEP:LMC) reported that semantic generation between study of word lists successfully eliminated PI. In a series of 3 experiments, I failed to confirm that retrieval of unrelated information eliminates proactive interference. In Experiment 1, participants studied five lists and for lists 1-4 either took a test on that list, restudied it, or generated an autobiographical memory. Performance on the list 5 recall test was no better in the autobiographical memory condition than in the restudy condition. In Experiments 2a (related words) and 2b (unrelated words), I matched the critical aspects of the procedure as closely as possible to Pastötter et al.'s. I included both my autobiographical memory task, and Pastötter et al.'s semantic generation task between study of word lists as between-subjects conditions. In both experiments, neither recalling an autobiographical memory nor semantic generation reduced PI. Email: Yana Weinstein, Yana_Weinstein@uml.edu

2:05-3:05 (70)
Test-Potentiated (New) Learning: A Meta-Analytic Review. JASON CHAN, SARA D. DAVIS, and CHRISTIAN MEISSNER, Iowa State University. — An emerging literature shows that testing can facilitate subsequent learning activities. This effect, broadly termed test-potentiated learning, appears to be robust. We will present the key results of a large scale meta-analysis that summarizes existing research on this topic. The results showed a clear benefit of testing on subsequent accurate recall and (reduced) intrusions. For both dependent variables, there was a slight publication bias whereby published studies demonstrated larger effects than unpublished studies. Few variables moderated the beneficial effects of testing on intrusions. However, several moderator variables (e.g., interleaving initial testing with new learning trials, initial test type, final test type) had a substantial impact on the magnitude and even direction of test-potentiated influence memory for complex events. For example, taking a test after witnessing a staged-crime has been shown to increase susceptibility to post-event misinformation. Evidence supports the conclusion that enhanced suggestibility may be the result of fluency-biased responding that accrues from the attention directed to post-test information. Changes in attention allocation to post-event details have been directly linked to preceding testing as well as response accuracy. Further, exogenously manipulating attention results in identical patterns of suggestibility as those found when retrieval and study are interleaved. However, more recent studies suggest that attention may be important for retrieval enhanced suggestibility, but may play a smaller role in retrieval enhanced learning. Thus, the effects of retrieval practice on event memory and misinformation susceptibility are contingent on the interaction between attention and the demands of the test. Email: Ayanna Thomas, ayanna.thomas@tufts.edu
learning on accurate recall. Our meta-analysis also identifies numerous questions unanswered by the literature. Email: Jason Chan, ckchan@iastate.edu

Reasoning
Marquette, Friday Afternoon, 1:30-3:30
Chaired by Michelle Arnold, Flinders University

1:30-1:45 (71)
Understanding Anomalous Belief: Exploring Memory and Reasoning for Believers of Extraordinary Phenomena. MICHELLE ARNOLD, NICOLA VOZZO, DANIELLE WELCH, LEAH MCCANN, and TOBY PRIKE, Flinders University. — Interest has grown in anomalous beliefs (e.g., paranormal, extra-terrestrials), as several studies have shown cognitive differences between believers and non-believers. The goals of the current studies were to clarify these previous findings and expand our understanding of anomalous belief. Experiment 1 explored memory differences for believers and non-believers by using words studied in either an anomalous or control context. Experiment 2 tested for a relationship between anomalous and complementary alternative medicine beliefs, and related these beliefs to performance on a confirmation bias task (Wason Selection Task). Finally, Experiment 3 looked at anomalous belief and two probabilistic reasoning tasks; perception of randomness and base rate fallacy. We also included measures of sleep (Experiment 1), working memory capacity (Experiments 1 and 3), and thinking styles (Experiment 3). Using regression analyses, relationships emerged between level of anomalous belief and other task measures, which will be discussed in terms of potential underlying mechanisms. Email: Michelle Arnold, michelle.arnold@Flinders.edu.au

1:50-2:05 (72)
Individual Differences in Bias Detection During Thinking. DARREN FREY, Paris Descartes University, WIM DE NEYS, CNRS-Paris Descartes University (presented by Wim De Neys). — Decades of reasoning and decision-making research has established that human judgment is often biased by intuitive heuristics. Recent “error” or bias detection studies have focused on reasoners’ abilities to detect whether their heuristic answer is erroneous and conflicts with logical or probabilistic principles. A key open question is whether there are individual differences in this bias detection efficiency and how this affects reasoning performance. Here we present three studies in which co-registration of different error detection measures allowed us to assess bias detection sensitivity at the individual participant level in a range of reasoning tasks. Results indicate that although most individuals show robust bias detection (as indexed by increased latencies and decreased confidence associated with erroneous answers), there are subgroups of reasoners who consistently fail to do so. We discuss implications for the debate on human rationality and popular dual process theories. Email: Wim De Neys, wim.de-neys@parisdescartes.fr

2:10-2:25 (73)
Do People Make Optimal, Bayesian, Predictions for Everyday Events? PETE CASSEY, University of Newcastle, CHRIS DONKIN, University of New South Wales, SCOTT BROWN, University of Newcastle, GUY HAWKINS, University of Amsterdam (presented by Scott Brown). — Reasoning and inference are well-studied aspects of basic cognition that have been explained as statistically optimal Bayesian inference. Using a simplified experimental design, we conducted quantitative comparisons between Bayesian inference and human inference, at the level of individuals. In a series of four experiments, with more than 14,000 participants, we asked people to make prior and posterior inferences about the probability of one of two coins generating certain outcomes. Most participants behaved in a manner inconsistent with what would be expected if they were updating their beliefs via Bayes rule. Only in the most simplified version of the task did the majority of participants adhere to Bayes rule, but even in that case there was a large proportion who failed to do so. The current results highlight the importance of close quantitative comparisons between Bayesian inference and human data at the individual-subject level when evaluating Bayesian models of cognition. Email: Scott Brown, scott.brown@newcastle.edu.au

2:30-2:45 (74)
Evaluating Explanations: What Makes a Good Explanation? JEFFREY C ZEMLA and STEVEN SLOMAN, Brown University, DAVID A. LAGNADO and CHRISTOS BECHLIVANIDIS, University College London. — People rely heavily on explanations in order to make sense of the world and to impart knowledge to others. However bad explanations have the power to spread misinformation and hinder social and scientific progress. What leads people to think an explanation is good? We collected explanations across a variety of domains from Reddit’s Explain Like I’m Five.” While previous research has largely focused on scientific explanations, our corpus of lay explanations spans domains such as social policy, historical, legal, and public health. Participants from MTurk rated these explanations on overall quality as well as numerous additional attributes (e.g., articulation, scope, alternatives, internal coherence, etc.). Our results indicate that subjective ratings of internal coherence accounted for nearly half the variance in individual quality ratings. We further analyzed the structure of the explanations in various ways (e.g., causal structure) to determine what representations people are most attuned to. Email: Jeffrey C Zemla, jeffzemla@gmail.com

2:50-3:05 (75)
Searching for the Best Cause: Roles of Mechanism Beliefs, Autocorrelation, and Exploitation. BENJAMIN ROTTMAN, University of Pittsburgh. — When testing which of multiple causes (e.g., medicines) works the best, the testing sequence has important implications for the validity of the final judgment. Trying one cause for a period of time is important if the cause has tolerance, sensitization, delay, or carryover effects (TSDC). Alternating between the causes is important in autocorrelated environments – when the outcome naturally comes and goes in waves or follows a temporal trend. Across
two studies, participants’ beliefs about TSDC influenced the amount of alternating; however, their beliefs about autocorrelation had a very modest effect on the testing strategy. When TSDC effects are impossible and autocorrelation is high, alternating between two causes is the best strategy, though relatively few participants alternated frequently. This research helps chart how well people adapt to various environments in order to optimize causal learning, and these findings could justify decision support tools or training to improve causal search skills for certain occupations such as doctors trying to find the best medication for an individual patient.

Email: Benjamin Rottman, rottman@pitt.edu

3:10-3:25 (76)
Eye-Tracking Denominator Neglect Tells Us About Confidence and Accuracy. VALERIE THOMPSON, University of Saskatchewan. — This experiment investigated individual differences in attentional strategies in a denominator neglect task. One hundred participants solved each of 16 problems twice: Once under a strict (1.6 sec) deadline and a second time without time restriction. Each problem presented two fractions and pictures of two trays of red and white jelly beans: Participants were told to select the tray that offered the greatest chance of selecting a red bean. Eye-gaze was tracked with SMI RED-m remote eye-tracking device. We also obtained individual differences measures of IQ, numeracy and thinking dispositions. Under a deadline, participants resorted to the less optimal strategy of focussing on the trays; under free time, they switched to the fractions. Individual differences in gaze patterns predicted variance in both self-reported confidence and accuracy after controlling for the effect of IQ, thinking dispositions, and numeracy.

Email: Valerie Thompson, valerie.thompson@usask.ca

Spatial Cognition
Continental B, Friday Afternoon, 1:30-3:30
Chairied by Jeanine Stefanucci, University of Utah

1:30-1:45 (77)
The Effect of Anxiety on Gender Differences in Survey Spatial Learning. IAN RUGINSKI, JEANINE STEFANUCCI, and SARAH CREEM-REGEHR, University of Utah (presented by Jeanine Stefanucci). — Past research shows that state anxiety redirects attention to less global stimuli and compresses perceptual spatial judgments. The current study tested if state and trait spatial anxiety underlie gender differences in survey spatial learning during navigation. We used a virtual desktop survey spatial learning task and manipulated state anxiety between-subjects. Controls breathed through a wide straw while individuals in the anxiety condition breathed through a very narrow straw. Participants passively learned the locations of landmarks and then were tested using egocentric pointing and map landmark placement tasks. Results showed that males performed better than females overall, replicating past work. Further, state anxiety adversely affected pointing accuracy for females but not males. State anxiety did not affect map distance judgments. Trait spatial anxiety did not mediate gender differences in survey spatial learning performance.

Results are discussed in the context of how anxiety might underlie gender differences in survey spatial learning. Email: Jeanine Stefanucci, jeanine.stefanucci@psych.utah.edu

1:50-2:05 (78)
Age-Related Changes in Spatial Learning: Roles of Orientations and Perspectives. NAOHIDE YAMAMOTO, Queensland University of Technology, MICHAEL J. FOX, Cleveland State University. — Not all forms of spatial learning are equally susceptible to aging effects. Specifically, we have shown that older adults are more impaired at learning a spatial layout through exploratory navigation than through map reading (Yamamoto & DeGirolamo, 2012, Frontiers in Aging Neuroscience). In exploratory navigation, observers experience multiple orientations of an environment in a ground-level perspective. In map reading, typically, observers view a map from a specific orientation in an aerial perspective. Thus, it remains unclear whether older adults had difficulty in processing spatial information in a particular perspective or managing varying orientations. To address this issue, the present study added a new condition in which participants learned the spatial layout through a map that was periodically turned. Older adults’ performance in this new condition was equivalent to that in the exploratory navigation condition, suggesting that the spatial learning impairment primarily stemmed from age-related decline in processing multiple orientations.

Email: Naohide Yamamoto, naohide.yamamoto@qut.edu.au

2:10-2:25 (79)
Effects of Gesturing Strategies on Navigation Performance and Spatial Memory. ALEXIA GALATI, University of Cyprus, STEVEN M. WEISBERG, Temple University & University of Pennsylvania, NORA NEWCOMBE, Temple University, MARIOS N. AVRAAMIDES, University of Cyprus. — Does gesturing during route learning facilitate navigation and memory? In Experiment 1, 36 participants were instructed to gesture while studying the description of one route and to keep their hands still for another. When they gestured, participants were slower and made more errors during navigation in a virtual environment. However, they showed better memory, at least for one route, particularly if they had lower spatial ability scores. Thus, forcing gestures may tax cognitive resources or introduce ambiguities in the initial representation of the environment, but may facilitate memory in the end. In Experiment 2, 24 participants studied the same route descriptions without instructions either to gesture or to hold their hands still, i.e., they gestured spontaneously. In analyses so far, the effects of gesturing continue to depend on the complexity of the route and the spatial abilities of the navigators, suggesting the advantage of gesturing is selective rather than global.

Email: Alexia Galati, alexia.galati@gmail.com

2:30-2:45 (80)
Examining Chimpanzees’, Bonobos’, And Humans’ Navigational Decision-Making Strategies in Virtual Small- and Large-Scale Space. FRANCINE DOLINS, University of Michigan, Dearborn, CHARLES R. MENZEL
and WILLIAM D. HOPKINS, Georgia State University, JARED P. TAGLIATELTA, Kennesaw State University, CHRISTOPHER KLIMOWICZ, University of Michigan-Ann Arbor. — Foraging primates localize resources across ecologically complex landscapes, exploiting feeding sites of varying spatial dimensions to balance navigational efficiency and energy costs with nutrient intake, seasonal availability, competition and group size. Generation of navigational strategies and spatial representations in large- and small-scale space were predicted to differ by distance between landmarks, geometric features, and encoded associations. Comparing navigational strategies in environments of varied spatial scale presents significant methodological challenges. This study compared four captive chimpanzees, five bonobos, and 16 humans in virtual reality environments that varied in scale but displayed parallel landmark arrangements. Results indicate that chimpanzee, bonobo and human participants applied topological strategies in both small- and large-scale space. They did not demonstrate shifts in spatial strategy in relation to scale or resource distribution. Email: Francine Dolins, fdolins@umich.edu

2:50-3:05 (81)
Naive Psychophysics of Physics Teachers. MICHAEL K. MCBEATH and ROSALINE A. DYE-JOHNSON, Arizona State University. — Naive Physics refers to cognitive biases and systematic inaccuracies about physical properties or behaviors, with examples like misjudgments of ball trajectories, inertia, and causality. Classically, naive physics is framed as uneducated errors best remedied by taking classes in physics and STEM areas that emphasize modeling from an inanimate, allocentric perspective. Yet, many naive physics biases may just be functional shortcuts that generalize over a range of animate, egocentric situations. If so, then formal training in physics may sometimes diminish performance in judgments of perceptual, psychophysical phenomena. We surveyed 221 physics teachers and educators from a national physics-education network. We asked about ball trajectories, curved animate motion, and acoustics. We found physics experts often systematically err, overgeneralizing principles taught in physics, so that they are frequently poor at considering psychophysical phenomena. Our findings support that many naive physics biases may be functional compromises that physics education can train away or hide, leading physics experts to overcompensate, favoring inanimate, allocentric perspectives even when asked to predict animate egocentric ones. Email: Michael K. McBeath, m.m@asu.edu

3:10-3:25 (82)
Cognitive Load Increases Bias in Estimation. SEAN DUFFY, JOHN SMITH, and SARAH ALLRED, Rutgers-Camden, L. ELIZABETH CRAWFORD, University of Richmond. — Previous work demonstrates that memory for simple stimuli can be biased by information about the category of which the stimulus is a member. Specifically, stimuli with values greater than the category’s average tend to be underestimated and stimuli with values less than the average are overestimated. This is referred to as the central tendency bias. This bias has been explained as an optimal use of both noisy sensory information and category information. In a largely separate literature, cognitive load experiments attempt to manipulate the available working memory of participants in order to observe its effect on choice or judgments. In three experiments, we demonstrate that participants under a high cognitive load exhibit a stronger central tendency bias than when under a low cognitive load. Although not anticipated at the outset, we also find that judgments exhibit an anchoring bias. Email: Sean Duffy, seduffy@camden.rutgers.edu

1:30-1:45 (83)
Phonological Effects in Humor Perception. CHRIS WESTBURY and RENZO GARCIA, University of Alberta. — Westbury, Shaoul, Moroschan, & Ramscar (submitted) found that the Shannon entropy of the orthographic representation of non-words reliably predicts the extent to which people rate a nonword as humorous. This follow-up study examines the role of the phonological content of NWs on humor perception. In two experiments, we demonstrate that the number of words a biphone appears in and the frequency of those words are together predictive of both absolute and relative (forced-choice) non-word humor judgments. These measures interacted with how frequently phonemes occurred in non-words previously rated for humor, suggesting a sound symbolic effect for a subset of phonemes that is independent of the two frequency measures. In a pair-wise forced choice experiment, a statistical model of non-word humor was able to predict 50 choices reliably for 87% of experimental participants, correctly predicting individual choices as often as 84% of the time. Email: Chris Westbury, chrisw@ualberta.ca

1:50-2:05 (84)
The Locus of the Facilitation Effect in Backward Priming. CURT BURGESS, University of California, Riverside. — The role of backward priming (e.g., baby-stork) has played an important role in adjudicating between multiple and selective access processes in ambiguous word priming. Peterson and Simpson (1989) demonstrated that backward priming does not occur in the circumstances that could compromise this issue. Of interest in this experiment is determining if the backward priming effect occurs at a lexical (associative) level, a semantic level, or by some other post-lexical process. Using the HAL model, semantic distances and conditional probabilities (associative measure) were computed for the 2 (directionality) X 2 (symmetry) X 2 (relatedness) design. Results showed that conditional probability was considerably stronger for the backward priming (or unidirectional) condition (stork, baby) than for the reverse. The pattern from the conditional probability measure and the semantic distance measure...
suggest that the locus of effect for the backward priming word pairs is primarily at a lexical, associative level of processing. Email: Curt Burgess, curt@ucr.edu

2:10-2:25 (85)
Disambiguating Homographs: Multiple Priming From Diverse Sources. DAVID S. GORFEIN, University of Texas, Dallas. — In a series of recent studies it has been demonstrated that repeated priming of the secondary meaning of a homograph results in an increased likelihood of eliciting a secondary meaning response to a word-association test ten or more minutes later. Such an effect was found when the homographs were primed from one to three times in a sentence-sensibility judgment task as well as a comprehension test in which participants read one or three stories containing the homograph in a secondary meaning context. The present study addressed the question of whether diverse forms of priming would lead to similar effects. Two priming tasks were employed: 1) a picture-location task in which participants were required to remember the quadrant on the page in which each picture labeled by a verbal homograph had appeared in a multi-page display of pictures, and 2) a sentence-sensibility judgment task. The order of the two tasks was counterbalanced across participants. Performance was tested with a subsequent word-association test. The design also provided the opportunity to assess the direct effect of the picture task on sensibility judgments. Results indicate a combined effect of the two presentation forms. Email: David S. Gorfein, dgorfein@yahoo.com

2:30-2:45 (86)
Conceptual Combination Influenced by Actions on Physical Objects. TIMOTHY CLAUSNER, University of Maryland, MARY LOU MAHER and BERTO GONZALEZ, University of North Carolina, Charlotte. — Hand actions and gestures are known to influence problem solving but little is known about their role when hands manipulate physical objects. We investigated the role of action type in a conceptual combination task adapted from Wisniewski and Gentner (1991). Middle-school aged participants combined nouns from different taxonomic categories then described combined meanings. Action type varied in two conditions: non-manipulable (point and touch actions) in which word stimuli were printed on a poster paper; and manipulable in which words on cubes afforded grasp, arrange, point and touch actions. Participants described more between-category relations (e.g., N1 “shaped like” N2) in the non-manipulable condition than when manipulating cubes, which yielded more within-category descriptions (e.g., “it’s a” N1 with properties of N2). The results imply that actions which manipulate objects engage conceptualization and influence meaning differently than other actions and gestures. We will discuss the relative role of actions and gestures in conceptualization. Email: Timothy Clausner, tim.clausner@gmail.com

2:50-3:05 (87)
The Mechanisms of Semantic Priming: Insights From Individual Differences. SALLY ANDREWS, University of Sydney; MELISSA PRINCE, Flinders University, AARON VELDRE, University of Sydney. — This experiment compared semantic priming effects from masked 50 ms primes with brief (200 ms) visible primes in 99 skilled readers assessed on vocabulary and spelling ability. To distinguish between prospective and retrospective contributions to semantic priming, symmetrically associated words (eg answer-question), were compared with pairs that were asymmetrically associated in either the forward (eg panda bear) or backward (eg ball-catch) direction. Higher proficiency on a composite measure of vocabulary and spelling was associated with stronger priming from masked primes, regardless of type of association, but reduced priming from unmasked primes, particularly symmetrical and backward associates. These findings suggest that higher lexical proficiency is associated with enhanced automatic spreading activation and reduced reliance on strategic mechanisms such as retrospective matching. Email: Sally Andrews, sally.andrews@sydney.edu.au

1:30-1:45 (88)
Evidence for Capacity Sharing When Stopping. *FREDERICK VERBRUGGEN, University of Exeter, GORDON LOGAN, Vanderbilt University. — Research on multitasking indicates that central processing capacity is limited, resulting in a performance decrement when central processes overlap in time. The main theoretical and computational accounts of stop performance assume that going and stopping do not share processing capacity. However, almost all previous investigations of capacity sharing between stopping and going have manipulated the difficulty of the go task while keeping the stop task simple. In this study, we manipulated the difficulty of the stop task. In four experiments, subjects performed a selective stop-change task, which required them to stop and change a go response if a valid signal occurred, but to execute the go response if invalid signals occurred. We found strong dependence between stopping and going, especially when the demands on the rule-based system were high. Our results also shed a new light on strategy selection in selective stop tasks. We propose that in these tasks, the decision to stop or not will share processing capacity with the go task. This idea can account for performance differences between groups, subjects, and conditions. I will discuss implications for the wider stop-signal and dual-task literature. Email: Frederick Verbruggen, f.l.j.verbruggen@exeter.ac.uk

1:50-2:05 (89)
Attentional Inertia as a Source of Task-Switch Costs. STEPHEN MONSELL, AURELIU LAVRIC, CAILONGMAN, and HEIKE ELCHLEPP, University of Exeter. — Accounts of the performance costs observed when participants switch between simple cognitive tasks have tended to emphasize the conflict between the S-R rules of the present and previous
task(s). But in the majority of task-switching experiments, participants must also switch attention between different stimulus attributes, or sources. We will review evidence from several kinds of experiment indicating that difficulty in resetting attentional parameters (“attentional inertia”) can contribute substantially to task-switch costs, even when there is ample opportunity for task-set preparation before the stimulus onset. The research reviewed includes experiments which localize the costs of a task-switch to early or later processes within the latent interval using ERPs, experiments which directly monitor attention using eye-tracking, and experiments in which the S-R rules remain constant from trial to trial and only attentional parameters change. Email: Stephen Monsell, s.monsell@ex.ac.uk

2:10-2:25 (90)
The Attention Networks: An Electrophysiological Study in Older Adults. SOLEDAD BALLESTEROS and CARMEN PITA, Universidad Nacional de Educación a Distancia, FRANCISCO MUNOZ, Universidad Complutense de Madrid, JULIA MAYAS, Universidad Nacional de Educación a Distancia. — The present study investigated the neural correlates of the alerting, orienting and executive control networks and their interactions in older adults. A group of cognitively healthy older adults performed the Attention Network Test-Interactions. ERPs results showed significant differences in the P300 between congruent and incongruent conditions in fronto-central areas. In the alerting network, we found a P100 component related to the alerting tone. The interaction alerting by executive attention networks indicated that the tone reduced the P300 difference in fronto-parietal areas suggesting a facilitation to inhibit incongruent stimuli. Behavioral results showed the facilitatory effect of the tone, especially in the valid condition and in the executive control network. Alerting cues speeded up the shifts of attention and enhancing orienting processes in the congruent condition. A study in progress with young adults will inform about the changes occurring in the attention networks with age. Email: Soledad Ballesteros, mballesteros@psi.uned.es

2:30-2:45 (91)
The Costs and Benefits of Switching Between Single and Dual-Task Performance. HAGIT MAGEN, Hebrew University of Jerusalem. — Task switching costs occur when tasks alternate on consecutive trials due to interference and reconfiguration processes. The present study explored task switching between single and dual-task trials which required the addition (single-to-dual switch) or the elimination (dual-to-single switch) of task-sets. In three experiments, visual and auditory single-task and dual-task trials with equal emphasis were intermixed within blocks. Across experiments, significant single-to-dual and dual-to-single switching costs were observed, with partial task repetition benefits in the single-to-dual switches. A cue providing information of the upcoming task was introduced in Experiments 2 and 3 allowing the manipulation of the response-cue interval (RCI) and the cue-target interval (CTI). Increasing the RCIs resulted in smaller switching costs only for the dual-to-single switches, whereas longer CTIs reduced both types of costs. Overall, the results demonstrate that switching between single and dual-task contexts involves both active and passive components, and suggests that dual-task performance can benefit from single task-set activations in preceding trials. Email: Hagit Magen, mnsragen@mail.huji.ac.il

2:50-3:05 (92)
Bottom-Up and Top-Down Effects of Visual Attention on Task Selection During Voluntary Task Switching. CATHERINE M. ARRHINGTON, KAITLIN M. REIMAN and DAVID BRAUN, Lehigh University. — Models of task selection during voluntary task switching (VTS) assume that participants form the intent to perform a task then configure a task set appropriate for that task; however, ample evidence suggests that task selection deviates from this ideal. We previously proposed that bottom-up and top-down shifts of visual attention may be the mechanisms by which stimulus availability (Arrington, 2008) and stimulus set selection strategies (Arrington & Weaver, 2015) influence task selection. We tested these hypotheses in two experiments in which subjects performed VTS with letter and number stimuli while eye movements were monitored. When stimuli onset asynchronously, first fixation to S1 drove the increasing probability of performing the task associated with S1. With synchronous onset, task selection was correlated with first fixation and individual differences suggested multiple task selection strategies including stimulus set selection based on target location. Eye movements confirm multiple roles for visual attention in task selection. Email: Catherine M Arrington, kate.arrington@lehigh.edu

3:10-3:25 (93)
Strategic Transitions of Attentional Guidance Between Visual Working Memory and Long-Term Memory. CHRISTIAN OLIVERS, VU University Amsterdam. — Current models emphasize a close connection between visual attention and visual working memory (VWM). However, recent evidence suggests a rapid transition of attention-biasing representations from VWM to long-term memory (LTM) with target repetition. In several experiments we combined VWM, visual search, and target repetition. Observers searched for a target kept in memory, or searched for a target while some other item was kept in memory for an accessory task that was irrelevant to the search. In some experiments we repeated the search target, while in others we repeated the accessory memory item. The results indicate a marked reduction in VWM involvement within just one or two repetitions in all experiments. However, what is learned is under considerable strategic control: Depending on the task-relevance of the memorized item, repetition leads to either increased or reduced attentional bias. Furthermore, the change from relying on VWM to relying on LTM is also under strategic control: VWM can be re-invoked after learning when observers expect that VWM is soon required again. The results point towards a dissociation between mechanisms of learning and mechanisms of memory-based attentional guidance. Email: Christian Oliver, c.p.l.olivers@vu.nl
Audition
International North, Friday Afternoon, 1:30-2:50
Chairled by Andrea R. Halpern, Bucknell University

1:30-1:45 (94)
Individual Differences in Auditory Imagery Predict Structure and Function of Sensorimotor Systems. CESAR LIMA, University College London, NADINE LAVAN, Royal Holloway, SAMUEL EVANS, University College London, ZARINAH AGNEW, University of California, San Francisco, ANDREA R. HALPERN, Bucknell University, PRADHEEP SHANMUGALINGAM, SOPHIE MEEKINGS, DANA BOEBINGER, MARKUS OSTAREK, CAROLYN MCGETTIGAN, JANE WARREN, and SOPHIE SCOTT, University College London (presented by Andrea R. Halpern).
— People vary in the extent to which they report vivid auditory imagery, but not much is known about what brain systems might mediate these differences. Combining voxel-based morphometry and fMRI, we examined the structural basis of individual differences in self-report of auditory imagery, and explored associations among auditory imagery, visual imagery, and auditory processing. Vividness of auditory and visual imagery correlated with grey matter volume in the supplementary motor area (SMA), parietal cortex, superior medial frontal gyrus, and middle frontal gyrus. An analysis of functional responses to different types of vocalizations revealed that the SMA and parietal sites that predict imagery are also modulated by sound type. Higher representational specificity of sounds in SMA predicted vividness of imagery, indicating a link between sensory- and imagery-based processing in sensorimotor cortex. These findings provide evidence for a common role of perceptual-motor interactions for processing heard and internally generated auditory information.
Email: Andrea R. Halpern, ahalpern@bucknell.edu

1:50-2:05 (95)
The Rhythm of Perception: Acoustic Rhythmic Entrainment Induces Subsequent Perceptual Oscillation. GREG HICKOK, HALEH FARAHBOD, and Kourosh Saberi, University of California, Irvine. — Acoustic rhythms are pervasive in speech, music, and environmental sounds. Evidence for neural codes representing periodic information has recently emerged, which seems a likely neural basis for the ability to detect rhythm and rhythmic information has been found to modulate auditory system excitability, providing a potential mechanism for parsing the acoustic stream. Here we explore the effects of a previous rhythmic stimulus on subsequent auditory perception. We found that low-frequency (2, 3, & 5Hz) amplitude modulated signals induce a subsequent oscillation of perceptual detectability of a brief non-periodic acoustic stimulus (1 kHz tone); the frequency but not phase of the perceptual oscillation matches the entrained stimulus-driven rhythmic oscillation. This provides evidence that rhythmic contexts have a direct influence on subsequent auditory perception of discrete acoustic events. Rhythm coding is likely a fundamental feature of auditory system design that predates the development of explicit human enjoyment of rhythm in music or poetry.
Email: Greg Hickok, greg.hickok@uci.edu

2:10-2:25 (96)
Spoken Word Identification Involves Accessing Position Invariant Phoneme Representations. JEFFREY BOWERS and Nina Kazanina, University of Bristol, NORA ANDERMANE, University of Sussex. — We investigated the role of phonemes in speech perception using a novel adaptation technique. Participants repeatedly categorized an ambiguous test stimulus that started with a blended /l/-/s/ fricative (?ail can be perceived as /fail/ or /sail/) or blended /d/-/b/ stop (?ail can be perceived as /fail/ or /sail/) after exposure to a set of adaptor words. Adaptors included unambiguous /l/ or /s/ fricatives or /d/ or /b/ stops at the start (e.g., farm), onset of second syllable (e.g., tofu), or the end (e.g., leaf) of words. Similarly sized adaptation effects were obtained for the fricatives and stops across positions despite the fact that the acoustics of stops vary more as a function of position. The findings support the claim that position independent phonemes play a role in word identification.
Email: Jeffrey Bowers, j.bowers@bristol.ac.uk

2:30-2:45 (97)
Factor Analysis of Lateralized Auditory Perceptual Resources. ERIC T. GREENLEE and DAVID BOLES, University of Alabama. — Previous research indicates that the hemispheric lateralization of auditory perceptual processing is task-dependent, meaning that lateralization depends upon which auditory qualities must be discriminated in a given task. A number of these lateralized auditory processes have been identified; yet, the exact number of lateralized auditory resources, the nature of their processing, and the relationships between these resources remains unclear. In order to address these uncertainties, 13 tasks representing previously reported asymmetric perceptual performance were selected for use in the current study. Perceptual asymmetries from 124 participants were factor analyzed, revealing evidence for multiple, independent auditory resources, each responsible for a different type of perceptual processing. Whereas previous research has examined these processes in a piecemeal fashion, the current findings provide a relatively comprehensive model of lateralized auditory resources. Further, these results have potential applications for the field of cognitive task analysis.
Email: Eric T. Greenlee, greenleeete@gmail.com

Implicit Learning and Memory
Continental B, Friday Afternoon, 3:50-5:30
Chairled by Heather Bortfeld, University of Connecticut

3:50-4:05 (98)
Auditory Deprivation Does Not Impair Implicit Sequence Learning. MATTHEW HALL, INGE-MARIE EIGSTI, HEATHER BORTFELD, and DIANE LILLO-MARTIN, University of Connecticut (presented by Heather Bortfeld).
— To what extent does auditory deprivation impair other domains of cognition? One prominent claim is that reduced
auditory experience impairs implicit sequence learning [1]. A previous study found that whereas children with normal hearing showed evidence of implicit sequence learning in a novel task, deaf children who used cochlear implants did not [2]. Here, we use a replicate-and-extend approach with 24 profoundly deaf children who have native exposure to sign language, and 31 hearing controls matched on age and SES. First, we replicate [2] and find that neither the deaf nor the hearing group showed evidence of implicit learning in this novel task. We then extend by using the more familiar serial reaction time task, on which both deaf and hearing children showed robust and equivalent implicit learning. These findings show that auditory deprivation does not impair implicit sequence learning, at least when deafness is unaccompanied by language delay. [1] Conway, C. M., Pisoni, D. B., & Kronenberger, W. G. (2009). Current Directions in Psychological Science, 18(5), 275–279. [2] Conway, C. M., Pisoni, D. B., Anaya, E. M., Karpcic, J., & Henning, S. C. (2011). Developmental science, 14(1), 69–82. Email: Heather Bortfeld, heather.bortfeld@uconn.edu

4:10-4:25 (99)
About Hebb’s Inhibitions: When Negative Priming Prevents Sequence Learning. FRANCOIS VACHON, ALEXANDRE MAROIS, and MAXIME LEGENDRE, Université Laval. — Sequence learning plays a key role in many daily activities such as language and skills acquisition. The present study sought to assess the nature of the Hebb repetition effect — the improved serial recall for a repeated sequence of items compared to random sequences — by examining the vulnerability of this classical sequence-learning phenomenon to auditory distraction. More specifically, embedding a negative-priming manipulation within the traditional Hebb paradigm, we assessed the impact of presenting the repeated sequence as an irrelevant auditory sequence on the previous trial on the learning rate of that sequence. The results showed that the typical hebbian learning of the repeated sequence found in the control condition was abolished in the negative-priming condition. This absence of Hebb effect on correct responses could not be attributable to the increase reproduction — i.e. the learning — of incorrect responses. These findings suggest that inhibiting the representation of a sequence can prevent the formation of a long-lasting memory traces for that sequence. Email: Francois Vachon, francois.vachon@psy.ulaval.ca

4:30-4:45 (100)
Maybe You Can Forget, but You Can’t Prevent From Learning: Implicit Learning in the Directed Forgetting Paradigm. LEONEL GARCIA-MARQUES, DIANA ORGHIAN, and JOAO BRAGA, Faculdade de Psicologia Universidade de Lisboa. — In the present presentation we explore the link between implicit conceptual learning and directed-forgetting effects (DFE). We employed an item-method directed forgetting paradigm where two different colors schematic faces were presented overlapped and while only one was to be attended by the participants both of them were tested in the recognition test. The attended to-be-remembered, attended to-be-forgotten, unattended to-be-remembered and the unattended to-be-forgotten items all belonged to 4 different categories. We found 1) that the DFE only occurs with the attended items and not with the unattended and 2) the conceptual learning occurs for the items from the category of the attended to-be-remembered items and not for the items from the category of the to-be-forgotten items and the reverse happens for the unattended items, i.e., implicit learning it the forget condition and not in the remember condition. Email: Leonel Garcia-Marques, garcia_marques@sapo.pt

4:50-5:05 (101)
Contextually Cued Involuntary Retrieval. STEVEN SMITH and JUSTIN D. HANDY, Texas A&M University, LARRY JACOBY, Washington University in St. Louis. — Although there is considerable evidence that intentional recollection can be enhanced by context cues, evidence that automatic retrieval is also contextually sensitive has been sparse and inconclusive, particularly for indirect measures that are primarily data-driven. We report an experiment in which video environmental context reinstatement reliably enhanced solving anagrams whose solutions were primed in the reinstated contexts. Post-test questionnaire data indicated that the effect was greater for participants who used intentional recollection to solve anagrams, but it was also robust for those who did not use an intentional retrieval strategy. Email: Steven Smith, stevesmith@tamu.edu

5:10-5:25 (102)
The Time Course of Errors in Long-Term Episodic Memory for Color. PERNILLE HEMMER, Rutgers University. — Prior knowledge is known to influence recall when episodic information is noisy. Recent approaches, however, have suggested that recall is the result of either remembering (with some noise) or guessing. Here, we evaluate the fidelity of long-term (LT) episodic memory for color, and the contribution of imprecise recall, prior knowledge, and random guessing to memory errors. At an aggregate level, performance appears to have a high rate of guessing. However, this changes over the time course of recall, when partitioned by lag (i.e., the number of intervening trials between study and test). We found that immediate LT memory mirrors perception in its high fidelity, but with increasing lag the precision of memory appears to be more complex, and only at longer lags is recall a mixture of episodic information, and guessing. We speculate that performance at intermediate lags reflects the influence of category knowledge on noisy episodic representations. We implement and compare several models, including a simple Bayesian memory model and the “remember-guess” model. Our findings suggest that rather than the loss of fidelity in LT memory being acute, there is an intermediate stage reliant on prior knowledge. Email: Pernille Hemmer, pernille.hemmer@rutgers.edu
The linear relationship between average uncertainty and mean response time is known as Hick/Hyman Law. This law holds true even when different types of trials within a block have different frequencies of occurrence and, therefore, different surprisal values. However, the near-perfect (linear) relationship of Hick/Hyman Law at the Block and Trial Level. J. TOBY MORDKOFF, University of Iowa. — The linear relationship between average uncertainty and mean response time is known as Hick/Hyman Law. This law holds true even when different types of trials within a block have different frequencies of occurrence and, therefore, different surprisal values. However, the near-perfect (linear) relationship of Hick/Hyman Law has only been demonstrated at the level of the block, under which average uncertainty predicts mean RT across all trials. Efforts to replace, extend, or explain the block-level law in terms of the different RTs for trials with different frequencies have been largely unsuccessful, even after a variety of transformations have been applied. The present work takes a hierarchical approach and includes both block- and trial-level effects, as opposed to one or the other. The hybrid model does very well at predicting both block- and trial-level RT. While the block-level effect remains logarithmic, as it is under Hick/Hyman Law, the trial-level effect appears to depend on the raw (untransformed) frequency of the trial. However, the order and mechanism by which RT is determined by average uncertainty and specific trial frequency remain unclear. Email: J. Toby Mordkoff, jonathan-mordkoff@uiowa.edu
Measuring Memory and Attention to Preview in Motion. RICHARD JAGACINSKI, GORDON HAMMOND, and EMANUELE RIZZI, Ohio State University. — Human participants used a joystick to keep a cursor in the center of a two-dimensional moving roadway. Perturbation techniques were used to infer memory for the passed roadway and attention to the previewed roadway from their influence on participants’ manual tracking movements. The frequency bandwidth of the winding roadway primarily affected the spatio-temporal shaping of memory rather than the distribution of attention to preview. As noted by Sheridan (1966), the combination of these two functions measure a span of environmental information used to control motion. Email: Richard Jagacinski, jagacinski.1@osu.edu

Much of the Dual-Target Cost in Visual Search Can Be Avoided. KYLE CAVE, University of Massachusetts, TAMARYN MENNEER, University of Southampton, ELINA KAPLAN, University of Massachusetts, MICHAEL J. STROUD, Merrimack College, NICK DONNELLY, University of Southampton. — Previous studies demonstrated a dual-target cost when searching for two targets simultaneously. In these experiments, the target was a rotated T, and distractors were rotated Ls in a variety of colors. When the target color was certain (e.g., red), there were very few fixations to target-dissimilar colors (e.g., green or yellow). However, when the target could be either of two colors (e.g., red or blue), there were many more fixations to target-dissimilar colors. In these experiments, the target always differed in shape from the distractors, so participants could abandon color guidance and find the target by shape. In new experiments, the target is defined solely by color, and the dual-target cost is diminished. Thus, if target identification does not require shape discrimination, then search for two color targets can be guided fairly effectively to avoid target-dissimilar distractors. This guidance is not always used, however, making searches unnecessarily inefficient. Email: Kyle Cave, kcave@psych.umass.edu

Switching Between Targets and Switching Between Trials in Hybrid Visual/Memory Search. MATTHEW S. CAIN, U.S. Army Natick Soldier Research, Development, & Engineering Center, CHARLES WRIGHT, University of Massachusetts, ELINA KAPLAN, University of Massachusetts, TAMI CHUBB, and GEORGE SPERLING, University of California, Irvine. — A paradigmatic result in visual search is the contrast between the pop out that occurs when the target is defined by a single feature and the increase in search time with increasing numbers of distractors that occurs when the target is defined by the conjunction of two features. These contrasting results have been seen as important evidence about the nature of feature-based selection and about features generally. Here we report results suggesting that human observers can efficiently use both size-color conjunctions and shape-luminance conjunctions to select the instructed subset of a briefly presented stimulus cloud when making a centroid judgment. The selectivity ratio when the target was a conjunction was often 10:1 or better and as good as or better than that observed when the target was a single feature. These results suggest that the picture of feature-based selection derived from visual search may be insufficient. Email: Charles Wright, cewright@uci.edu

Divided Attention Effects in Perception: Dual-Task Deficits and Congruency Effects. JOHN PALMER, ALEX L. WHITE, and GEOFFREY M. BOYNTON, University of Washington. — We measured divided attention effects using a dual-task paradigm with stimuli presented in noise on either side of fixation. In a single task, relevant stimuli occur at one location; while in a dual task, relevant stimuli occur at two locations. We applied this paradigm to detecting Gabors patches and to the semantic categorization of words. Consider two effects: Dual-task deficits are a decline in performance for a dual task compared to a single task. We found such deficits for categorizing words but not for detecting Gabors. We also examined congruency effects, which are a dependence of performance at one location on whether a congruent stimulus is at the other location. Congruency effects were found for detecting Gabors but were largely absent for categorizing words. In summary, we found two different kinds of dependency. For detecting Gabors, overall performance was independent (unlimited capacity) but the congruency effects show a dependency that is consistent with crossstalk. For categorizing words, overall performance was dependent (limited capacity) but there was little sign of crossstalk. Such complementary effects are inconsistent with single process models of divided attention such as suggested by the spotlight metaphor. Email: John Palmer, jpalmer@uw.edu
4:50-5:05 (113)  
**Hybrid Visual-Memory Search Meets Big Data.** TODD HOROWITZ, National Cancer Institute. — How does memory set size influence performance in hybrid visual memory search? Is the reaction time (RT) by set size function linear (Shiffrin & Schneider, 1977) or logarithmic (Wolfe, 2012)? How does this change with expertise? The Airport Scanner (Kedlin Co., www.airportscannergame.com) dataset (see Mitroff and Biggs 2014) provides a naturalistic setting for studying this problem. Airport Scanner is a mobile game which simulates searching for threats in baggage x-rays. The list of threats grows over time. I analyzed 7,708,112 single target trials from 180,226 players. Memory set size ranged from 3 to 210 items. RT decreased with expertise. RT and accuracy improved slightly at the highest memory set sizes for all expertise groups, suggesting a quadratic, rather than loglinear function. However, memory set size was a poor predictor of RT, compared to visual set size. This may reflect semantic structure in the memory set. Email: Todd Horowitz, todd.horowitz@nih.gov

5:10-5:25 (114)  
**The Long and Short of Visual Search: Examining Both Long- and Short-Term Influences on Search Performance.** STEPHEN MITROFF, JONATHAN WINKLE, JUSTIN M. ERICSON, and CHRISTINA A. GANCAYCO, Duke University. — Through data collected from novice searchers (university participants), professional searchers (TSA officers), and via big data obtained from mobile technology (Airport Scanner; Kedlin; Mitroff et al., 2015, JEP:HPP), our lab has recently found both short-term and long-term influences on visual search performance. Given the applied nature of search, it is important to understand all influences on performance, regardless of whether the influences are short- or long-lived. From a short-term perspective, we have found trial-by-trial effects such that accurate trials are more likely to follow other accurate trials (i.e., success begets success). From a long-term perspective, we have examined the phenomenon of long-term visual search — the evolution of learning in a new search environment — revealing constant influences on search accuracy and response times, as well as individual difference effects. These data collectively highlight the multifaceted nature of search, and we will discuss the effects individually and in relation to one another. Email: Stephen Mitroff, mitroff@duke.edu

### Leading Edge Workshop Symposium: The Process of Explanation  
**International North, Friday Afternoon, 3:30-5:40**  
**Chaired by Andrei Cimpian, University of Illinois**

3:30-3:40 (115)  
**Introduction to the Symposium and Overview of the Psychonomic Society's first Leading Edge Workshop, The Process of Explanation.** ANDREI CIMPIAN, University of Illinois

3:40-4:00 (116)  
**The Illusion of Explanatory Depth and the Community of Knowledge.** STEVEN SLOMAN and NATHANIEL RABB, Brown University. — Asking people to explain how something works reveals an illusion of explanatory depth: Typically, people know less about the causal mechanism they are describing than they think they do (Rozenblit & Keil, 2002). I report studies showing that explanation shatters people’s sense of understanding in politics. I also show that people’s sense of understanding increases when they are informed that someone else understands and that this effect is not attributable to task demands or understandability inferences. The evidence suggests that our sense of understanding resides in a community of knowledge: People fail to distinguish the knowledge inside their heads from the knowledge in other people’s heads. Email: Steven Sloman, steven_sloman@brown.edu

4:00-4:20 (117)  
**Different Kinds of Explanations in Context.** NADYA VASILYEV, DANIEL WILKENFELD, and TANIA LOMBROZO, University of California, Berkeley. — What makes some answers to why-questions better explanations than others? In particular, how does the perceived quality of an answer depend on the kind of explanation it provides, and on the relationship between that kind of explanation and additional factors, such as one’s context or goals? In a series of studies, we investigate the perceived value and interpretation of different kinds of explanations: mechanistic, functional, formal, structural, and essentialist. We find that explanations of different kinds have unique profiles in terms of the inferences that they license, and that the inferences that one anticipates making influence the perceived quality of explanations of different types. These findings support the idea that explanations are tailored to the context by supplying information with high anticipated utility, and that the kind of explanation that is offered has important cognitive consequences. Email: Nadya Vasilyeva, vasilyeva@berkeley.edu

4:20-4:40 (118)  
**Analogies as a Mechanism for Constructing Explanations in Uncertain Situations.** DAVID LANDY and BRAD ROGERS, Indiana University. — When faced with uncertain situations, people often construct explanations by invoking structurally related categories or situations. People routinely make such analogies in uncertain situations, but nearly all prior studies approach analogies in purely deterministic situations, where both source and target situation information are known. We aim to understand how explanations reached via analogy are evaluated in noisy, uncertain environments. We contrast two possibilities: In one, analogical explanations are treated as structural correspondences, judged simply on the basis of their consistency and coherence. Alternatively, analogical explanations might be treated as empirical proposals about unknown structure; new evidence can then support or contradict the analogy, and analogies can be used as conduits of inferential support. Three experiments support the latter possibility. People tend to treat the analogies used in explanations largely as
they treat direct evidence, using these analogies to inform their probability judgments about unseen causes. Email: David Landy, dlandy@indiana.edu

4:40-5:00 (119)
The Biasing Effects of Hypothesis Generation on Visual Information Search. DANIEL BUTTACCIO and MICHAEL DOUGHERTY, University of Maryland (presented by Michael Dougherty). — A critical component of many diagnostic-reasoning tasks involves hypothesis generation — the process by which decision makers generate a set of potential explanations from memory to explain extant data. Recent work has identified the memorial processes underlying hypothesis generation as well as indicated the importance of its downstream effects on behavior. In the present study, we investigated the implications of hypothesis generation for visual search and show that the output of the generation process guides the deployment of visual attention by providing the decision maker with potential search targets. We find that search is facilitated when a hypothesis presumed to have been generated into working memory appears as a target and impeded when it is less likely to be in working memory. Email: Michael Dougherty, mdougher@umd.edu

5:00-5:20 (120)
The Inherence Heuristic: Generating Everyday Explanations. ANDREI CIMPIAN, University of Illinois. — How are explanations generated? I propose that people come up with explanations much as they come up with solutions to other complex problems — heuristically. People routinely answer difficult questions by retrieving simple information that comes to mind easily and then using this information to construct an approximate, heuristic answer. Prompts for an explanation (e.g., why do we eat eggs for breakfast?) are hypothesized to trigger a similar process. This process oversamples highly accessible facts about the entities in the observation to be explained. Due to the organization of memory, these accessible facts are more often about the inherent features of the relevant entities (e.g., eggs have a lot of protein) than about their history, their relations to other entities, etc. This skew toward inheritance then propagates through to the final product of this heuristic process (hence the name inheritance heuristic). A series of experiments with both children and adults support the predictions of this account. Email: Andrei Cimpian, acimpian@illinois.edu

5:20-5:40 (121)
Panel Questions and Answers. ANDREI CIMPIAN, University of Illinois

Animal Learning & Cognition
Marquette, Friday Afternoon, 3:50-5:30
Chair by Ralph Miller, SUNY, Binghamton

3:50-4:05 (122)
Assessing Inhibitory Associations Between Cues Produced by Inhibitory Perceptual Learning Treatment. RALPH MILLER, CODY W. POLACK, and SARAH R. O’HARA, SUNY-Binghamton. — Given Cues X, A, B, and C, many interspersed presentations of XB and AB are said to establish an inhibitory relation between X and A as a result of unfulfilled expectations evoked by B. This is assessed by pairing A with a US, and then seeing whether X serves as an inhibitor for expectation of the US. However, this procedure doesn’t differentiate between X being inhibitory with respect to A or with respect to the US. In the present research, a novel measure of inhibition between cues is proposed and tested which avoids inhibiting the US. Inhibition between X and A attenuated overshadowing between these cues (Experiment 1) and X compounded with A and Y (a novel cue) at test suppressed overshadowing of Y by A (Experiment 2). Experiment 1 serves as a retardation test for X-A inhibition, and Experiment 2 serves as a negative summation test for X-A inhibition. Email: Ralph Miller, rmiller@binghamton.edu

4:10-4:25 (123)
Contextual Cuing Supports Concept Learning in Pigeons. E. A. WASSERMAN, University of Iowa, KALLIUS COUTO, Oslo and Akershus University College, VICTOR NAVARRO and TATIANA SMITH, University of Iowa. — How supervision is arranged can materially affect the way that humans learn and represent concepts. Yet, we know nothing about the role that supervision plays in animal concept learning. Prior research in pigeon concept learning has used differential reinforcement procedures to support reliable discrimination and generalization involving from 4 to 16 concurrently presented photographic categories. In the present project, we used a nondifferential reinforcement paradigm — contextual cueing — to investigate concept learning in pigeons. We found that pigeons were faster to peck a target stimulus when members of 4 categories of black-and-white photographs — dogs, trees, shoes, keys — correctly cued its location than when they did not. This faster target detection also generalized to untrained members of these photographic categories. Our results thus pass the key behavioral tests of conceptualization and suggest that high-level supervision is unnecessary to support concept acquisition in pigeons. Email: E. A. Wasserman, ed-wasserman@uiowa.edu

4:30-4:45 (124)
The Effects on Novelty on Learning Patterning Discriminations. J.W. WHITLOW JR., Rutgers University. — Complex discriminations like patterning discriminations or feature positive/feature negative discriminations often include a difference in cue numerosity between reinforced and nonreinforced displays. One way to control for these differences is to use unique items as filler items. However, it turns out these items introduce novelty as a cue. This research explores the theoretical and empirical implications of including novelty as a cue in patterning discriminations in a human learning task and considers broader implications of treating novelty to be as important as familiarity in learning and memory. Email: J.W. Whitlow Jr., lwitlow@camden.rutgers.edu
4:50-5:05 (125)
Evidence for Probabilistic Reasoning by a Grey Parrot.
IRENE M. PEPPERBERG, KATHERINE A. CLEMENTS, and SUZANNE L. GRAY, Harvard University, BRYA GROSS, Brandeis University. — Some levels of inferential learning are likely widespread throughout the animal kingdom; for example, in cases of exclusion, where a subject infers the placement of a reward based on knowledge of where it is not. Might, however, nonhumans succeed on more complicated kinds of probabilistic, statistical reasoning, that is, the type that relies on generalizations about a sample based on information about a population? Nonhumans have not, so far, been formally tested in a manner similar to that of older children. We demonstrate that a Grey parrot (Psittacus erithacus), trained to use elements of English speech, could view the hiding of a collection of two types of objects and, when asked about a still-hidden but removed object, label the most likely outcome for sets skewed toward that outcome. Email: Irene M. Pepperberg, impepper@media.mit.edu

5:10-5:25 (126)
Capuchin Monkeys (Cebus Apella) Treat Small and Large Numbers of Items Similarly During Relative Quantity Judgments. MICHAEL BERAN and AUDREY E. PARRISH, Georgia State University. — A key debate in studying the evolutionary and developmental emergence of numerical cognition regards what mechanism or mechanisms support perception and representation of quantitative information. Two systems have been proposed. One system deals with approximate representation of sets of items across an extended numerical range and has been found in many species. Another system produces highly precise representations of only small numbers of items. Adult humans sometimes show “superprecise” representation of small sets of items in comparison to large sets of items, which provides support for the presence of this second system in human adults. We presented capuchin monkeys with a computerized test in which small sets or large sets of dots with the same numerical ratios had to be discriminated. Capuchin monkeys showed no increased precision for small sets over large sets. These data indicate only a single mechanism at work in the quantity discrimination of this species. Email: Michael Beran, miberan@yahoo.com

4:10-4:25 (128)
Comparisons of Memories for Events and Events That Were Wished for But Never Occurred. JOSEPH FITZGERALD, Wayne State University. — Although the metaphor of time travel has become popular in recent years, very little data is available comparing the nature of experiences of autobiographical memories, as opposed to the experience of thinking about events that have not taken place. Participants reported an event that they wished was part of their past or would take place in the future. Participants also reported four memories of life events that they believed belonged in a book about their life: a childhood memory, a memory that involved an interaction with society, a memory for a significant loss, and an important event that did not fall within the other categories. The current sample consisted on 184 adults ranging in age from 40 to 80. Participants described each event, responded to metamemory questions regarding recollection, belief (plausibility), rehearsal, and impact, and reported on the centrality of the event in their identity. The content of the reports was analyzed with a focus on the affective and cognitive language. The results indicated that wished/hoped for events bore many similarities to remembered events or differed in limited ways. Events that would have taken place in the past differed in ways from the future wished for events. Email: Joseph Fitzgerald, aa1670@wayne.edu

4:30-4:45 (129)
Who Won World War II? HENRY L. ROEDIGER, Washington University in St. Louis, SHARDA UMANATH, Claremont McKenna College, JAMES V. WERTSCH, Washington University in St. Louis, MAGDALENA ABEL, Regensburg University. — The Allies won World War II, but which allies? After all, soldiers from 20 countries fought on the same side. Americans tell the story about how “the U.S. won the war” with critical turning points (Midway, D-Day, the Battle of the Bulge, bombing of Japan) and people of the former Soviet Union do the same (battles of Moscow, Stalingrad, and Kursk, among others). We surveyed over 100 people in 11 countries about collective memories of key events in the war, their knowledge about the war, and their estimates of their country’s proportion of responsibility for winning (or losing) the war. The results demonstrate different memories of the war depending on the nationality of the respondent, as well as national narcissism in attributing a great proportion of the victory (and even of the loss) to their own country’s contributions. The results provide strong evidence for narcissism in national collective memory. Email: Henry L. Roediger, roediger@wustl.edu

3:50-3:55 (127)
Autobiographical Memory
Waldorf, Friday Afternoon, 3:50-5:30
Chaired by Martin A Conway, City University London

3:50-4:05 (127)
Introspecting on Memory Construction: Misconceptions and Flawed Experiments. MARTIN A. CONWAY and ANNICK SAUER, City University London. — Recent research used a procedure in which people reported what they were aware of while retrieving autobiographical memories. Earlier research, however, had shown that being aware of aspects of the retrieval process is often not possible. In a series of new memory retrieval experiments we show that unawareness is often the case. Theoretical proposals based on a procedure that does not take into account the fact the people are often unaware of the retrieval process are flawed. Introspective procedures used in a wide range autobiographical memory research, from vividness ratings to judgments of memory perspective, are generally questionable and, we suggest, strongly influenced by demand characteristics. Email: Martin A. Conway, Martin.Conway.1@city.ac.uk

3:50-4:05 (127)
Introspecting on Memory Construction: Misconceptions and Flawed Experiments. MARTIN A. CONWAY and ANNICK SAUER, City University London. — Recent research used a procedure in which people reported what they were aware of while retrieving autobiographical memories. Earlier research, however, had shown that being aware of aspects of the retrieval process is often not possible. In a series of new memory retrieval experiments we show that unawareness is often the case. Theoretical proposals based on a procedure that does not take into account the fact the people are often unaware of the retrieval process are flawed. Introspective procedures used in a wide range autobiographical memory research, from vividness ratings to judgments of memory perspective, are generally questionable and, we suggest, strongly influenced by demand characteristics. Email: Martin A. Conway, Martin.Conway.1@city.ac.uk
4:50-5:05 (130)
Overgeneral Autobiographical Memory Is Related to Hypothetical Reasoning: Evidence From Trauma Memories in Rwanda. ISABELLE BLANCHETTE and SERGE CAPAROS, Université du Québec à Trois-Rivières, EUGÈNE RUTEMBESA, University of Rwanda, EMMANUEL HABIMANA, Université du Québec à Trois-Rivières. — We investigated the link between autobiographical memory and reasoning in the context of trauma memories. Trauma exposure is linked to overgeneral memory (OGM), a difficulty in retrieving specific features of past personal experiences, and alterations in the ability to imagine the future. In this study we investigated a possible link between OGM and hypothetical thinking. We asked 59 Rwandan participants to retrieve their most important memory from the time of the genocide. We also asked them a counterfactual question about what they would have changed in Rwanda after the genocide, had they had the opportunity. We measured belief bias using linear syllogisms. Results showed a strong link between memory specificity and counterfactual reasoning. Participants who did not retrieve specific autobiographical memories were unable to provide specific counterfactuals. Participants who generated less specific counterfactuals showed more belief bias. These effects were independent of overall cognitive ability. Our results suggest important links between trauma, autobiographical memory, and hypothetical thinking. Email: Isabelle Blanchette, isabelle.blanchette@uqtr.ca

5:10-5:25 (131)
Similarities and Differences Between Imagining the Future and Remembering the Past: Evidence From Multi-Voxel Pattern Analysis. NATHAN ROSE, University of Wisconsin-Madison, KARL SZPUNAR, University of Illinois at Chicago, DAVID MAILLET, Harvard University, BRADLEY R. POSTLE, University of Wisconsin-Madison, DANIEL L. SCHACTER, Harvard University. — Functional neuroimaging studies have found that simulating future events relies on many of the same cognitive and neural processes as remembering past events. However, almost all of these studies have relied on a univariate approach to fMRI analysis. On each trial in the current study, subjects saw a cue word (e.g., car) and an orienting cue (future or past) that instructed the subject to either imagine a future event or remember a past event related to the word for 12 s. We used multi-voxel pattern analysis in an attempt to classify whether subjects were imagining the future or remembering the past on each trial based only on their patterns of brain activity. A pattern classifier could successfully decode patterns of brain activity that reflected imagining the future or remembering the past during early portions of the trial (2-6 s), but failed to do so during later portions of the trial (8-12 s). These results are generally consistent with the constructive episodic simulation hypothesis, which holds that imagining future events and remembering past events rely on some unique processes, particularly during event construction, as well as the use of similar (episodic) information stored in memory during event elaboration. Email: Nathan Rose, nsrose@wisc.edu
**Vision**

**International North, Saturday Morning, 8:00-9:40**  
**Chaired by Gregory Francis, Purdue University**

**8:00-8:15 (132)**

**Cortical Dynamics of Perceptual Grouping and Segmentation: Crowding**. **GREGORY FRANCIS,** Purdue University. — I describe a real-time neural model of perceptual grouping and segmentation that allows non-specific top-down signals to alter the representation of visual percepts. This top-down control allows an observer to separate target and flanking elements in a visual crowding situation, where a target is difficult to classify when surrounded by flanking elements on either side. Simulations show that the model properly accounts for many empirically measured grouping effects in crowding; namely a target is strongly crowded if it groups with the flankers but is hardly crowded at all if the target seems to be part of a distinct group. The model segmentation process explains why adding flanking elements can (otherwise paradoxically) reduce crowding and why seemingly tiny changes to the flankers can alter perceptual grouping and dramatically alter the effects of crowding. It also explains why target-flanker similarity produces the strongest crowding effects. These attention-like mechanisms explain how observers interact with the visual representation of a scene to enable them to solve specific perceptual tasks.  
Email: Gregory Francis, gfrancis@psych.purdue.edu

**8:20-8:35 (133)**

**The Visual Perception of Distance Ratios in Physical Space.**  
J. FARLEY NORMAN, OLIVIA C. ADKINS, and LAUREN E. PEDERSEN, Western Kentucky University. — Previous research has demonstrated that human observers cannot accurately perceive environmental distances. Nevertheless, our visual systems obviously detect environmental information sufficient to meet the demands of everyday life. In the current experiment, 20 younger and older adults estimated distance ratios in actual physical space; on any trial, the participants judged how long one distance interval was relative to a second, shorter, distance interval (stimulus ratios ranged from 1.0 to 9.5). Each participant judged 18 stimulus ratios 3 times. The average Pearson r correlation coefficient relating actual distance ratios to perceived ratios was 0.87 and did not differ for younger and older adults. Despite this strong correlation, the participants’ judgments were inaccurate — the average slope of the best-fitting regression line was 0.86, such that the stimulus ratios were perceived to be smaller than they actually were. Despite some inaccuracy, human adults can reliably compare environmental distances in different directions.  
Email: J. Farley Norman, farley.norman@wku.edu

**8:40-8:55 (134)**

**Can Auditory Stimuli Influence Visual Integration?**  
CATHLEEN M. MOORE, TYLER WATKINS, and ANJA FIEDLER, University of Iowa. — Performance in visual tasks can be enhanced by presenting unrelated but concomitant auditory stimuli, perhaps reflecting a functional effect of neurons that are driven by both visual and auditory stimulation. These effects are not reliably understood in terms of functional mechanisms. We tested the hypothesis that an abrupt auditory stimulus defines a temporal window within which the representations of visual stimuli are isolated from integration with other temporally surrounding visual information. We presented abrupt auditory stimuli in two different visual tasks, one that required separation of two separate visual displays and one that required integration of two visual displays. The hypothesis predicted that the auditory stimulus would facilitate the separation task but disrupt the integration task. Evidence was found for the first of these two predictions, but not the second. Follow-up experiments are being conducted to understand the difference between the two types of task.  
Email: Cathleen M. Moore, cathleen-moore@uiowa.edu

**9:00-9:15 (135)**

**Areas of Visual Information Utilized by Humans in Multispectral Fused Imagery Using Classification Images.**  
JENNIFER L. BITTNER, Air Force Research Laboratory. — The human visual system can be highly impacted by changes to visual presentation. Understanding these impacts has been of great interest in both the vision sciences and applied research. The current project bridges these two worlds, using noise masking techniques from visual perception to study the influence of image enhancements upon the visual system. In a series of experiments, I examined human information usage over imagery captured in various spectral bands (e.g. visible, thermal) and fused (i.e. algorithmically combined) via techniques intended to improve vision. Using response classification, I derived classification images, behavioral maps of the areas of a stimulus most affecting perception, from participants completing a basic two-choice task. Results indicated the information utilized varied dependent upon image type. This, in conjunction with human efficiency differences, provides the general framework for analyzing the influence of multifaceted image enhancements in direct relation to the visual system.  
Email: Jennifer L. Bittner, Jennifer.L.Bittner@gmail.com

**9:20-9:35 (136)**

**A Color Similarity Effect on Memory in Grapheme-Color Synesthetes.**  
KATHERINE MOORE, Arcadia University, NICOLE YARLMOKEVICH, Illinois State University, MEREDITH DEANGELO, Elmhurst College. — Grapheme-color synesthetes automatically associate letters and numbers with specific colors. It is believed that this type of synesthesia leads to superior verbal memory because synesthetes can use color cues. We tested this idea by searching for a color similarity effect akin to the phonological similarity effect, in which similar sounding phonemes (e.g., G, P, T, E) are harder to recall in order than dissimilar ones (e.g., R, Q, J, D). Participants listened to lists of letters and recalled them in order. Critically, the lists were customized for each synesthete according to their color associations, so that half of the lists used letters evoking similar colors (e.g., all blue), and the other half used letters evoking dissimilar colors. Synesthetes performed better on dissimilar lists than similar lists, just as in the phonological similarity effect. Matched controls, given the same lists, did not exhibit this effect. These results support
prior research showing that synesthetes use color associations to enhance verbal memory. Additionally, this study lays groundwork for an assessment of color-grapheme synesthesia in the blind, who are unable to complete visual batteries. Email: Katherine Moore, moorek@arcadia.edu

Metamemory/Metacognition II
Williford, Saturday Morning, 8:00-10:00
Chairied by Daniel Oppenheimer, University of California Los Angeles

8:00-8:15 (137)
How Students Determine What Material Is Important to Learn (or at least, How They Think They Do).
Sara Etchison and Daniel Oppenheimer, UCLA (presented by Daniel Oppenheimer). — How do students determine whether material is important or tangential/supplementary? A growing literature explores this question and finds that students are not particularly good at this task. To date, relatively little work has asked what meta-theories people have about how they make these determinations. Such meta-theories may yield new insights into whether errors come from intentionally using problematic strategies or from misapplying useful ones. We look at students’ self-reports about what strategies they think that they use to identify important classroom material. Although previous research has shown that students’ objective ability to identify important materials does not improve throughout college, we find that students differ in their reported strategy over time. Specifically, freshman and sophomores reported using repetition and formatting as importance signifiers more frequently than did juniors and seniors. Correlations between these strategies, explicit instruction on note-taking, and GPA will also be discussed. Email: Daniel Oppenheimer, daniel.oppenheimer@anderson.ucla.edu

8:20-8:35 (138)
Judgment of Learning and Testing as Learning Strategies.
Elçin Adogan, PhD, Marie Izaute, University Blaise Pascal, Elisabeth Bacon, Inserm (presented by Marie Izaute). — Re-reading is the most common learning strategy, albeit not a very efficient one. Testing is highly efficient, but not perceived by students as a learning strategy. The prospective metamemory judgment-of-learning (JOL) reflects the learner’s impression of subsequently being able to retrieve the ongoing learning in a cued recall task. Estimating JOL involves attempting to retrieve the information, similar to testing. Few studies that have explored the potential mnemonic benefit of JOL have yielded contradictory results. Our aim was to compare JOL and testing with re-study and challenge these strategies within the relative difficulty of the material (cue-target association strength) in two experiments. After a first encoding phase, participants re-studied, rated their JOL, or took a test. Forty-eight hours later, they participated in a final cued-recall test, during which their confidence level judgments were collected. The difficult material produced comparable performances with JOL and testing, and both yielded better performances than re-study. The easy or very difficult material revealed no differences between these strategies. JOL is proposed as an alternative to testing when faced with difficult material. Email: Marie Izaute, marie.izaute@univ-bpclermont.fr

8:40-8:55 (139)
Generating Lies Produces Crossed Double Dissociations Between Metamemory and Memory. Miri Besken, Bilkent University (Member Select-Speaker Award Recipient).
— Most manipulations that induce disfluency during encoding reduce memory predictions for the more disfluent condition. Similar to other manipulations of fluency, lying generally takes longer and requires more mental effort than telling the truth. However, the effects of lying on memory predictions have not been investigated systematically. In a series of three experiments, participants told the truth and generated plausible lies to general knowledge questions and made item-by-item predictions about their subsequent memory performance during encoding, followed by a free recall test. The manipulation consistently yielded crossed double dissociations between predicted and actual memory performance: Participants predicted that the truth would be better recalled, despite better actual memory for the lies. Moreover, response latency for generating lies was slower than telling the truth, providing objective evidence of disfluency. The results demonstrate that lying might be similar to other manipulations of fluency, with the more disfluent condition producing lower memory predictions. Email: Miri Besken, mbesken@gmail.com

9:00-9:15 (140)
The Role of Cue Fluency in Feeling-of-Knowing and Retrospective Confidence Judgments. Elizabeth F. Chua and Lisa A. Solinger, Brooklyn College, CUNY.
— Cue fluency is known to influence prospective feeling-of-knowing judgments (FOKs), and has also been shown to influence retrospective confidence judgments (RCJs). Here we test whether the effect of cue fluency on RCJs is direct or indirect. Eye movements were monitored during a face-scene associative memory task. At test, participants viewed a studied scene, then rated their feeling-of-knowing that they would remember the associated face. This was followed by a forced choice recognition test and retrospective confidence ratings. Initial analyses showed that cue fluency, as measured by the number of fixations to the scene cue, was positively related to both FOKs and RCJs. However, further analyses revealed that the effect of cue fluency on RCJs was indirect and mediated by FOKs. These findings demonstrate the mechanism by which cue fluency influences confidence and highlight the interplay of metamemory processes across time. Email: Elizabeth F Chua, echua@brooklyn.cuny.edu

9:20-9:35 (141)
Good Versus Bad Consequences of Retrieval During Judgments of Learning. William Joseph Muntean, Pearson, Daniel Kimball and Thomas Bobbit, University of Oklahoma.
— Delayed metacognitive judgments of learning (JOLs) are more accurate when covert retrieval is possible (e.g., prompting delayed judgments with only the cue from a previously studied cue-target pair) than...
when covert retrieval is not possible (e.g., prompting with both cue and target). This serves as evidence that retrieval fluency is a diagnostic basis for predicting subsequent target recall. Successful retrieval of targets during JOLs results in both high JOLs and an increase in subsequent target recall, whereas failure to retrieve targets results in low JOLs and no increase in subsequent target recall. The retrieval process thus improves the relative accuracy of JOLs — an advantageous byproduct. Conversely, when participants overtly retrieve learned information in the retrieval practice paradigm, the retrieval process induces forgetting — a disadvantageous byproduct. Drawing parallels between the two paradigms, the current study explores good and bad memorial consequences of delayed JOLs.

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9:40-9:55 (142)
Incorporating Metacognition Into Usability Testing of E-Learning Tools. RAKEFET ACKERMAN, AVI PARUSH, FAREDA NASSAR, and AVRAHAM SHTUB, Technion–Israel Institute of Technology. — Usability testing is an important phase in developing any software tool, and e-learning tools, in particular. Usually, objective measures, like response time and success rates, are collected, together with global satisfaction. In this study, we adapted measures from the metacognitive approach to generate a comprehensive set of measures allowing more detailed analysis of subjective experience and work efficiency. We compared two user interfaces of a software tool supporting project management learning in an academic course. In addition to fluent work, the participants performed focused tasks and rated their confidence in each one. Triangulating response time, success, and confidence was highly informative in exposing differences between the user interfaces that were not exposed by the commonly used measures. Importantly, better outcomes were found when reliable confidence was experienced. This finding suggests that a product that eliminates overconfidence produces better outcomes. Overall, the study offers an applicable methodology for usability tests that takes into account metacognitive considerations for delving into the subjective experience and learning process of the users in more detail than done before.

Email: Rakefet Ackerman, ackerman@ie.technion.ac.il

Automatic Processing
Waldorf, Saturday Morning, 8:00-10:00
Chaired by Gordon Logan, Vanderbilt University

8:00-8:15 (143)
Type Lashley: A Theory of Serial Recall in Skilled Performance. GORDON LOGAN, Vanderbilt University. — Many theories of serial recall address short-term memory. I present a theory of serial recall from long-term memory in automatized skills, focusing on typing. The theory assumes strong associations in long-term memory between keystrokes and the context in which they occur (the word being typed and keystrokes typed so far). During typing, the current context cues retrieval from long-term memory, instigating a parallel race between all keystrokes associated with the current context. The retrieved keystroke is executed and added to the current context, changing the retrieval cue for the next keystroke, thereby changing what is retrieved. Simulations show the model accounts for serial performance in skilled typing without assuming typical mechanisms for serial order (primacy gradients, sequential associations, competitive queuing), predicting timing and error data. The model is tested on two large sets of typing data. I will end by relating the model to serial recall from short-term memory.

Email: Gordon Logan, gordon.logan@vanderbilt.edu

8:20-8:35 (144)
Spacing for Chunking in Skilled Typewriting. MOTONORI YAMAGUCHI, Edge Hill University, GORDON LOGAN, Vanderbilt University. — Skilled performance is characterised by hierarchically structured control processes, in which processing units at the lower-level process are chunked into a larger processing unit at the higher-level process. The present study investigated chunking in the context of skilled typewriting. Skilled typists typed words and nonwords under concurrent memory load of five digits; typing words produced smaller interference with digit recall than typing nonwords, indicating that letters were chunked in the former but not in the latter. Interference decreased after repeated exposure to nonwords only when the same nonwords repeated in consecutive trials but not when they repeated in spaced trials. When typists typed nonwords without concurrent memory load and then were tested with concurrent memory load later, interference decreased more for trials with larger spaces than for trials with smaller spaces. These outcomes indicate a critical role of working memory in the acquisition of chunks in typewriting.

Email: Motonori Yamaguchi, cog.yamaguchi@gmail.com

8:40-8:55 (145)
Attentional Control of Response Selection in Task Switching. DARRYL W. SCHNEIDER, Purdue University. — Modulation of cognitive control was investigated by using a proportion congruent manipulation to change response congruency effects in task switching. In an experiment that involved cued switching between semantic categorization tasks, targets were either congruent or incongruent (mapped to the same or different responses across tasks, respectively), and the proportion of congruent targets was manipulated between subjects. Response congruency effects (worse performance for incongruent than for congruent targets) were observed and they increased with proportion congruent for both response time and error rate. A sequential congruency effect (a smaller response congruency effect following an incongruent than a congruent trial) was observed for error rate, but only for task repetitions. The results suggest top-down control of attention rather than bottom-up control based on item-specific learning because targets were never repeated during the experiment. Implications for understanding attentional control of response selection in conflict situations will be discussed.

Email: Darryl W. Schneider, dhws@purdue.edu
9:00-9:15 (146)
Time-Based Expectancy for Responses and Task-Relevant Stimulus Features. ROLAND THOMASCHKE, Universität Freiburg, JOACHIM HOFFMANN and CAROLA HAERING, University of Würzburg, ANDREA KIESEL, Universität Freiburg. — When a particular target stimulus appears more frequently after a certain interval than after another one, participants adapt to such regularity, as evidenced by faster responses to frequent interval-target combinations than to infrequent ones. This phenomenon is known as time-based expectancy. Previous research has suggested that time-based expectancy is primarily motor-based, in the sense that participants learn to expect a particular response requirement after a specific interval. We conducted a Two-Alternative-Forced-Choice experiment with four stimuli differing in shape and orientation, in order to determine whether time-based expectancy can also impact on perceptual processing. Only a subset of the stimuli was frequently paired with a certain interval, while the other subset was uncorrelated with interval. We varied the response relevance of the interval-correlated stimuli, and investigated under which conditions time-based expectancy transfers from trials with interval-correlated stimuli to trials with interval-uncorrelated stimuli. The results indicate that participants formed time-based expectancy for responses as well as for response-relevant stimulus features. Email: Roland Thomaschke, roland.thomaschke@psychologie.uni-regensburg.de

9:20-9:35 (147)
Are There (Semantic) Super Stroopers? DEREK BESNER and DARCY WHITE, University of Waterloo. — Participants named the colour of an irrelevant word that was either neutral or semantically related to a colour in the response set. In two experiments, a median split coupled with Vincentile analyses yielded a dissociation consistent with the inference that for half the participants, semantic processing of the irrelevant word either does not occur or else its products can be prevented from affecting a response. Email: Derek Besner, dbesner@uwaterloo.ca

9:40-9:55 (148)
The Magic of Words Reconsidered: Investigating the Automaticity of Reading Color-Neutral Words in the Stroop Task. SACHIKO KINOSHITA, Macquarie University, DENNIS Norris, MRC Cognition and Brain Sciences Unit. — In two variants of the color-word Stroop task, we compared color response latencies to five types of color-neutral stimuli: real words (e.g., hat), pseudowords (e.g., hix), consonant string (e.g., hdk), symbol string (e.g., $#%), and a row of Xs (e.g., XXX), as well as incongruent color words (e.g., “green” displayed in red). With verbal response, lexicality had no effect, but pronounceability did. Reaction-time (RT) distribution analyses showed that the differences between the string types increased across the quantiles, suggesting the locus of the effect was in task conflict. Longer words and pseudowords interfered more with color naming, but the length of unpronounceable strings did not have an effect. With key-press responses, no difference was observed among the five types of neutral strings, despite a large interference effect with the incongruent color words. The results shed light on the nature of the “automatic reading process” in the Stroop task. Email: Sachiko Kinoshita, sachiko.kinoshita@mq.edu.au

8:00-8:15 (149)
Spatiotemporal Predictability Alters Perceived Duration of Visual Events: Memento Effect Revisited. MARKUS HUFF, University of Tuebingen, LUCY D. VANES, Institute of Psychiatry, Psychology, and Neuroscience, King’s College London, HAUKE MEYERHOFF, Knowledge Media Research Center. — Does event perception alter perceived duration? Previous research has shown that the perceived duration of a short scene depicting a disc moving along a segmented path is reduced when the temporal order of the motion segments is reversed (Memento effect). This effect has been attributed to the idea that reversed segments give rise to the perception of distinct visual events, whereas continuous segments are perceived as a single event. It has been suggested that the reduction in perceived duration is a result of perceiving multiple distinct events rather than one. Here, we replicate and investigate the origin of the Memento effect. In four experiments, we explore the role of the spatiotemporal predictability of the disc’s movement as well as the influence of the number of discrete events on perceived duration. Controlling for spatiotemporal predictability eliminates the Memento effect; however, controlling for the number of distinct events does not. Thus, our results suggest that violations in spatiotemporal predictability rather than a varying number of discrete events induce the Memento effect. We discuss the impact of these findings for the perception of more naturalistic events. Email: Markus Huff, markus.huff@uni-tuebingen.de

8:20-8:35 (150)
Memory for Characters and Their Motions in Events. ALAN KERSTEN, JULIE LYNN EARLES, and LEEHE NEGRI, Florida Atlantic University. — Kersten, Earles, and Berger (2015; JEP: General) found that people were better at remembering which actor performed particular intrinsic motions, or the relative motions of body parts, than at remembering which actor performed particular extrinsic motions, or motions in relation to external landmarks. They proposed that intrinsic motions are stored together with identity information in unitized memory representations, whereas extrinsic motions are represented separately. An alternative explanation is that actors with different body shapes may have been unable to perform an intrinsic motion identically; whereas extrinsic motions may have been easier to reproduce. In order to rule out this explanation, in the present research, the same actor performed all of the motions while wearing different costumes. Each motion was later performed either by the same character or by a different character played by the same actor. Participants again were better at recognizing the character who had performed a particular intrinsic motion than the character who had performed a particular extrinsic motion. These results support the
theory that object representations include information about how the parts of an object move in relation to one another. Email: Alan Kersten, akersten@fau.edu

8:40-8:55 (151)
Scale, Clutter, and Facial Expressions: Inferences from Movies to Emotion Judgments and Back. JAMES CUTTING and KACIE L. ARMSTRONG, Cornell University. — The perception of facial expressions and that of objects at a distance are entrenched psychological research venues, but their intersection is not. We were motivated to study them together because of their joint importance in the physical composition of popular movies – shots that show a larger image of a face typically have shorter durations than those in which the face is smaller. Here, for static images, we explore the time it takes viewers to categorize the valence of different facial expressions as a function of their visual size. In two studies we find that smaller faces take longer to categorize than those that are larger, but this pattern interacts with background clutter. More clutter impedes interpreting expressions for more distant faces but not proximal ones. Filmmakers at least tacitly know this. In a third study we find that contemporary movies further lengthen shots that show smaller faces and increased clutter. Email: James Cutting, jec7@cornell.edu

9:00-9:15 (152)
Older Adults Suppression of Facial Reactivity to Films With Different Emotional Intensity and Valence. PETER RENDELL, DAVID J. PEDDER, IZELLE LABUSCHAGNE, and GILL TERRETT, Australian Catholic University, PHOEBE E. BAILEY, University of Western Sydney, JULIE D. HENRY, University of Queensland. — The primary aim was to investigate the capacity for emotion regulation in older adults when attempting to suppress facial reactivity while viewing dynamic stimuli varying in emotional intensity and valence. We also investigated the memory costs of suppression. Forty young and 40 older adults were instructed to watch or suppress their emotional responses toward low- and high-intensity positive and negative films. Facial activity was assessed with electromyography. Older adults did have less facial activity than young adults during all just watch conditions. On high-intensity positive films, both groups were able to reduce but not completely suppress facial activity. On low-intensity positive films, the facial activity was not able to be reduced, but the activity was relatively low when just watching. In contrast, only the young adults could reduce facial activity on negative films. For young and older adults, attempting to suppress the facial activity (vs watch condition) did not impact on the recall of emotional stimuli. Overall, the older had less to suppress than young, and the intensity and valence did impact on their ability to suppress facial reactivity. Email: Peter Rendell, peter.rendell@acu.edu.au

9:20-9:35 (153)
Valence Is Determined by Stimulus and Context Properties. PETER GRAF, University of British Columbia. — Pictures are able to trigger powerful affective reactions, which are likely to influence our perception and evaluation of related and unrelated other stimuli. To investigate the possibility that our affective response to a valence picture stimulus is determined primarily by that stimulus versus by the context in which it is presented, we showed participants sequences of 5 pictures with all pictures in a sequence from the same valence bin (e.g., positive). Immediately following each sequence, we displayed a target picture either from the same or a different valence bin. Subjects rated the valence of each picture on an 8-point scale. The results showed that negative target pictures, for example, were rated as more negative when presented in the context of negative compared to neutral or positive pictures. Email: Peter Graf, pgraf@psych.ubc.ca

8:00-8:15 (154)
Neural Components of Cognition. Marquette, Saturday Morning, 8:00-10:00
Chaired by Robert Belli, University of Nebraska-Lincoln

8:20-8:35 (155)
Transient and Sustained Neural Correlates for Feedback Processing Associated With Reinforcement Learning. ROBERT WEST, DePauw University, KIRA BAILEY, Ohio Wesleyan University, ANN MARIE HUET, Iowa State University. — Feedback processing is considered an important element of reinforcement learning, and is consistently associated with transient ERP activity over the medial frontal region of the scalp (i.e., feedback negativity or FN). In addition to this transient ERP activity, feedback processing in a gambling task is associated with slow wave activity over the lateral frontal and posterior regions. In two experiments we examined whether slow wave activity would also be associated with feedback processing during a reinforcement learning task. In Experiment 1, two effects were observed that reflected transient and sustained ERP activity. The first distinguished positive from negative feedback, and the second distinguished expected positive feedback from...
unexpected positive feedback. In Experiment 2 age-related differences in feedback processing were examined. Together the results of these experiments demonstrate that sustained ERP activity over the lateral frontal and posterior regions represents a general characteristic of feedback processing. Email: Robert West, robertwest@depauw.edu

8:40-8:55 (156)
The Eyes Have It: The Relationship Between Pupil Size and Intelligence. JASON S. TSUKAHARA, TYLER L. HARRISON, and RANDALL ENGLE, Georgia Institute of Technology (presented by Randall Engle). — It has long been known that dilation of the pupils of the eyes is associated with attention-demanding cognitive processes. However, baseline pupil size has never been used as a physiological indicator of characteristics of the individual, such as memory ability and intelligence. We investigated whether individual differences in baseline pupil size are associated with working memory capacity and fluid intelligence. Throughout our studies we found that high cognitive ability subjects showed much larger baseline pupil sizes compared to low cognitive ability subjects. Importantly, we showed that this difference remained as subjects engaged in an attention-demanding task (Study 1) and was a stable characteristic over time as subjects became familiar with the testing environment (Study 2). Our findings indicated that baseline pupil size is an abiding characteristic of the individual and is associated with cognitive ability level. Email: Randall Engle, randall.engle@gatech.edu

9:00-9:15 (157)
Is the Right Hemisphere More Flexible During Language Comprehension? FRANK DURGIN, ELISABETH TAWA, and LES SIKOS, Swarthmore College, PAUL THIBODEAU, Oberlin College. — During conversation, words often take on specific meanings in context. Such local meaning cannot require that the lexicon be permanently modified. We suggest that left-hemisphere semantic representations are relatively stable whereas right-hemisphere semantic representations may be more flexible. To test this hypothesis we used a divided-visual field paradigm in which novel extended metaphors appeared either following supportive contexts or following non-supportive contexts. Sentence comprehension time following lateralized presentation of a sentence-terminal novel metaphor served as the dependent measure. Principal components of ratings collected with Mechanical Turk served as measures of metaphor quality. For RVF/LH presentation of the critical figurative word, metaphor quality assessed offline predicted comprehension time across all contexts. But for LVF/RH presentation, metaphor quality only predicted comprehension time for non-supportive contexts. A supportive context seemed to significantly change the relevant semantic alignments of the RH, consistent with the flexibility hypothesis. Email: Frank Durgin, fdargin1@swarthmore.edu

9:20-9:35 (158)
Uncovering the Time Course of Activation of Brain Sites During Analogical Reasoning With fNIRS Brain Imaging. KEVIN NIALL DUNBAR, University of Maryland College Park, EVELYN ANNE FORSTER, University of Toronto. — The types of cognitive processes and the order in which they occur were investigated using fNIRS brain imaging during the generation of the final term in a four term analogy task. Results showed peak frontopolar, dorsolateral, and supramarginal gyrus activation during the presentation of the first two words of the analogy. When three of the four words were present and participants had to generate the fourth word (with and without a letter cue), activation shifted to the middle and superior temporal gyri. These results suggest a model in which a framework is first constructed via recruitment of frontopolar cortex (and DLPFC) and then categorical relations are generated by recruiting MTG and STG. Overall, these findings are consistent with our Micro-Category model of Analogy. Email: Kevin Niall Dunbar, kndunbar@umd.edu

9:40-9:55 (159)
Affective Motivation in the Human Cerebral Cortex. *DANIEL CASASANTO and GEOFFREY BROOKSHIRE, University of Chicago. — We propose that the organization of affective motivation in the cerebral cortex depends on the organization of the cortical motor system. According to the standard model of motivation, the left cerebral hemisphere is specialized for approach motivation. We challenge this conclusion, showing that the hemispheric laterality of approach motivation differs between individuals as predicted by the way they tend to perform approach-motivated actions with their hands. We measured approach motivation before and after 5 sessions of transcranial direct current stimulation to increase excitation in the left or right dorsolateral prefrontal cortex in left- and right-handers. Stimulation to frontal cortex induced changes in approach motivation that depended on the strength and direction of participants’ handedness, and reversed completely between strong left- and right-handers. Results support a new theory of motivation in the brain, and suggest that affective motivation may rewire neural circuits that evolved for performing approach and avoidance-related motor actions. Email: Daniel Casasanto, casasanto@alum.mit.edu

Speech Perception
Continental B, Saturday Morning, 8:00-10:00
Chaired by Ariel Cohen-Goldberg, Tufts University

8:00-8:15 (160)
Frequency and Neighborhood Density Effects in ASL Sign Recognition. NAOMI CASELLI and ARIEL COHEN-GOLDBERG, Tufts University (presented by Ariel Cohen-Goldberg). — A majority of deaf children are at risk for language deprivation because they do not have access to spoken or signed language. We investigated the long-term effects of language deprivation on sign perception. Eighty deaf adults with a range of early language experiences provided speeded lexical decision judgments for 300 ASL signs and 300 nonsigns. A linear mixed-effects model controlled for several lexical and demographic characteristics. Values for sign frequency and neighborhood density — the number of signs sharing formal properties (flexion, location, movement) with the target — were obtained from a newly created ASL lexical database. People with limited early exposure to sign language showed large effects of sign frequency (facilitatory)
and neighborhood density (inhibitory) relative to people with extensive early exposure. These results suggest language deprivation leads to relatively inefficient retrieval mechanisms that are inordinately subject to lexical competition. We interpret these results in a computational model of sign access. Email: Ariel Cohen-Goldberg, ariel.goldberg@tufts.edu

8:20-8:35 (161)
Phonetic Recalibration by Text and Lipread Speech. MIRJAM N. KEETELS, JEROEN J. STEKELENBURG, and LEMMY SCHAKEL, Tilburg University, MILENE BONTE, Maastricht University, JEAN VROOMEN, Tilburg University (presented by Jean Vroomen). — Listeners quickly learn to label an ambiguous speech sound if there is lipread information that tells what the sound should be (phonetic recalibration (Bertelson, Vroomen, & de Gelder, 2003)). We now report that printed text can also serve as a teacher to induce recalibration. At the neurological level, though, these two information sources differ because only lipread speech evokes a mismatch negativity (MMN) if a deviant lipread token is combined with a standard sound. Participants thus adjust their phonetic boundary in accordance with disambiguating lipread speech or text alike, but at different levels in the brain. Bertelson, P., Vroomen, J., & de Gelder, B. (2003). Visual Recalibration of Auditory Speech Identification: A McGurk Aftereffect. Psychological Science, 14(6), 592-597. Email: Jean Vroomen, j.vroomen@uvt.nl

8:40-8:55 (162)
Non-Native Speech Learning in Older Adulthood. ERIN INGVALSON, Florida State University. CASANDRA NOWICKI, and AUDREY ZONG, Northwestern University, PATRICK WONG, Chinese University of Hong Kong. — Bilinguals have a reduced risk of cognitive decline (Gollan et al., 2011), leading to the hypothesis that teaching older adults a second language could protect against dementia (Antoniou et al., 2013). However, it is unknown if older adults will be successful second-language learners. Older adults show individual variation in phonetic sensitivity (Souza et al., 2003), suggesting they may show the same individual variation in non-native speech learning as younger adults. Perrachione et al. (2011) found that whereas listeners with a high baseline aptitude for differentiating lexical tone had higher rates of learning success when trained with multiple talkers, listeners with relatively lower baseline aptitudes had more success with only one talker. The present study replicated Perrachione et al’s Experiment 1 in older adults, expecting to find the same aptitude x training type interaction. Our hypothesis was not confirmed, instead, learning success was best predicted by measures of memory. These findings are consistent with earlier studies of learning in older adulthood, and suggest that language training paradigms will need to be modified to account for the cognitive declines of aging to lead to success by older adults. Email: Erin Ingvelson, ingvalson@northwestern.edu

9:00-9:15 (163)
Both Preceding and Following Distal Speech Rate Can Cause Words to Disappear. LAURA DILLEY, Michigan State University, MARK PITT, The Ohio State University, NAVIN VISWANATHAN, SUNY, New Paltz & Haskins Lab, LISA SANDERS, University of Massachusetts-Amherst. — Previous studies have shown a lexical rate effect (LRE), whereby slowing the rate of speech context (e.g., Glenn thought his friend and neigh…) both preceding and following a reduced function word caused drops in listeners’ rates of reporting a function word (e.g., neighbor are like… versus neighbor like…). We investigated how two factors influenced the magnitude of the LRE: the portion of rate-manipulated speech (preceding vs. following the function word), and the proximity of context that preceded or followed the function word. Manipulations involving only the adjacent context preceding or following the function word produced sizeable LREs. Moreover, manipulations involving the remainder of the fragment (i.e., the distal, nonadjacent context either preceding or following the function word) also produced substantial LREs. These findings suggest models of word segmentation and recognition must include ongoing monitoring of speech rate across an utterance as a significant factor in processes of spoken communication. Email: Laura Dilley, ldilley@msu.edu

9:20-9:35 (164)
Effects of Production and Task-Switching on Learning to Perceive Speech Sounds. MELISSA MICHAUD BAESE-BERK, University of Oregon, ARTHUR SAMUEL, Stony Brook University and the Basque Center on Cognition, Brain, and Language. — The relationship between speech perception and production is complex. There is preliminary evidence suggesting that simply producing tokens during training can disrupt perceptual learning (e.g., Leach & Samuel, 2007). We present three experiments examining whether this disruption is truly due to producing tokens during training, or is instead attributable to shifting between perception and production tasks during training. Listeners were taught a non-native phonemic contrast. In Experiment 1, we examine discrimination performance after training in perception alone, or training in perception+ production; in the latter, listeners repeat tokens on every trial. In Experiment 2, rather than repeating the training tokens, listeners read an unrelated letter aloud on each perceptual training trial. In Experiment 3, listeners respond to the unrelated letter with a button press, rather than reading it aloud. The results suggest that the disruption of perceptual learning is influenced by multiple factors, including production of the specific training token. Email: Melissa Michaud Baese-Berk, mbaesebe@uoregon.edu

9:40-9:55 (165)
Sound-Specificity Effects and the Content of the Lexicon. SVEN MATTYS and DORINA STRORI, University of York, JOHANNES ZAAR, Technical University of Denmark (DTU). — Recent evidence suggests that non-linguistic sounds co-occurring with spoken words are retained in the lexicon (Pufahl & Samuel, 2014). We tested the hypothesis that this sound-specificity effect might be due to the different acoustic glimpses of the words that the associated sounds create. We paired spoken words with one of two sounds, varying the level of energetic masking from exposure to test. The sound change from exposure to test led to a drop in recognition
accuracy only when there was a high energetic masking contrast. Independently, when the sounds were made more integral to the words through pitch and intensity modulation, a sound change also led to a drop in recognition accuracy. Removing integrality cancelled the effect. These results suggest that the assimilation of background sounds into lexical memory cannot be reduced to a simple context effect.

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Symposium III: From Thought to Action: Cognitive & Neural Mechanisms in Writing
International North, Saturday Morning, 10:00-12:00
Chair by Brenda Rapp & Michael McCloskey, Johns Hopkins University

10:00-10:10 (166)
Introduction and Overview. BRENDA RAPP, Johns Hopkins University

10:10-10:25 (167)
Exploring Handwritten Word Production Across Alphabetic and Non-Alphabetic Scripts. MARKUS DAMIAN, University of Bristol. — A substantial literature exists on spelling, examining both children and adults and targeting healthy as well as impaired populations. By contrast, the idea of exploring orthographic language production in close parallel to spoken production, and applying comparable methods and tasks, is relatively new. A series of studies will be described in which we examined handwritten word production in healthy adult individuals, with the general aim of pinpointing the contribution of phonological codes to orthographic production, as well as identifying the relative time course of access to sound and spelling when preparing written responses. These studies involved speakers of languages with alphabetic (English) or non-alphabetic (Chinese) orthographic scripts, and hence additionally speak to the differences and commonalities between radically different types of orthographic systems when individuals generate written responses. Email: Markus Damian, M.Damian@bristol.ac.uk

10:30-10:45 (168)
The Neural Bases of Spelling: Can Neural Data Inform Our Understanding of Cognitive Representations and Processes? BRENDA RAPP, Johns Hopkins University. — Understanding the neural bases of spelling and writing is an important goal in its own right; in addition, the study of neural substrates can contribute to our understanding of the cognitive representations and processes underlying written word production. In reviewing evidence from neuroimaging and lesion localization research on spelling and writing, I will consider how patterns of neuro-topographical association and dissociation are analogous to patterns of association and dissociation in behavioral research and can similarly shed light on such issues as: the nature of the long-term and working memory processes that support literacy, the multiple components of lexical selection and representation, the nature and abstractness of orthographic representations. I will argue that neural approaches constitute additional tools that we can apply to the challenge of understanding the cognitive bases of written word production. Email: Brenda Rapp, rapp@cogsci.jhu.edu

10:50-11:05 (169)
What Do Young Children Know About the Symbolic Function of Writing? REBECCA TREIMAN, BRETT KESSLER, KRISTINA DECKER, and TATIANA CURY POLLO, Washington University in St. Louis. — Children learn a good deal about the outer appearance of writing before they are able to spell by using letters to symbolize phonemes. When asked to write truck, for example, a 4-year-old may produce letters along a roughly horizontal line from left to right. However, the letters that the child chooses, such as aop, may not reflect the words’ sounds, suggesting a failure to understand how writing symbolizes language. We report a study in which 4-year-old prephonological spellers, selected on the basis of Monte Carlo methods, used more elements on average to write plural nouns such as legs than singular nouns such as leg. Young children seem to take variations in spelling length to reflect the quantity of the referent rather than the word’s phonological length, for children did not use more elements to write present progressive verbs such as buying than shorter bare verbs such as buy. Email: Rebecca Treiman, rtreiman@wustl.edu

11:10-11:25 (170)
The Development of Neural System That Support Letter Perception: The Importance of Early Handwriting. KARIN HARMON JAMES, Indiana University. — Prior to understanding and reading words, children must develop letter knowledge. In preschool, children generally learn to name letters through visual and auditory study, tracing, writing, and in many cases, through typing. However, mounting evidence suggests that learning letters through handwriting facilitates letter understanding more than these other methods. I will present neuroimaging (fMRI) evidence that suggests that early handwriting practice recruits the sensorimotor networks that are used for letter processing as well as for later word reading. These networks become functionally connected through handwriting practice, but not through tracing or typing. Thus, I will argue that the representations that underlie letter processing include the sensorimotor networks that are created through handwriting. Early handwriting, therefore, may be important for brain development that subsequently supports reading ability. Email: Karin Harman James, kjames@indiana.edu

11:30-11:45 (171)
Stroke Patterns in Written Letter Production: An Optimality Theory Analysis. MICHAEL MCCLOSKEY, Johns Hopkins University. — The strokes for writing a letter shape (e.g., b, B) could be produced in various directions and orders. Some variation in stroke patterns is observed, but most possible patterns never occur (e.g., for B: lower loop, then vertical line, then upper loop). Researchers have proposed principles underlying stroke patterns, but the principles often conflict, and are frequently violated. What, then, determines how characters are written? Applying
Optimality Theory (OT), a computational framework developed by Prince and Smolensky in the context of phonology, I propose that stroke patterns are governed by violable, rank-ordered constraints (e.g., Start at the Left, No Upward Strokes). Stroke patterns violating only low-ranking constraints are favored over those violating higher-ranking constraints. I suggest that the OT framework sheds light on a) stroke patterns that do and do not occur; b) individual variation; c) stroke errors in children and dysgraphic individuals; and d) character inventories in writing systems. Email: Michael McCloskey, Michael.McCloskey@jhu.edu

11:50-12:00 (172)
General Question and Answer Period

Working Memory I
Continental C, Saturday Morning, 10:00-12:00
Chair by Ullrich Ecker, University of Western Australia

10:00-10:15 (173)
Individual Differences in the Removal of Outdated Information From Working Memory, ULLRICH ECKER, University of Western Australia. — The ability to keep working memory content up to date is important for a number of higher cognitive functions such as reasoning, but it is also crucial for the effective operation of working memory itself. We argue that an active item-wise removal process lies at the heart of working memory updating. Removing outdated or irrelevant information allows focused processing of relevant information, and minimizes interference. We recently introduced a new memory updating paradigm to measure a person's removal efficiency. In this talk, I will present data from a number of individual differences studies exploring the co-variation of an index of removal efficiency with working memory capacity, inhibition abilities, as well as fluid intelligence. Email: Ullrich Ecker, ullrich.ecker@uwa.edu.au

10:20-10:35 (174)
Short-Term Consolidation: A Process Separable From Encoding and Refreshing, TIMOTHY J. RICKER, College of Staten Island, City University of New York. — Working memory research has begun to focus on ways to improve memory performance beyond merely increasing the time available for encoding processes. This focus has been especially prominent in the areas of working memory training and post-cuing, but other avenues are also being explored. One such process that has been of increased interest is short-term consolidation. This is an attention demanding process that continues after encoding ends, resulting in increased resistance to forgetting for the memory trace. This presentation will lay out the basic evidence for consolidation as a separate process from both encoding and attention-based refreshing. The relationship between consolidation, masking, and verbal rehearsal will also be discussed. Email: Timothy J Ricker, rickert@ missouri.edu

10:40-10:55 (175)
Mixed-Up Samples: A Model of Visual Working Memory With Neither Capacity Nor Resource Limits, JONATHAN FLOMBAUM, Johns Hopkins University. — It is orthodoxy that visual working memory is consumable and limited. The motivation is limited recall performance. I suggest that performance limits don't reflect consumable assets, but instead, the difficulty of recovering the contents of a scene (given the inputs). To support this theory, I present modifications of the delayed estimation paradigm. Participants encode several hues, eventually reporting the hue in a probed location. The modifications involve reporting, on some trials, the number of objects perceived or the positions of the objects. The results demonstrate simultaneous uncertainty about the number of objects, where they were, and their colors. To explain these results, I present "Mixed-up Samples". The model receives multiple samples with color and spatial noise from all objects. But the sources of the samples are unlabeled. To report color in a probed location, the model clusters samples received in that vicinity. To report number, it uses a clustering algorithm as well. And to recall the positions of objects, it supplies estimates for the positions of likely clusters. Without consumable memory limits, the model produces performance limits that match those of participants. Email: Jonathan Flombaum, flombaum@jhu.edu

11:00-11:15 (176)
Loss and Reconstruction of Verbal and Visuospatial Information in Working Memory, PIERRE BARROUILLET, KIM UTTENHOVE, NAOMI LANGEROCK, and ANNALISA LUCIDI, University de Geneve. — The Time-Based resource-Sharing model (TBRS, Barrouillet & Camos, 2015) assumes that the maintenance of information in working memory involves the constant reconstruction of memory traces to repair the damages created by temporal decay and interference during concurrent processing. The interplay between this loss and reconstructive processes leads to predict that recall performance in working memory tasks should decline with longer concurrent processing times but remain unaffected by the number of processing episodes. A series of experiments verified these predictions for verbal memory (letters), but not for visuospatial memory (spatial locations) that proved affected by both factors. A second series of experiments tested two hypotheses in explaining this asymmetry: the lack of long-term memory knowledge or the absence of specific mechanism of maintenance for visuospatial information. The results shed light on the constraints that limit the maintenance of both types of information in working memory. Email: Pierre Barrouillet, pierre. barrouillet@ unige.ch

11:20-11:35 (177)
Building Knowledge Requires Bricks, not Sand: The Critical Role of Familiar Constituents in Learning, LYNNE REDER and XIAONAN L. LIU, Carnegie Mellon University; ALEXANDER KEINATH, University of Pennsylvania; VENCISLAV POPOV, New Bulgarian University. — Despite vast efforts to understand human learning, researchers have failed to appreciate that forming new knowledge is more difficult with less familiar constituents
and that more familiar stimuli consume less working memory resources. Subjects unfamiliar with Chinese characters were trained to discriminate visually similar characters during a visual search task over four weeks during which half of the characters appeared much more frequently. Each week subjects learned novel character pairs associated with a different English word. Ability to recall a word when cued with its character pair improved each week. Crucially, however, even though all Chinese character pairs were novel each week, pairs consisting of more familiar characters were more easily learned. Performance on a working memory task was better for more familiar stimuli, consistent with the claim that familiar stimuli consume fewer working memory resources. Implications for optimal instruction, including second language learning, will be discussed. Email: Lynne Reder, reder@cmu.edu

11:40-11:55 (178)
In and Out of the Focus of Attention: The Effects of a Secondary Task on Information Held in Working Memory. EVIE VERGAUWE and NELSON COWAN, University of Missouri-Columbia. — Memory and processing items are thought to be flexibly brought in and out of the focus of attention during online cognition. We examined this. Short series of letters were presented for subsequent recall. A probe letter followed each to-be-remembered letter and was to be judged as present or absent from the list presented so far. Probes were sometimes preceded by an unrelated to-be-processed stimulus. We manipulated the duration of the pre-probe delay and examined how this modulates set-size effects on probe response times. When there was no intervening processing, set-size effects remained invariant over time, suggesting that the list remained in the focus of attention. When there was an intervening processing task, however, set-size effects were small at short delays and increased over time, indicating that the list was out of the focus of attention shortly after processing and was then gradually brought back into the focus of attention. Email: Evie Vergauwe, vergauwec@missouri.edu

Associative Learning
Williford, Saturday Morning, 10:20-12:00
Chaired by Jan De Houwer, Ghent University

10:20-10:35 (179)
Expanding the Boundaries of Evaluative Learning Research: How Intersecting Regularities Shape Our Likes and Dislikes. JAN DE HOUWER and SEAN HUGHES, Ghent University, MARCO PERUGINI, University of Milan-Bicocca. — There are a number of important pathways via which novel preferences may be formed and existing ones altered. Most of these pathways involve regularities in the presence of a single stimulus (e.g., mere exposure), two or more stimuli (e.g., evaluative conditioning) or between behavior and its consequences (e.g., approach/avoidance learning). We propose that changes in liking due to intersections between regularities represent a fourth, and previously unrecognized, type of evaluative learning. Across four related studies, we found strong support for the hypothesis that when environmental regularities intersect with one another (i.e., share elements or have elements that share relations with other elements), the evaluative properties of the elements of those regularities can change. These changes in liking were observed across a range of stimuli and procedures and were evident when self-report measures, implicit measures (IAT) and behavioral choice measures of liking were administered. Functional and mental explanations of this phenomenon are offered followed by a discussion of how this new type of evaluative learning effect can accelerate theoretical, methodological and empirical development in attitude research. Email: Jan De Houwer, jan.dehouwer@ugent.be

10:40-10:55 (180)
Face-Name Learning in Older Adults: A Benefit of Hyper-Binding. JENNIFER C. WEEKS, University of Toronto, RENÉE K. BISS and KELLY MURPHY, Baycrest Hospital, LYNN HASHER, University of Toronto (presented by Lynn Hasher). — Difficulty remembering faces and their corresponding names is a hallmark of cognitive aging, as is increased susceptibility to distraction. Given evidence that older adults both spontaneously encode distractors and bind them to simultaneously occurring targets (a hyper-binding phenomenon), we asked whether memory for face-name pairs could be improved if names were previously presented as distraction together with target faces. In three experiments, young and older participants performed a selective attention task on faces while ignoring superimposed names; after a brief delay, they learned and were tested on a list of face-name pairs that included maintained and re-arranged (disrupted) pairs from the first task. In each experiment, older but not younger participants showed better memory for maintained than disrupted pairs, suggesting that they bound targets and distractors at encoding and tacitly relied on this knowledge at retrieval. These results suggest that older adults’ natural propensity to automatically encode both relevant and irrelevant information, as well as the relationships between them, can be employed to aid face-name memory performance. Email: Lynn Hasher, hasher@psych.utoronto.ca

11:00-11:15 (181)
Exploring the Underpinnings of Color-Word Contingency Learning. NOAH D. FORRIN and COLIN M. MACLEOD, University of Waterloo (presented by Colin M. MacLeod). — In the color-word contingency learning task, a word is presented in color on each trial. The participant is to identify the color by a key press, ignoring the irrelevant word. Critically, each word is presented most often in one color (high contingency) and less often in the other colors (low contingency). As trials progress, responding is more rapid to high contingency items than to low contingency items, evidence of learning of the contingencies. We report experiments investigating how the extent of congruency (the ratio of high to low contingency trials) and the relative speed of processing of the two dimensions influence the degree of learning. Our goal is to understand what drives this rapid, powerful form of implicit learning. Email: Colin M. MacLeod, cmacleod@uwaterloo.ca
11:40-11:55 (183)

Learning and Memory Gains From Phonological Processing. FRANK EISNER, Radboud University, MEREL BURGERING, Tilburg University, JAMES MCQUEEN, Radboud University Nijmegen, JEAN VROOMEN, Tilburg University. — How does the language system support learning and retention of new associations? Here we tested the contribution of phonological processing to the learning of novel sound–picture associations. Participants learned to associate 12 pictures of non-objects with 12 spoken non-words which had been distorted using sine-wave synthesis. One group of participants was aware that these sounds were in fact speech, while a second group was not. Experiment 1 showed that those participants who had been informed that the sounds were distorted speech were faster to learn the sound–picture associations, and retained more of the associations after a two-day delay, than the participants who were unaware that the sounds were in fact speech. Experiment 2 replicated the training effect, and showed that the speech-mode advantage does not diminish over the course of one week. Memory encoding and retention appear to be enhanced when the language system is engaged, even if only on a phonological level.

Email: Frank Eisner, f.eisner@donders.ru.nl

Numerical Cognition

Marquette, Saturday Morning, 10:20-12:00

Chaired by Thomas J. Faulkenberry,
Tarleton State University

11:00-11:15 (186)

How Are Numerals Read? Insight From a Modified Task Switching Procedure. MICHAEL REYNOLDS and NATALIE FORD, Trent University. — Four experiments are reported that utilized a variant of the task switching procedure in order to examine whether Arabic numerals are named like objects (Dice) or read like words. Subjects named the value of two notations that alternated in a repeating AABB sequence. Insight into whether these notations were being named differently was inferred by comparing naming times on switch trials (A → B and B → A) and non-switch trials (A → A and B → B). A switch cost was observed for (1) numerals and dice, (2) number words and dice, but not for (3) numerals and...
number words. This pattern is consistent with the claim that numerals are read like words rather than named like objects. Email: Michael Reynolds, michaelchanreynolds@trentu.ca

11:20-11:35 (187)
Modeling Numeracy, Aging, Individual Differences. ROGER RATCLIFF and GAIL MCKOON, The Ohio State University. — Thirty-one elderly adults were tested on 5 numeracy tasks: a symbolic task (is this 2-digit number greater or less than 50), a non-symbolic task (is the number of asterisks in this array greater or less than 50), a go/no-go version of the non-symbolic task, a task used to control for brightness and area, and a number memory task. The diffusion model was fit to the data and model parameters were compared between the elderly adults and college-age adults. We also examine how the approximate number system model for numeracy will integrate with the diffusion model to account for distance effects. Email: Roger Ratcliff, ratcliff.22@osu.edu

11:40-11:55 (188)
Adding Up to Good Bayesian Reasoning: Problem Format Manipulations and Individual Skill Differences. GARY BRASE, Kansas State University, W. TREY HILL, Fort Hays State University. — How people perform in Bayesian reasoning tasks depends on both the way the task is presented and individual differences in general ability. Different theoretical views predict that these factors should either interact or be independent of each other. This research examined reasoning performance across different presentation formats (natural frequencies versus percentages, and with versus without pictorial aids) as well as across levels of ability (in numerical literacy and spatial ability). The contributions of numerical literacy and spatial ability to Bayesian reasoning success were largely independent of the presentation format of the tasks, and these factors additively can account for just over 30% of the variance in performance. This result is most consistent with an ecological rationality view of statistical reasoning. Email: Gary Brase, gbrase@ksu.edu

Bilingualism I
Waldorf, Saturday Morning, 10:20-12:00
Chaired by Debra Titone, McGill University

10:20-10:35 (189)
Bilingual Social Usage and L2 History Modulate Behavioral Indicators of Executive Control Among Healthy Young Adults in Montreal. DEBRA TITONE, IRINA PIVNEVA, NAVEED SHEIKH, and VERONICA WHITFORD, McGill University. — Whether healthy young adult bilinguals outperform monolinguals on behavioral measures of executive control is controversial (reviewed in Baum & Titone, 2014). Guided by the Adaptive Control Hypothesis (Green & Abutalebi, 2013), we used mixed effects modeling to investigate the more nuanced question of whether individual differences among bilinguals in L1/L2 social usage and L2 history (L2 AoA) relate to executive control on the Simon (n = 781) and Number Stroop (n = 767) tasks. Across tasks, bilinguals who use their L1/L2 in dual-language social contexts showed smaller response-switch-costs than bilinguals who use their L1/L2 in compartmentalized social contexts. For the Simon task, both social usage and L2 AoA modulated incongruency costs, with the largest cost reductions accruing to late bilinguals in dual-language social contexts. Thus, behavioral measures of executive control among healthy young adult bilinguals are modulated by social usage and language history, consistent with the Adaptive Control Hypothesis. Email: Debra Titone, dtitone@psych.mcgill.ca

10:40-10:55 (190)
Morphosyntactic Development in a Second Language: An Eye-Tracking Study on the Role of Attention. BERNARD I. ISSA, University of Tennessee Knoxville, GARY E. RANEY and KARA MORGAN-SHORT, University of Illinois at Chicago (presented by Kara Morgan-Short). — This study explored the role of attention in second language (L2) acquisition (e.g., Schmidt, 1990) by examining how external and internal attentional manipulations affected attentional allocation during L2 processing and whether these manipulations led to learning of a novel L2 morphosyntactic target form. To assess attention, we compared eye-tracking measures recorded during external and internal attentional manipulations to those recorded on control trials (with no attentional manipulation). L2 development was assessed with an interpretation task based on the target form. The external attentional condition (N = 21) led participants to skip the target form less and evidence medium learning effects (d = 0.65). The internal attentional condition (N = 20) led participants to skip the target form less, fixate on it longer, and evidence large learning effects (d = 3.48). Although both conditions effectively manipulated attention, results suggest that these manipulations affect attention in qualitatively different ways, which may have implications for the amount of resultant L2 learning. Email: Kara Morgan-Short, karams@uic.edu

11:00-11:15 (191)
Syntactic Category Expectation in Spanish-English Bilinguals Is Language-Independent. GUADALUPE DE LOS SANTOS, University of Michigan, MICHAEL SHVARTSMAN, Princeton University, JULIE BOLAND and RICHARD L LEWIS, University of Michigan (presented by Julie Boland). — The present study investigated whether probabilistic grammatical expectations generated by Spanish-English bilinguals are language-specific or language-independent. In particular, we were concerned with whether expected abstract lexical categories are specific to the language of the input that was used to create the expectation, or whether such expectations operate across languages. Using eye-tracking, we measured first pass reading times on nouns in grammatical (det-N) and ungrammatical (adv-N) word pairs, in both same-language and mixed-language pairs, as participants performed a lexical decision task on the word pairs. Mixed-language pairs were read more slowly, indicating a language switch cost. But crucially, nouns were read faster following a determiner than an adverb, regardless of whether the determiner and noun were from the same language. Furthermore, the magnitude of the speedup did not differ across same- and mixed-language pairs. The results suggest that grammatical category expectations are language-independent. Email: Julie Boland, jeboland@umich.edu
11:20-11:35 (192)
The Effects of Age, Multilingualism, and Education on L1 Vocabulary Size: Results of a Massive Online Experiment. EMMANUEL KEULEERS, PAWEL MANDERA, MICHAEL STEVENS, and MARC BRYSBAAERT, Ghent University.
— We use the results of a large online experiment on word knowledge in Dutch to investigate variables influencing vocabulary size in a large population and to examine the effect of word prevalence — the percentage of a population knowing a word — as a measure of word occurrence. Nearly 300,000 participants were presented with about 70 word stimuli (selected from a list of 53,000 words) in an adapted lexical decision task. We identify age, education, and multilingualism as the most important factors influencing vocabulary size. The results suggest that the accumulation of vocabulary throughout life and in multiple languages mirrors the logarithmic growth of number of types with number of tokens observed in text corpora (Herdan’s law). Moreover, the vocabulary that multilinguals acquire in related languages seems to increase their first language (L1) vocabulary size and outweighs the loss caused by decreased exposure to L1.
Email: Emmanuel Keuleers, emmanuel.keuleers@ugent.be

11:40-11:55 (193)
The Bilingual Expertise Hypothesis. CONOR T. MCLENNAN and SARA INCERA, Cleveland State University.
— The bilingual expertise hypothesis is proposed as a way to account for conflicting findings in the literature (Bialystok, et al., 2015; de Bruin, et al., 2015a & 2015b). Experts in many domains take longer to initiate a response but then outperform novices. We used mouse tracking to compare monolingual and bilingual Stroop performance. Participants were instructed to identify a word’s color by clicking the corresponding response option. We recorded participants’ initiation times and mouse trajectories. Consistent with the bilingual expertise hypothesis, initiation times were longer for bilinguals, but mouse trajectories revealed more efficient movement toward the correct response. A separate group of monolinguals told about this method of responding did not alter their performance, suggesting that bilinguals’ performance was not the result of a conscious strategy. Overall, these results suggest that some cognitive processes may be qualitatively different in monolinguals and bilinguals, and that bilinguals are “experts” at managing conflicting information.
Email: Conor T. McLennan, c.mclennan@csuohio.edu

Scene Processing
Continental B, Saturday Morning, 10:20-12:00
Chaired by Michael Dodd, University of Nebraska-Lincoln

10:20-10:35 (194)
Can Individuals Deducibly Which Task Someone Was Performing Based Solely on Their Eye Movements? MICHAEL DODD, BRETT BAHLE, MARK MILLS, MONICA ROSEN, and GERALD MCDONNELL, University of Nebraska-Lincoln, JOSEPH MACINNES, Higher School of Economics, Moscow.
— Numerous investigations have revealed that eye movements and fixation locations differ as a function of how an individual is attempting to process a scene (e.g., Castelhano et al., 2009; Dodd et al., 2009; Land & Hayhoe, 2001; Mills et al., 2011, Yarbus, 1967). As a consequence, a common question of interest is whether a participant’s task can be predicted from their observed pattern of eye movements. To that end, a number of researchers have taken a cue from the machine learning literature and attempted to train a task set classifier with varying degrees of success (e.g., Borji & Itti, 2014; Greene et al., 2012; Henderson et al., 2013). In the present experiments, we examine whether human participants can effectively classify task set based on the eye movements of others and how their performance compares a recent classifier.
Email: Michael Dodd, mdodd2@unl.edu

10:40-10:55 (195)
Perceiving a Continuous Visual World Across Eye Blinks. DAVID E. IRWIN and MARIA M. ROBINSON, University of Illinois. — People blink their eyes every few seconds but the changes in retinal illumination that accompany eye blinks are hardly noticed. Furthermore, despite the loss of visual input, visual experience remains continuous across eye blinks. Two hypotheses were investigated to account for these phenomena. The first proposes that perceptual information is maintained across a blink, while the second proposes that perceptual information is not maintained but rather post-blink perceptual experience is ante-dated to the beginning of the blink. In three experiments subjects judged the temporal duration of a stimulus that was interrupted by an eye blink with that of a stimulus presented while the eyes were open. The duration of stimuli that were interrupted by eye blinks was judged to be 130 – 150 ms shorter than that of stimuli presented while the eyes remained open, indicating that blink duration was not accounted for in the perception of stimulus duration. This suggests that perceptual experience is neither maintained nor ante-dated across eye blinks, but rather is ignored.
Email: David E. Irwin, irwin@illinois.edu

11:00-11:15 (196)
Temporal Yoking in Detection of Pictured Scenes. MARY C. POTTER and QUAN WAN, Massachusetts Institute of Technology, CARL E. HAGMANN, Syracuse University. — Presenting a written target name before an RSVP sequence of pictures leads to more accurate detection than when the name appears after the sequence (Potter, Wyble, Hagmann, McCourt, 2014). To investigate temporal yoking of the 1-4 word name and the picture in greater detail, we presented spoken or written target names at varying times between 1.5 s before and 1.5 s after the onset of the RSVP sequence. The stream of 6 pictures was presented for 40 or 53 ms per picture; all pictures were new to the participants. Strikingly, performance (d’) remained well above chance in each temporal condition, although it dropped significantly when the name was presented after the target picture. The name needed to be presented only 500 ms (if spoken) or 250 ms (if written) before the sequence to give the full advance benefit. Spoken and written names gave similar results, pointing to the abstract nature of the comparison. Advance conceptual information enhances target detection, but detection is still possible when the target information is simultaneous with or immediately follows the sequence, supporting feedforward processing.
Email: Mary C. Potter, mpotter@mit.edu
Expert Perception of Scene Gist: Finding Breast Cancer in Less Than a Second. JEREMY M. WOLFE and DIANNE GEORGIAN-SMITH, Harvard Medical School/Brigham and Women’s Hospital, JULIE COOPER, York Teaching Hospital, UK, TAMARA MINER HAYGOOD, M.D. Anderson Cancer Center, KARLA K. EVANS, University of York. — Humans can extract meaning from scenes after very brief exposure. This “gist” perception can be learned for novel stimuli. Radiologists distinguish between normal mammograms and those containing subtle signs of cancer within 500msec. Untrained observers cannot perform the task. Within 500msec, localization of pathology is at chance even for experts, suggesting they are detecting a global signal of abnormality. What is the signal? Performance is poor with low-pass filtered images but almost as good with high-pass as with unfiltered images. Radiologists, trying to recognize if a patient has breast cancer, perform above chance when viewing only isolated portions of a mammogram, even if the portion does not contain obvious signs of cancer or depicts part of the contralateral breast. Detection may be based on a widely-distributed image statistic. These experiments show that subtle aspects of “scene gist” can be learned, providing insight into the processes supporting more “natural” scene perception.

Irrelevant Background Scenes Render Neural Responses to Words as Non-Words During Lexical Decisions. MELISSA VÕ, SABINE ÖHLSCHLÄGER, and TIM CORNELISSEN, Goethe University Frankfurt. — We tested whether neural responses during lexical decisions are modulated by task-irrelevant scene backgrounds. Strings of letters appeared on pre-cued locations of background scenes. Participants’ task was to decide whether the letter string formed a word or non-word. Words could either be congruent with the scene (“SOAP’ on sink), semantically incongruent (“SOCK on sink), or syntactically incongruent (“SOAP” on towel rack – i.e., semantically congruent but it in a wrong relative location). We found that words semantically incongruent with respect to the background scene triggered an N400 response signaling semantic integration difficulties. At the same time, semantically inconsistent scenes rendered brain responses to words as non-word responses. Syntactic violations did not significantly affect brain responses. We conclude that scenes semantics are accessed automatically. Language and scene processing interact, implying that both may share common, amodal cognitive mechanisms that are efficiently integrated to function as a unitary whole.

Email: Joliet, Saturday Afternoon, 12:00-1:00
Chaired by Stephan Lewandowsky, University of Bristol, and Lou Shomette, The Psychonomic Society
Symposium IV: Enhancing Education Through Cognitive Psychology
International North, Saturday Afternoon, 1:30-3:40
Chaired by Alice F. Healy, Matt Jones, Michael C. Mozer, University of Colorado

1:30-1:35 (199)
Introduction. ALICE F. HEALY, University of Colorado. — Education stands as one of the most promising domains of application for research in cognitive psychology. Recent work has begun to fulfill this promise by more tightly integrating these two fields. Research applying cognitive psychology to education has advanced dramatically in the last 10 years, driven by technical advances and increased emphasis on ecological validity. Specifically, the field has embraced in-classroom studies, active and self-directed learning, adaptive teaching methods, and quantitative modeling of learning. This symposium will cover some of the most exciting and influential examples of this research, including work on predicting long-term knowledge retention from short-term assessments, the relationship between test types and students’ metacognitive strategies, interactions between perceptual and symbolic processing, adaptive instruction technology based on models of human learning, individual differences in concept representation, and the benefits of exploratory and errorful learning. Email: Alice F. Healy, alice.healy@colorado.edu

1:35-1:50 (200)
Assessing Student Knowledge With Real-Time in-Classroom Quizzing. MATT JONES, ALICE F. HEALY, LINDSEY ANDERSON TACK, DANIEL CORRAL, LAKSHMI LALCHANDANI, and ERICA V. ROZBRUCH, University of Colorado. — Recent technological advances in real-time quizzing in the classroom enable instructors to rapidly adapt their teaching to the knowledge state and learning needs of their students. This capability raises questions of how quizzes can best predict later retention of course material. We report three experiments that address these questions by manipulating the timing and content of quiz questions, motivated by cognitive theories of spacing effects in learning, task-appropriate transfer, and sustained attention. We then develop statistical models for evaluating three facets of the predictive value of the quizzes: determining the relative difficulty of different test items, determining the relative proficiency of different students, and predicting performance by individual students on individual items. Results indicate that quizzes are more predictive if their presentation is delayed from the initial teaching of the corresponding material, and if quiz questions match the format of test questions. Interspersing quizzes throughout learning decreases their predictability at the student level but increases their predictability at the student-by-item level. Email: Matt Jones, mcj@Colorado.EDU

1:50-2:10 (201)
Multiple-Choice Testing as a Desirable Difficulty: Evidence From the Laboratory and the Classroom. ELIZABETH L. BJORK, NICHOLAS SODERSTROM, JERI LITTLE, and ERIN SPARCK, University of California-Los Angeles. — We will discuss evidence from both the laboratory and the classroom demonstrating that multiple-choice testing (often not thought to be as effective for learning as more open-ended testing formats, such as free- and cued-recall) can also function as an effective learning tool or as a desirable difficulty, with even some advantages over those other more highly regarded testing formats. We will include a discussion of the necessary properties that multiple-choice questions must possess in order to function in this manner and also the metacognitive strategies students need to use when answering such questions to benefit fully from their use, and how their use of such strategies can be improved. Email: Elizabeth L. Bjork, elbjork@psych.ucla.edu

2:10-2:30 (202)
Algebraic Reasoning as Spatial Transformations of Physical Notation. ROBERT L. GOLDSTONE and DAVID H. LANDY, Indiana University, ERIN R. OTTMAR, Worcester Polytechnic University, ERIK WEITNAUER and MICHAEL BAILEY, Indiana University. — We have observed that when people engage in algebraic reasoning, they often perceptually and spatially transform algebraic notation directly rather than first converting the notation to an internal, non-spatial representation. We will describe empirical evidence for three spatial transformations — grouping, transposition and overlaying intermediate results — and we present a general account that posits others: spatial distribution, pulling out, canceling, marking off, and swapping. Understanding mathematical reasoning as trained perceptual-motor routines has led us to develop and assess an algebra tutoring system for use in K-12 classrooms. We describe the results from 4-day 7th grade classroom interventions using either a business-as-usual control or versions of the system that vary in the amount of scaffolding they provide to students. More scaffolded physical transformations produced greater improvement on paper-and-pencil tests, consistent with students benefiting from not being distracted by needing to perform calculations only tangentially related to critical algebraic concepts. Email: Robert L. Goldstone, rgoldsto@indiana.edu

2:30-2:50 (203)
Adaptive Teaching: Improving the Efficiency of Learning Through Hypothesis-Dependent Selection of Training Data. TODD M. GURECKIS, PATRICIA CHAN, DOUG MARKANT, and BRENDEN LAKE, New York University. — Active machine learning research shows that training of classifiers can be improved when the learning algorithm itself selects training data (e.g., choosing examples for which it is uncertain). Recent work with humans documents similar improvements whereby "active" learners who can select their own training examples are faster at learning simple classification rules than "passive" learners who observe data selected by another source. One explanation for this advantage is that active learners are able to choose data that test the hypothesis they are currently considering, whereas for passive learners, data are independent of the learner's belief. We explore whether the efficiency of passive learning can be improved with "adaptive teachers" that estimate a learner's current hy-
Individual Differences in Learning Exemplars Versus Abstracting Rules: Influences on Authentic Classroom Outcomes. MARK A. MCDANIEL, REGINA FREY, MICHAEL CAHILL, JIUQING ZHAO, DAVID RUVOLO, and MICHAEL RAUCH, Washington University in St. Louis. — An important part of classroom learning is understanding general concepts illustrated through didactic examples. We find in laboratory concept learning that people tend to differ in how they approach concept learning, with some learners focusing on acquiring the particular examples and responses associated with the examples, and other learners focusing on abstracting underlying regularities (abstractors). We present several studies investigating the relation between students’ tendencies to focus on examples versus abstraction in a laboratory learning task and these students’ performances in university-level general chemistry courses. The results indicate that these individual learning tendencies are related to course performance. We also present a preliminary study regarding whether augmented instruction can close the gap in course performance across the different learning tendencies. Email: Mark A. McDaniel, markmcdaniel@wustl.edu

Learning From Errors. JANET METCALFE, Columbia University. — It has often been thought that to be effective, performance during the processes involved in knowledge acquisition should be error-free. Skinnerians proposed that people and animals alike should be trained in an errorless manner. This assumption, though, has some adverse consequences including a reluctance to encourage students to actively generate possibilities and explore, because in so doing they are likely to commit errors. In contrast to this assumption, an increasing number of studies indicate that the commission of errors — as long as those errors are corrected — results in enhanced learning. This literature in support of errorful learning, along with exploration of possible mechanisms for this enhanced learning, will be reviewed. In addition, the construct of “prediction error” has gained traction in the neuroscience community. The complex relation between “prediction error” and the enhanced learning and memory through error commission that is seen in cognitive studies will be discussed. Email: Janet Metcalfe, jm348@columbia.edu

Discussion. MICHAEL C. MOZER, University of Colorado. Email: Michael C. Moser, mozer@Colorado.EDU

The Role of Response Inhibition and Interference Resolution in Lexical Selection. ANGELA FINK and MATT GOLDRICK, Northwestern University (presented by Matt Goldrick). — During speech production, activation from conceptual representations spreads to the target and its semantic neighbors (e.g., naming a cat triggers coactivation of CAT, DOG, RAT). This coactivation influences processing; naming semantically related pictures (DOG) slows selection of lexical items on subsequent trials (CAT; Howard, Nickels, Coltheart, Cole-Virtue, 2006). Using a negative transfer paradigm (Persson, Welsh, Jonides, & Reuter-Lorenz, 2007), we examine the role of two inhibitory control processes in managing the effects of such coactivation. Participants perform a production task before and after intensive practice that “fatigues” one of two control processes: response inhibition, which suppresses a dominant response, or interference resolution, which biases activation when multiple responses compete for selection. If that control process modulates coactivation, we expect fatiguing it will impact the effect of semantic neighbors on processing. Results suggest that fatiguing response inhibition but not interference resolution modulates the influence of semantic neighbors on lexical selection. Email: Matt Goldrick, matt-goldrick@northwestern.edu

Cumulative Semantic Interference Without Lexical Selection. NICOLAS DUMAY, University of Exeter; BCBL, Basque Center on Cognition, Brain, and Language, SABRINA ARISTEI, University of Exeter. — Two experiments examined whether cumulative semantic interference requires naming competitors to emerge, or whether it simply builds up implicitly, irrespective of lexical selection. The phonological facilitation found in color naming when colors and depicted objects start by the same sound (a goat/cat depicted in “green”) was used. In Experiment 1 participants named either the color or the object, while the latter appeared in semantically related pictures (DOG) slows selection of lexical neighbors (e.g., naming a cat triggers coactivation of CAT, DOG, RAT). This coactivation influences processing; naming semantically related pictures (DOG) slows selection of lexical items on subsequent trials (CAT; Howard, Nickels, Coltheart, Cole-Virtue, 2006). Using a negative transfer paradigm (Persson, Welsh, Jonides, & Reuter-Lorenz, 2007), we examine the role of two inhibitory control processes in managing the effects of such coactivation. Participants perform a production task before and after intensive practice that “fatigues” one of two control processes: response inhibition, which suppresses a dominant response, or interference resolution, which biases activation when multiple responses compete for selection. If that control process modulates coactivation, we expect fatiguing it will impact the effect of semantic neighbors on processing. Results suggest that fatiguing response inhibition but not interference resolution modulates the influence of semantic neighbors on lexical selection. Email: Matt Goldrick, matt-goldrick@northwestern.edu

Attention Economics and Recent Evolution of Learnability in American English. THOMAS HILLS and JAMES ADELMAN, University of Warwick. — Concreteness — the psycholinguistic property of referring to a perceptible
entity — enhances processing speed, comprehension, and memory. These represent selective filters for cognition likely to influence language evolution in competitive language environments. Taking a culturotics approach, we use multiple language corpora representing more than 350 billion words combined with concreteness norms for over 40,000 English words and demonstrate a trend in the desire in concrete language in America. In four blocks over the last 200 years, both Williams and the contemporary. Classes (nouns, verbs, adjectives, and prepositions) between new and old concepts less nouns indicate this is not explained by semantic bleaching, but we find some evidence that the rise is related to changes in population demographics and may be associated with second language learners or attention economics in response to crowding in the language market. In sum, we demonstrate evolution in the psycholinguistic structure of American English, with a well-established impact on cognitive processing, which is likely to permeate modern language use. Email: Thomas Hills, thomhills@gmail.com

2:10-2:25 (210)
The Dual Nature Account of Homophones in the Production Lexicon: Evidence From Aphasia. ERICA MIDDLETON, Moss Rehabilitation Research Institute. — The study of homophones has great potential to inform models of language production. Frequency inheritance refers to a phenomenon where a low-frequency word (e.g., deer) is named more fluently than would be expected based on its frequency characteristics, presumably because of shared phonology with a high-frequency homophone counterpart (e.g., dear). However, prior studies have been inconsistent in showing frequency inheritance. According to the dual nature account of homophony, this inconsistency derives from a high-frequency counterpart (dear) exerting two counterposing effects when its low-frequency mate (deer) is named: (1) a detrimental impact during semantically-driven lexical retrieval; (2) a beneficial impact during phonological retrieval. In support of the dual nature account, in a large unsolicited sample of speakers with aphasia, homophone naming targets were associated with more errors originating from semantically-driven lexical retrieval but fewer phonological retrieval errors compared to control words. Implications for contemporary models of lexical access are discussed. Email: Erica Middleton, middleerre@gmail.com

2:30-2:45 (211)
Divided Attention Makes Non-Dominant Responses More Common. DANIEL KLEINMAN (Member Select-Speaker Award Recipient), TAMAR GOLLAN, and VICTOR FERREIRA, University of California, San Diego. — Three experiments investigated how the attentional requirements of response activation and selection affect choices in linguistic and non-linguistic domains. On each trial, participants responded to two stimuli presented either in close temporal proximity (leading to divided attention) or not (undivided attention). The critical second task always afforded two responses. In Experiment 1, bilinguals named pictures in whichever language came to mind first (dog or perro). In Experiment 2, monolinguals named pictures with two acceptable names, one of which (couch) was more common than the other (sofa). In Experiment 3, participants received different amounts of training on two non-linguistic tasks (color and shape categorization), and were subsequently instructed to perform whichever task came to mind first. In every experiment, when RTs were fast, participants were more likely to select the difficult response — their non-dominant language, the less common picture name, and the less-practiced task — when their attention was divided. As attention is often divided in real-life response selection (e.g., when planning multiple words), the words we use and the actions we choose may be influenced by our tendency to plan them in advance. Email: Daniel Kleinman, dkleinman@ucsd.edu

2:50-3:05 (212)
Viewer Discretion Advised: Warning Enhances Attentional Control of Emotion During Speech Production. KATHERINE WHITE, ANNE E. HOHLT, and LISA R. HSI, Rhodes College, LISE ABRAMS, University of Florida. — Recent research has shown that speech production is disrupted in the presence of emotional words, resulting from difficulties in reactive attentional control necessary to block these words. This experiment investigated whether engaging proactive attentional control via cues (anticipating interference) reduces interference from emotional distractors during picture naming. Participants named target pictures superimposed with taboo, negative, or neutral distractors. In one block, trials were preceded by a color cue (+) that signaled which type of distractor would appear, while the other block used black fixations with no information about upcoming distractors. Taboo distractors (and negative distractors to a lesser degree) slowed picture naming relative to neutral distractors. However, cues reduced interference from taboo but not negative distractors. Furthermore, providing cues in the first block slowed naming in the second block when cues were unavailable. These findings demonstrate the importance of both proactive and reactive attentional control in reducing interference during speech production. Email: Katherine White, whitek@rhodes.edu

Working Memory II
Continental B, Saturday Afternoon, 1:30-3:30
Chaired by Stephan Lewandowsky, University of Bristol and University of Western Australia

1:30-1:45 (213)
Rehearsal in Serial Recall: An Unworkable Solution to the Non-Existent Problem of Decay. STEPHAN LEWANDOWSKY, University of Bristol and University of Western Australia, KLAUS OBERAUER, University of Zurich. — We examine the explanatory roles that have been ascribed to various forms of rehearsal or refreshing in short-term and working memory, usually in conjunction with the assumption that memories decay if they are not rehearsed. Notwithstanding the popularity of the rehearsal idea, there have been few detailed examinations of its underlying mechanisms. We simulate rehearsal in a decay model and explore its role by simulation in several benchmark paradigms ranging from immediate serial recall to complex span and
delayed recall. The results show that articulatory rehearsal often fails to counteract temporal decay. Rapid attentional refreshing performs considerably better, but so far there is scant direct empirical evidence that people engage in refreshing. Combining articulatory rehearsal and refreshing as two independent maintenance processes running in parallel leads to worse performance than refreshing alone. We suggest that explanatory appeals to rehearsal are theoretically unhelpful unless buttressed by quantitative modeling. Email: Stephan Lewandowsky, stephan.lewandowsky@bristol.ac.uk

1:50-2:05 (214)
Evidence for Modality-Independent Order Coding in Working Memory. ANDRE VANDIERENDONCK, University of Ghent. — The multicomponent working memory model assumes that both identity and order are coded in modality-specific storage systems such as the phonological loop and the visuospatial sketch pad. To further test this assumption, the present study used a serial recall task which was performed in a single-task condition and in a dual-task condition with an embedded memory task in the retention interval. The modality of the serial task was either verbal or visuospatial and the embedded tasks were in the other modality and required either serial or item recall. In Experiment 1, visuospatial but not verbal serial recall was more impaired when the embedded task was an order than when it was an item task. Using a more difficult verbal serial recall task, verbal serial recall was also more impaired by another order recall task in Experiment 2. The implications for the modality-specific and modality-independent views of order coding in working memory are discussed. Email: Andre Vandierendonck, andre.vandierendonck@ugent.be

2:10-2:25 (215)
Mind the Gap: Individual Differences in Verbal and Nonverbal Working Memory as Measured by Complex Span and N-Back Tasks. THOMAS S. REDICK, Purdue University. — Individual differences in working memory concurrently and longitudinally predict many important cognitive, educational, and clinical outcomes. However, prior research has shown relatively little overlapping variance between complex span and n-back tasks to measure working memory, despite their frequent use. The current work investigated the relationship between working memory and reasoning as a function of the verbal and nonverbal content of the constituent tasks. Across two large-sample studies, a content-specific pattern first reported by Redick and Lindsey (2013) was observed — verbal complex span and verbal n-back tasks were not correlated with each other, whereas correlations involving either a nonverbal complex span task or a nonverbal n-back task were stronger and significant. In addition, regardless of the verbal or nonverbal content of the measures, both complex span and n-back tasks accounted for significant variance in reasoning tests. Results are discussed in relation to previous studies of individual differences in working memory. Email: Thomas S. Redick, tredick@purdue.edu

2:30-2:45 (216)
Free Time Is Used to Remove Distractors From Working Memory in the Complex-Span Paradigm. KLAUS OBERAUER, University of Zurich, STEPHAN LEWANDOWSKY, University of Bristol and University of Western Australia. — The function of working memory is to hold the currently most relevant information available for processing. If working memory is to work, it needs to be rapidly updated to keep pace with the constantly changing need for relevant information. Doing so requires an efficient mechanism for disposing of no-longer relevant information. Traditional theories assigned this job to trace decay. There is, however, strong evidence against decay in working memory. Therefore, we need to assume a process that removes outdated information from working memory. For instance, in the complex-span paradigm, encoding of to-be-remembered material alternates with processing of other information that becomes irrelevant right after processing. We recently proposed a computational model, SOB-CS, which includes a mechanism for removing irrelevant information, such as distractors in complex span. Here we present experiments with the complex-span paradigm showing that (1) distractors are encoded into working memory, thereby contributing to interference, and (2) free time following a distractor is used to remove that distractor from working memory. Email: Klaus Oberauer, k.oberauer@psychologie.uzh.ch

2:50-3:05 (217)
Sources of Interference Between Verbal and Spatial Lists in Working Memory. CANDICE COKER MOREY and MONICA MIRON, University of Edinburgh. — Verbal memories have been shown to be resilient to interference from visual memories, but visual memories deteriorate when verbal items are also maintained. The boundary conditions of this phenomenon are unknown. We investigated interference between verbal and spatial serial order reconstruction tasks, manipulating whether the to-be-tested list was retro-cued in order to disentangle interference due to encoding two lists simultaneously from interference due to maintaining two sets of information simultaneously. We also manipulated the occurrence of task-irrelevant deviant stimuli in each kind of memory list. Deviants were infrequent changes in the aural list (i.e., presentation in a different voice) or the spatial list (i.e., presentation of the placeholder in a different colour). Manipulating the occurrence of deviant stimuli allowed for the testing of attention capture and its subsequent effects on performance. There were dualtask costs to both verbal and spatial serial reconstructions, but a retro-cue benefit only for spatial information, indicating that unique costs arising from shared storage occurred only for spatial lists. Consistently, auditory deviants were more likely to impair spatial than verbal recall. Email: Candice Coker Morey, cmorey@staffmail.ed.ac.uk

3:10-3:25 (218)
Working Memory Helps Solving Second-Order False Belief Task in Normal Adults: An Event-Related fMRI Study Based the Theory of Mind. NAOYUKI OSAKA and KEN YAO, Kyoto University; TAKEHIRO MINAMOTO and MARIKO OSAKA, Osaka University. — Mindreading based...
on the theory of mind allows us to attribute empathies and intentions to others to predict their behaviors. First-order false-belief task (FBT) testify an ability to make attribution about others’ false belief with regard to fact, while second-order FBT is related with what people think about others’ thoughts. Children under the age of four, for example, likely fail to perform first order FBT. We assumed one of possible reasons the failure would due to insufficient executive function of working memory. We applied second-order FBT as more sophisticated mindreading task to normal adults to examine simultaneous dorsolateral prefrontal cortex (DLPFC) activation related to working memory using event-related fMRI. We thought working memory helps solving second-order FBT. Results showed brain activations in the bilateral DLPFC, media prefrontal cortex, precuneus, and posterior parietal cortex under second-order FBT.

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Consciousness
Continental C, Saturday Afternoon, 1:30-3:10
Chaired by Joseph S. Lappin, Vanderbilt University

1:30-1:45 (219)
Divided Visual Awareness of Multiple Moving Objects. JOSEPH S. LAPPIN, DOUGLAS L. MORSE, and ADRIANE E. SEIFFERT, Vanderbilt University. — Well-trained observers in three experiments monitored ongoing patterns of randomly moving objects, trying to minimize RT for detecting a non-random target motion by any one of the objects. Target detection involved two parallel visual processes: (1) Visual awareness of target motion was an exponential process with rate (a) proportional to 1/n, for n = 1-12 objects, and (b) constant over time. (2) Motion integration occurred from about 0.4 - 0.8s, independent of n, mean RT, motion speed, and visual awareness. Target detection rates were a product of these two processes: \( h_n(t) = A(n) \cdot M(t) \), where \( h_n(t) \) is the hazard rate at any given time t; \( A(n) = a/n \) is the detection rate of visual awareness, in bits/s; and \( M(t) = (t - c)/(k - c) \) quantifies linear motion integration for \( c \leq t \leq k \). \( M(t) = 0 \) for \( t < c \), \( M(t) = 1 \) for \( t > k \).

Email: Joseph S Lappin, joe.lappin@vanderbilt.edu

1:50-2:05 (220)
From Involuntary to Intrusive: The Features That Cause a Thought to Feel Intrusive. IRA HLYMAN, MADELINE JALBERT, and JOSEPH BLYTHE, Western Washington University. — What features make a thought feel intrusive? Although people experience a great number and variety of involuntary thoughts and memories, not all involuntary thoughts feel intrusive. Some people have suggested that intrusive thoughts primarily occur for involuntary thoughts and memories related to traumatic experiences particularly for people with PTSD. Another possibility is that intrusive thoughts are a subset of involuntary thoughts determined by the content of the thoughts and features of the re-experiencing. We investigated the features associated with moments when a song stuck in someone's head feels intrusive. Using surveys, diary studies, and an experimental investigation, we have found that several features contribute to how intrusive an involuntary mental experience feels. In particular, the emotional response, amount of repetition of the thought, clarity of the experience, and control over the experience contribute to thoughts feeling intrusive. We argue that intrusiveness is not limited to traumatic thoughts but can be a response to many different involuntary thoughts.

Email: Ira Hyman, ira.hyman@wwu.edu

2:10-2:25 (221)
The Plastic Self: Evidence From Virtual Reality Studies. KE MA, JING ZHANG, and BERNHARD HOMMEL, Leiden University (presented by Bernhard Hommel). — Rubber- and virtual-hand illusions show that people can perceive ownership for fake body parts under suitable conditions. Bottom-up approaches attribute perceived body ownership to multisensory matching (e.g., between seen object and felt hand movements), whereas top-down approaches claim that novel body parts are integrated only if they resemble some part of a permanent internal body representation. We used virtual reality to demonstrate that adults perceive body ownership for virtual cat claws, balloons, and squares, and exhibit affective responses to threats of these artificial body extensions. Ownership was predicted by agency (i.e., control of the extension), while similarity to actual body parts contributed to ownership in less specific ways. These findings suggest that perceived ownership emerges from the integration of unfiltered bottom-up information and general top-down biases. They also suggest that previous studies with passive-stimulation techniques have underestimated the plasticity of body representations.

Email: Bernhard Hommel, hommel@fsw.leidenuniv.nl

2:30-2:45 (222)
Consciousness in Theory of Mental Activity: Response to Challenges. DONELSON DULANY, University of Illinois. — These challenges come not only out of psychology but also out of philosophy of mind and science. This can briefly state major challenges with responses provided by a mentalistic metatheory and methodology of competitive support. Conceptual challenges? The place of intentionality — symbolic representation. Kinds and forms of conscious states. Their interrelations in mental activity temed explicit and implicit. What is conscious and nonconscious. The status of volitional control. Methodological challenges? Standards of theory confirmation and disconfirmation, with roles of Duhem-Quine, Bayes, and network richness. The mappings of conscious states to experimental variables. The kinds of defendable phenomenal reports. This will also summarize an experimental example of explicit and implicit learning. The scientific study of mental activity can have a broad focus on the roles of consciousness in phenomena studied within cognitive psychology and social cognition.

Email: Donelson Dulany, ddulany@illinois.edu

2:50-3:05 (223)
Consistency, Not Speed: Temporal Regularity as a Metacognitive Cue. LISA STEVENSON and RICHARD CARLSON, Pennsylvania State University (presented by Richard Carlson). — We examined the hypothesis that in
skilled, multi-step cognitive performance, it is temporal smoothness or regularity rather than speed that provides a fluency cue for metacognition. Participants were asked to count 20 to 40 items per trial, reporting a final count and confidence rating after each series of items. Participants were assigned to a consistent SOA (400ms), a varied SOA (ranging from 400-800ms), or a mixed SOA condition. For the mixed groups, switching from one SOA type to the other had differential effects on accuracy and confidence. Switching from consistent to varied SOAs led to higher accuracy but lower confidence, while switching from varied to consistent SOAs led to lower accuracy but higher confidence. No significant accuracy or confidence differences were found between the all-varied and all-consistent groups, suggesting that varying metacognitive judgments in the mixed conditions were due to comparative differences in fluency based on changes in temporal regularity. Email: Richard Carlson, racarlson@psu.edu

Perceptual Organization Marquette, Saturday Afternoon, 1:30-3:10 Chaired by Mary Peterson, University of Arizona

1:30-1:45 (224) Age-Related Deficits in Inhibition in Figure-Ground Assignment in Stationary Displays. MARY PETERSON, University of Arizona, JOHN A. E. ANDERSON, University of Toronto, KARL M. HEALEY, University of Pennsylvania, LYNN HASHER, University of Toronto. — Older adults have reduced inhibitory skills in many cognitive and perceptual tasks. Because figure assignment entails inhibitory competition, we examined older adults’ figure-ground perception in stationary displays. Old and young adults viewed silhouettes biased such that the figure was perceived on the inside of their borders and categorized them as depicting meaningful or novel objects. Meaningful silhouettes were common objects; novel silhouettes depicted novel shapes, but differed in the degree to which shape properties on the outside of their borders competed for figural status (High- vs. Low-Competition silhouettes). In previous studies, young adults classified High-Competition silhouettes as “novel” faster than Low-Competition silhouettes, suggesting they recruit more inhibition to resolve figure-ground when there is more competition. Here, young adults viewed silhouettes biased such that the figure was perceived on the inside of their borders and categorized them as depicting meaningful or novel objects. Meaningful silhouettes were common objects; novel silhouettes depicted novel shapes, but differed in the degree to which shape properties on the outside of their borders competed for figural status (High- vs. Low-Competition silhouettes). In previous studies, young adults classified High-Competition silhouettes as “novel” faster than Low-Competition silhouettes, suggesting they recruit more inhibition to resolve figure-ground when there is more competition. Here, young adults replicated this pattern but older adults showed the opposite pattern. These results extend the evidence for inhibitory deficits in older adults to figure assignment in stationary displays and show that inhibitory deficits are larger when the need for inhibitory resources is greater. Email: Mary Peterson, mapeters@u.arizona.edu

1:50-2:05 (225) Multiple Level Crowding: Crowding at the Object Parts Level and at the Object Configural Level. RUTH KIMCHI and YOSEF PIRKNER, University of Haifa. — In crowding, identification of a peripheral target in the presence of flanking stimuli is worse than when the target appears alone. Prevailing theories hold that crowding occurs because of integration of low-level features at a single, relatively early stage of visual processing. We examined whether crowding can occur at the object configural level in addition to feature/part-level crowding. Target (a disconnected square/diamond made of four elements) identification was measured at varying eccentricities. The flankers were similar either to the target parts or to the target configuration, and degree of feature similarity was controlled for. Crowding by parts was weaker and had smaller spatial extent than crowding by configurations. The strength of crowding by parts or configurations is dependent on the strength of the target’s parts grouping – the stronger the grouping the weaker the crowding by parts and the stronger the crowding by configurations. These results provide strong evidence that crowding occurs not only between object parts but also between configural representations of objects, and demonstrate the relationship between crowding and perceptual organization. Email: Ruth Kimchi, rkimchi@research.haifa.ac.il

2:10-2:25 (226) The Quest for the Simplest Gestalt. AMI EIDELS, University of Newcastle, ROBERT HAWKINS, Stanford University, JOSEPH HOUPUT, Wright State University, JAMES TOWNSEND, Indiana University. — Gestalt theories place particular emphasis on emergent features, which are based on the higher-order relationships among elements of a stimulus rather than local properties. Some Gestalt-related studies focus on relatively complex stimuli, such as faces or complex visual fields (the latter often looking at the principles governing grouping of items). In the current study we tested whether Gestalt advantage in processing can be found with stimuli as simple as a pair of dots. Even this minimal display can give rise to emergent features such as Proximity and Orientation, which serve as 'configural' cues. We employed Townsend’s capacity coefficient with a new task that required detecting a change in the location of any of the two dots. Performance was better when the dots’ displacement was accompanied by changes in proximity and orientation cues, compared to a control condition. We discuss information-processing models that incorporate emergent features. Email: Ami Eidels, ami.eidels@newcastle.edu.au

2:30-2:45 (227) An Illusion of Numerosity Explained. ADAM J. REEVES and QUAN LEI, Northeastern University. — We reported last year an illusion of numerosity in which there seem to be more grey disks than white disks when 50 randomly-located white disks are intermingled with 50 grey disks on a darker grey field. Relative to displays of homogenous disks, the white disks are underestimated whereas the less-salient grey ones are correctly estimated. The illusion disappeared when the white and grey disks were segregated spatially or by motion or in depth. Verbal estimates of numerosity confirmed these effects. Brightening the grey disks to close to the level of the whites increased the illusion. These and other results can be explained in conditions like ours, in which display area and density are fixed, if grey disks are isolated from the intermingled white ones by thresholding at a contrast level that preserves the contrast energy of the grey disks but reduces that of the white disks. Email: Adam J Reeves, reeves@neu.edu
Perceptual Grouping Over the Fingertips: Enumeration and Haptic Search. KRISTA OVERVLIET, University of Hamburg, MYRTHE PLAISIER, VU University Amsterdam. — Spatial arrangement is known to influence visual perception. Here we investigated how spatial arrangement of items presented to the individual fingers impacts haptic enumeration and search. More specifically, we tested whether grouping by proximity facilitates serial enumeration (counting). Participants were asked to report the number of tangible targets presented to the finger pads of both hands. We found that number of groups—and not number of items—were the critical factor in enumeration times. In a second experiment we found that this grouping also takes place when groups extend across fingers of both hands. Our results suggest that grouping by proximity facilitates haptic serial processing on a spatial as opposed to a somatotopic level. Our results support the idea that grouping by proximity, a principle introduced in vision, also greatly affects haptic processing of spatial information. Email: Krista Overvliet, krista.overvliet@gmail.com

Reading Processes
Williford, Saturday Afternoon, 1:30-3:30
Chairied by Jocelyn R. Folk, Kent State University

Incomplete Semantic Processing of Skipped Words During Reading. MICHAEL A. ESKENAZI and JOCELYN R. FOLK, Kent State University (presented by Jocelyn R. Folk). — During silent reading about 30% of words are skipped, but models of eye movement control disagree as to how much processing occurs on skipped words. Research has suggested that skipped words are not processed to the same degree as fixated words (Eskenazi & Folk, 2015); however, this measure came from an offline lexical decision task, which might not reflect word processing during sentence reading. The current two experiments used eye tracking to determine if skipped words function as weaker primes than fixated words during reading to investigate how deeply skipped words are processed. In the first experiment skipped words functioned as weaker repetition primes than fixated words. In the second experiment skipped words functioned as weaker semantic primes than fixated words. The data suggest that skipped words are not processed to the same degree as fixated words and that this might be a result, in part, of incomplete semantic processing. Email: Jocelyn R. Folk, jfolk@kent.edu

The Role of Spaces During Reading: Why Does Unsegmented Text Produce Reading Deficits? HEATHER SHERIDAN and ERIK D. REICHELE, University of Southampton, EYAL M. REINGOLD, University of Toronto. — To examine the role of inter-word spaces during reading, we used a gaze-contingent boundary paradigm (Rayner, 1975) to manipulate parafoveal preview (i.e., valid vs. invalid preview) in a normal text condition that contained spaces (e.g., “John decided to sell the table”) and in an unsegmented text condition that contained random numbers instead of spaces (e.g., “John4decided8to5sell9the7table”). Preview effects on mean first-fixation durations were larger for normal than unsegmented text, and survival analyses revealed a delay in the onset of both preview validity and word frequency effects on first-fixation durations for unsegmented relative to normal text. Taken together with simulations that were conducted using the E-Z Reader model (Reichle, Pollatsek, & Rayner, 2012), the present findings indicated that unsegmented text deficits reflect disruptions to both parafoveal processing and lexical processing, in addition to disruptions to saccadic programming. We discuss the implications of our results for models of eye movement control. Email: Heather Sheridan, h.sheridan@soton.ac.uk
skilled deaf readers are “more efficient” than skilled hearing readers at processing words within a single fixation. Finally, recent results suggest that WPE is also observed in young deaf readers, supporting the notion of an early onset of WPE. Email: Nathalie N. Belanger, nbelanger@ucsd.edu

2:50-3:05 (233)
The Curious Case of the Reverse Preview Benefit Effect in Reading. ELIZABETH SCHOTTER and MALLORIE LEINENGER, University of California, San Diego. — The boundary paradigm allows researchers to quantify preview benefit — shorter fixations on a target word with a valid preview of it from parafoveal vision compared to an invalid preview, which has been explained by integration of memory codes across fixations. Subjects read target words that were high or low frequency and have no orthographic, phonological, or semantic relationship (e.g., phone vs. scarf: “The boy found a red phone/scarf on his way home from school.”) that were orthogonally crossed to create valid preview conditions and invalid preview conditions where the preview was either higher or lower frequency than the target. We found standard preview benefit for high frequency targets (shorter fixations with a valid than invalid preview) but a reversed preview benefit for low frequency targets (longer fixations with a valid than invalid, higher frequency preview), suggesting the preview may directly influence fixation durations on the target without requiring integration. Email: Elizabeth Schotter, eschotter@ucsd.edu

3:10-3:25 (234)
Eye Movements and the Effect of Word Frequency on Display Change Detection During Reading. BERNHARD ANGELE, Bournemouth University, TIMOTHY J. SLATTERY, University of South Alabama, KEITH RAYNER, University of California, San Diego. — We used a display change detection paradigm to investigate whether display change detection uses abstract letter codes and whether display change detection is affected by the processing difficulty of the word preceding the boundary which triggers the display change. We report two main findings: First, subjects were significantly more sensitive to display changes when the word was in a non-wordlike preview than when the word was a wordlike preview. Eye movement measures showed a significant orthographic parafoveal-on-foveal effect on the pre-boundary word of the non-wordlike preview compared to the wordlike and the identical preview conditions. On the other hand, the preview benefit effect on the target word was not affected by whether the preview was wordlike or non-wordlike. Second, we did not find any influence of pre-boundary word frequency on display change detection performance. Our results suggest that display change detection does not use the same cognitive mechanisms that are involved in parafoveal preprocessing during natural reading. Instead, parafoveal processing may take place in two stages: an early, orthography-based, pre-attentional stage, and a late, attention-dependent lexical access stage. Email: Bernhard Angele, bernhard.angele@gmail.com

3:30-3:45 (235)
Mechanisms of Improved Dual-Task Performance in Action-Video Gamers. TILO STROBACH, Medical School Hamburg, TORSTEN SCHUBERT, Humboldt University Berlin. — Recent research has shown that video gamers are improved in different cognitive skills in untrained transfer situations. However, the mechanisms of these improvements are unknown: (1) a single more general level of improvement (Bavelier et al., 2012) or (2) improvements are specific and depends on similarities between the experienced video game genre and transfer situations (Oei & Patterson, 2014). The present study tested these mechanisms for the case of action-video-games and transfer situations with simultaneous dual-tasks: combinations of speeded tasks with predictable or unpredictable task orders, task combinations with high working-memory demands. While the "general" mechanism predicts improvements in all dual-tasks, the "similarity-based" mechanism predicts improvements in speeded dual-tasks; this is because action-video-games are particularly characterized by speeded actions. In action-video gamers in contrast to non-video gamers, we found trends for improvements in all dual-task situations. These findings support the "general" mechanism for the case of action-video-games and dual-tasking. Email: Tilo Strobach, tilo.strobach@medicalschool-hamburg.de

3:50-4:05 (236)
Individual Differences in Experience-Based Chunking Predict Online Language Processing. STEWART M. MCCAULEY and MORTEN CHRISTIANSEN, Cornell University (presented by Morten Christiansen). — There is considerable variation in language processing ability across the normal population. Previous work has demonstrated that individual differences in domain-general cognitive abilities, such as working memory and statistical learning, predict language skill. However, specific mechanisms underlying individual variation in language processing have yet to be isolated. We present evidence that a fundamental learning and memory skill — chunking — is an important predictor of language processing ability. Firstly, we demonstrate that chunking ability reflects experience with language, as measured by a novel variation on the serial recall task involving consonant combinations drawn from naturally occurring text. Our results reveal considerable individual differences in the ability to use chunk information during sequence recall. Secondly, we show that these differences predict participants' online processing of complex sentences involving relative clauses. Our study thus presents the first evidence tying the fundamental ability for chunking to sentence processing skill. Email: Morten Christiansen, christiansen@cornell.edu
4:10-4:25 (237)
Linking Reading and Numerical Knowledge in Children—The Role of Symbols. MARC F. JOANISSE, KAYLA R. PERLMUTTER, and ALEXANDRA M. CROSS, The University of Western Ontario. — Reading and mathematical abilities develop hand-in-hand in children. We examined how symbol learning contributes to this association. We tested kindergarteners on digit- and dot-comparison tasks to assess processing of symbolic and non-symbolic quantity, along with Rapid Automatized Naming (RAN), a well-studied predictor of reading success. We then followed up a year later in the first grade by testing children's word and nonword reading. While RAN correlated with both reading tests, digit comparison predicted only familiar word reading; dot comparison correlated with neither reading test. We also tested the children's RAN-digits performance, comparing high- and low-magnitude digits. Low digits were easier to name than high digits, reflecting the well-established numerical magnitude effect. But importantly, the difference between low- and high-magnitude RAN explained a significant amount of variance in reading familiar words, but not nonwords. Overall, our findings support the theory that reading and math build on common neurocognitive substrates supporting learning of symbol-semantics mappings. This expresses itself in how children encode whole-word forms for reading and how they learn numerical representations of digits. Email: Marc F Joanisse, marcj@uwo.ca

4:30-4:45 (238)
Empirical Cross-Validation and Generalization in Perceptual Categorization. SEBASTIEN HELIE, FARZIN SHAMLLOO, and LEAH D. JELLISON, Purdue University, SHAWN W. ELL, University of Maine. — Category representations can be broadly classified as containing within-category information (what is common to category members, e.g., “A” stimuli are large) or between-category information (what is different between category members and non-members, e.g., “A” stimuli are larger than “B” stimuli). In this presentation, we show that the kind of information that is learned depends on specific task instructions. For example, instructing participants to classify stimuli as members of one of a set of categories (e.g., “Is this and “A” or a “B”?) leads to the development of between-category information whereas instructing participants to classify stimuli as members or non-members of categories (e.g., “Is this an “A“) leads to the development of within-category information. Furthermore, we show that the kind of information that is learned affects performance in a transfer task where participants are asked to build and compare new categories. This research has important implications for designing optimal training regiments. Email: Sebastien Helie, shelie@purdue.edu

4:50-5:05 (239)
Transition From Means-Ends to Working-Forward Problem Solving. ROMAN TARABAN, Texas Tech University. — A fundamental question in undergraduate learning concerns how novices become skilled problem solvers. Comparable samples of engineering majors from higher-ranked and lower-ranked universities enrolled in statics courses (similar to introductory physics) solved three statics problems that varied in difficulty. Overall, higher-ability students (based on the school variable) were more likely to demonstrate evidence of skill, by constructing mental models, applying appropriate domain knowledge, carrying out correct calculations, and applying a working-forward than a means-ends strategy. In post-experiment interviews, a number of students who were classified as unskilled, indicated that they were applying a working forward strategy, contrary to the suggestion in Larkin, Simon, and elsewhere that working forward is a hallmark of problem-solving expertise. Rather, the results suggest that the path from unskilled to skilled incorporates several different kinds of knowledge that emerge and develop together, including a working forward strategy. Email: Roman Taraban, roman.taraban@ttu.edu
in deductive validity and consistency with background causal knowledge. Separate groups evaluated the arguments using either inductive or deductive criteria. Evaluations were made while completing a concurrent low or high load spatial memory task. Individual working memory capacity was assessed using operation span and memory updating tasks. Across both experiments individual working memory capacity predicted reasoning performance on items where deductive validity and causal consistency were in conflict. However this finding was obtained under both deductive and inductive reasoning conditions. Concurrent memory load also had similar effects on both kinds of reasoning. These results suggest that working memory has parallel effects on both kinds of reasoning.

Email: Brett Hayes, b.hayes@unsw.edu.au

3:50-4:05 (242)
The Roles of Inhibitory Control and Memory Retrieval in Inductive Reasoning. AIMEE K. BRIGHT, Queen Mary University of London, AIDAN FEENEY, Queen’s University Belfast (presented by Aidan Feeney). — Inductive inferences about categories are driven by different knowledge types. Thus, cars having some property might be good evidence that rabbits also possess it because of the strong association between the categories or because cars and rabbits belong to the same food web structure. In three studies using a forced choice triad task, we placed associative and structured inferences into conflict. The presence of a strongly associated foil consistently decreased the rate at which people made inferences based on unstructured relations. The tendency to respond on the basis of structured knowledge was associated with semantic rather than response inhibition, and decreased in the presence of a demanding secondary task. Furthermore, measures of semantic inhibition and memory retrieval independently predicted significant amounts of variance in reasoning. These results suggest that successful inductive reasoning requires inhibiting the effects of quickly available associative knowledge so that effortfully retrieved structured knowledge can drive reasoning.

Email: Aidan Feeneey, a.feeneey@qub.ac.uk

4:10-4:25 (243)
Testing Improves Memory, but Does it Improve Analogous Problem Solving? AUTUMN HOSTETTER, Kalamazoo College, TOM CARR, Michigan State University, ROBERT BATSELL and ELIZABETH PENIX, Kalamazoo College. — Learners have better memory for information they have been tested on than information they have only restudied. Are they also better at using that information to solve a problem? 120 participants read two stories describing a protagonist solving a problem. Participants then either read the stories a second time (study condition), copied them verbatim (copy condition), or typed them from memory (test condition). One week later, participants tried to solve two problems that could be solved by analogy to the stories. Their memory for the stories was also tested. We found no direct effect of testing on participants’ ability to solve the analogous problems a week later. However, testing did significantly improve memory for the stories a week later, and better memory for the stories was associated with more success on the analogous problems. Thus, memory helps analogical problem solving, regardless of its source.

Email: Autumn Hostetter, autumn.hostetter@kzoo.edu

4:30-4:45 (244)
Lay Beliefs About Interventions in the Mental Health Domain. ANDREW S. ZEVENEY and JESSECAE K. MARSH, Lehigh University (presented by Jessecae K. Marsh). — In a causal system, to keep one event from happening we can intervene on that event itself or we can intervene on a cause of that event. People believe that ideal interventions work on root causes. However, do people believe this is how actual interventions work? For example, in the mental health domain, where causes are often unknown, where do people think treatment interventions act? We created causal chains linking two symptoms that were each treated more effectively by a different intervention (therapy or medication). When asked how to remove a cause symptom, participants picked the treatment that had been pretested to match that symptom alone. However, therapy was rated as more effective at removing effect symptoms, regardless of symptom type and was rated as a more effective intervention overall. These findings demonstrate a domain specific phenomenon about the effectiveness of interventions and where they target a causal system.

Email: Jessecae K. Marsh, jem311@lehigh.edu

4:50-5:05 (245)
Does Analytical Style Promote Irrreligion? Not in a Culturally Constraining Environment. AYŞE AYÇİÇEĞİ-DINN and SEVIL HOCAOĞLU, Istanbul University, CATHERINE CALDWELL-HARRIS, Boston University (presented by Catherine Caldwell-Harris). — Having an analytical cognitive style is correlated with reduced religiosity, possibly because analysis prompts individuals to scrutinize beliefs that conflict with scientific naturalism. We tested the constraining environments hypothesis: Cognitive/personality styles have less influence when sociocultural norms constrain what beliefs are acceptable. Among female Turkish university students residing in Istanbul, cognitive style had minimal association with religiosity. However, the correlation was of similar magnitude to western samples among males, and among English-Turkish bilinguals. Turkish males face less stigma when they move away from religion than do females. The bilingual students may have acquired individualist ideologies via English exposure in their teen years, and may have experienced freedom from their family to pursue their own educational goals (i.e, invest in English study). Observed correlations between cognitive styles and religiosity might reflect a third variable: individualism (as a cultural value and personality trait) could separately promote analytical style and reduced religiosity.

Email: Catherine Caldwell-Harris, charris@bu.edu

5:10-5:25 (246)
An Axiomatic Approach to Human Behavior. SHELDON GRANT LEVY, Wayne State University. — The axiomatic method of Euclid (The Elements) has been applied in a number of systems including Newton's laws of motion, Spinoza's The
Ethics, and the political philosophy represented in the United States Declaration of Independence. Applications in psychology have been limited although Hull (Principles of Behavior) and more recently Smedslund have developed axiomatic models. An illustrative development of a set of postulates for human behavior is present in which only the relationships of "not," "and," "or" and "implies" are employed. The model capitalizes on Muncaster’s PropCalc for analyzing logical relationships for consistency and redundancy. It also provides a means for obtaining a basic set of deductions implied by the propositions. The model is presented attempts to develop group characteristics from individual motives and perception and then to group action. The focus of the paper is on the utility of the axiomatic approach for theory development. Email: Sheldon Grant Levy, shelly@umich.edu

Recognition I
Williford, Saturday Afternoon, 3:50-5:30
Chaired by Haley Vlach, University of Wisconsin, Madison

3:50-4:05 (247)
A Developmental Account of the Spacing Effect: Children That Forget More, Remember More. HALEY VLACH, University of Wisconsin, Madison. — More than 1,000 published experiments have demonstrated that distributing learning events across time promotes learning to a greater degree than massing learning events together in immediate succession, a phenomenon commonly called the spacing effect. Research has historically focused on demonstrating the generality of spaced learning across tasks, timescales, and species. Consequently, we do not have a developmental account or an understanding of how children come to benefit from a spaced schedule. The current study begins to build a developmental theory by examining whether differences in preschool-aged children’s (N = 99) memory abilities contribute to performance on massed and spaced schedules. The results revealed that children who forget information quickly, but not completely, demonstrated the largest benefit from a spaced schedule over a massed schedule. This work counters the intuitive assumption that forgetting uniformly constrains children’s learning, suggesting instead that rapid forgetting may be driving children’s ability to remember information across time. Moreover, this research demonstrates that only children within a range of memory abilities benefited from a spaced schedule. Email: Haley Vlach, hvlach@wisc.edu

4:10-4:25 (248)
Memory Illusions: Categorical Judgments Produce Them, Confidence Ratings Reduce Them. CHARLES BRAINERD, KOYUKI NAKAMURA, and VALERIE REYNA, Cornell University. — A convenient assumption about confidence ratings is that they retrieve the same memory content as categorical judgments, as when they are used to construct ROC curves for old/new judgments in recognition. However, fuzzy-trace theory posits that in episodic memory tasks, categorical judgments are slanted more toward gist retrieval than confidence ratings are. If so, memory illusions that have been tied to gist retrieval should be suppressed by confidence ratings, relative to categorical judgments. We tested that prediction for illusions of over distribution — circumstances in which we remember events as occurring in too many episodic states, even logically contradictory ones (disjunction fallacies, conjunction illusions/fallacies, violations of additive probability). These illusions are quite robust with categorical judgments, over a range of experimental conditions. Under otherwise identical conditions, all of them were reduced when confidence ratings replaced categorical judgments, and some disappeared altogether. Email: Charles Brainerd, cb299@cornell.edu

4:30-4:45 (249)
Late Consequences of Early Selection: When Successful Monitoring Backfires. KATARZYNA ZAWADZKA (Member Select-Speaker Award Recipient), MACIEJ HANCZAKOWSKI, and EDWARD L. WILDING, Cardiff University. — At retrieval, people can adopt a retrieval orientation by which they re-create the mental operations used at encoding. Monitoring by retrieval orientation leads to assessing targets and foils alike for qualities related to the encoding task. Consequently, foils can gain some of the qualities that targets already possess. We investigated the consequences of adopting a retrieval orientation when foils are repeated across two recognition tests. Participants first processed foils in the context of one of two tests differing in retrieval orientation. The foils were then re-used on a subsequent test in which retrieval orientation either matched or mismatched the first test. We found higher false alarms for these foils when there was a match between the retrieval orientations on both tests. The study demonstrates that when retrieval orientation enriches the foils with similar qualities as possessed by targets, it can backfire under conditions of repeated monitoring of the same foils. Email: Katarzyna Zawadzka, zawadzak@cardiff.ac.uk

4:50-5:05 (250)
A Linear Approximation of the Unequal Variance Likelihood Ratio Transformation and a Linear Ballistic Accumulator Model Extension. ADAM OSTHI, University of Newcastle, ANDREW HEATHCOTE, University of Tasmania, SIMON DENNIS, University of Newcastle. — Glanzer, Hillford, and Maloney (2009) argued for the basis of a log likelihood ratio transformation of memory strengths on the basis of several regularities in recognition memory, including the mirror effect, the zROC length effect, and the variances effect. They found that the three regularities held regardless of whether the distributions of memory strength were normal, binomial, or exponential in shape. Despite the power the transformation, when memory strength distributions are normal and possess unequal variance, the transfer function from memory strength to log likelihood ratio is both nonmonotonic and quadratic in shape, resulting in log likelihood ratio distributions that are noncentral chi-square in shape. We present a linear approximation of this transformation via the Taylor series, which results in log likelihood ratio distributions that are normal in shape. In advantage of this transformation is that it allows the transformation to be applied to the Linear Ballistic
Accumulator (LBA: Brown & Heathcote, 2008) model, which requires normal distributions for the drift rate. The results of a model selection procedure favor a likelihood ratio version of the LBA over an unequal variance memory strength model. Email: Adam Osth, adamosth@gmail.com

5:10-5:25 (251)
Implications of Response Time and Eye Movement Data for Models of Forced Choice Recognition. JEFFREY STARNES, ADRIAN STAUB, and TINA CHEN, University of Massachusetts Amherst. — In a forced-choice recognition task, participants are asked to select which of two words appeared on an earlier list. Researchers have claimed that forced-choice tests can be used to discriminate signal detection models that make different assumptions about the nature of memory retrieval, and forced-choice recognition has also played a role in constraining process models of memory. Throughout the forced choice literature, models assume that participants compare the memory strength of the two items and select the one with stronger memory evidence. We evaluated response time (RT) and eye movement data in two forced-choice recognition experiments. Results suggest that participants base decisions on the absolute memory evidence for each alternative, and they only resort to evaluating the relative evidence when they are uncertain of the correct response. I will discuss how these results constrain potential sequential sampling models for forced-choice accuracy and RT data. Email: Jeffrey Starns, jstarns@psych.umass.edu

Visual Search II
Waldorf, Saturday Afternoon, 3:50-5:30
Chaired by John McDonald, Simon Fraser University

3:50-4:05 (252)
Salient-Signal Suppression Controls Access to Visual Working Memory in Visual Search. JOHN MCDONALD and JOHN GASPAR, Simon Fraser University, DAVID PRIME, Douglas College, PIERRE JOLICOEUR, Université de Montréal. — The ability to efficiently filter relevant from irrelevant information is believed to contribute to an individual’s vWM capacity, but little is known about the precise filtering mechanism that differentiates low- and high-capacity individuals. The inefficient filtering observed in low-capacity individuals might be linked to problems enhancing relevant items or suppressing irrelevant items. Here, we isolated event-related potential components associated with attentional selection (N2pc) and active suppression (PD) during a competitive visual search task. We show that high-capacity individuals suppress salient distractors and permit only task-relevant stimuli entry into vWM. We further show that low-capacity individuals are unable to suppress salient distractors in time to prevent those items from capturing attention and gaining entry into vWM. These results demonstrate that individual differences in vWM capacity are associated with the timing of a specific attentional control operation that suppresses processing of salient-but-irrelevant visual objects and restricts their access to the vWM system. Email: John McDonald, jmcdi@sfu.ca

4:10-4:25 (253)
Logarithmic Efficiency in Visual Search: Implications for our Understanding of Visual Attention. ALEJANDRO LLERAS, DEBORAH CRONIN, ANNA MADISON, ZHIYUANG WANG, and SIMONA BUETTI, University of Illinois at Urbana-Champaign. — Over the past two years, we have documented a number of visual search tasks that are best characterized by RT x set size functions that increase logarithmically with set size (rather than linearly). Here, we will present evidence that (a) logarithmic efficiency coefficients are meaningful indices of target-distractor similarity, and that (b) the presence or absence of logarithmic efficiency in search depends on the top-down goals of the observer. There are at least three important implications that arise from these data. (1) First, our findings call into question the role of “pre-attentive” processes and representations in visual search. Consistent with Reverse Hierarchy Theory, our results suggest that from very early on, attention acts on holistic object representations. (2) A second implication is that, when looking for a specific target in the world, we attend to all of the information in the display in parallel prior to deploying the eyes or focused attention to specific regions of interest in the image. (3) Finally, the depth of processing of specific items in the display depends on the current behavioral goals, as well as on the item’s similarity to the target template. Email: Alejandro Lleras, alejandrolleras@gmail.com

4:30-4:45 (254)
Zooming In on the Cause of Perceptual Load Effect in the Go/Nogo Paradigm. ZHE CHEN, University of Canterbury, KYLIE R. CAVE, University of Massachusetts. — A number of objections have been raised to Perceptual Load Theory (PLT; Lavie, 1995), but there has not yet been a challenge to demonstrations of the load effect using a feature/conjunction go/nogo paradigm (Lavie, 1995, Experiments 2A and 2B). Because identical stimuli were used between the low and high load conditions, these results were taken as strong evidence for PLT. In 4 experiments, we show that the differential degree of distractor processing in these experiments is due to how broadly attention is allocated (attentional zoom) rather than to perceptual load. When stimuli are arranged to equalize the extent of spatial attention across conditions, distractor interference varies little regardless of perceptual load. Load effects emerge only when attentional zoom can covary with perceptual load. These results suggest that attentional zoom can account for the differential degree of distractor processing traditionally attributed to perceptual load in the go/nogo paradigm. Email: Zhe Chen, zhe.chen@canterbury.ac.nz

4:50-5:05 (255)
Distractor Suppression Decreases When Distractor Features Are Variable. DIRK KERZEL, University of Geneva. — Previous research has established that interference from irrelevant color singletons (distractors) occurs when observers search for variable shape singletons among homogeneous shapes (singleton detection), but not when they look for a specific shape among heterogeneous shapes (feature search). In the current study, we replicated this
YAN BAO and BIYI YE, Serial Search? Searching for a Unique Visual Rhythm: A Parallel or Serial Search? Email: Yan Bao, baoyan@pku.edu.cn

It has been recently suggested that searching for a target defined by a unique visual rhythm among same rhythmic moving distractors is not a “pop-out” process, but a serial one that demands attention. The present study further investigates whether search efficiency for a unique visual rhythm can be improved by manipulating the amplitudes or phases of those periodically moving objects. Two experiments are conducted using a visual search task with periodically “bouncing dots.” Subjects are asked to respond to the target with either shorter or longer period among the distractors with the same bouncing period. In Experiment 1 all distractors not only share the same period but also share the same amplitude of the target. In Experiment 2 all the same rhythmic moving distractors are phase synchronized, while their amplitudes are randomized. The results show a serial search in Experiment 1 and a parallel search in Experiment 2. These observations indicate that searching for a unique visual rhythm is not always a serial process, but can be a “pop-out” process which demands little attention. Compared to amplitude, phase is the crucial factor for a “pop-out” when combined with the period.

Email: Dirk Kerzel, dirk.kerzel@unige.ch

5:10-5:25 (256)
Searching for a Unique Visual Rhythm: A Parallel or Serial Search? YAN BAO and BIYI YE, Peking University, ERNST PÖPPEL, Peking University & University of Munich. — It has been recently suggested that searching for a target with variable color or by the inability to focus on a target with variable color. The results showed that variable distractors, but not variable targets, resulted in interference in feature search mode. Thus, efficient distractor suppression occurs only for single features (e.g., red), but not for variable singletons (any odd color).

Email: Yan Bao, baoyan@pku.edu.cn

Bilingualism II
Continental B, Saturday Afternoon, 3:50-5:30
Chair: Barbara Malt, Lehigh University

3:50-4:05 (257)
Representation and Process in Bilingual Lexical Interaction. BARBARA MALT and AMY LEBKUECHER, Lehigh University. — Bilinguals show word use patterns in each of their languages that differ from those of monolingual speakers. One interpretation is that for bilinguals, the elements of meaning associated with words of one language are influenced by those associated with words in the other. Another is that the cross-language influence lies in online processes: word retrieval probabilities or word form activation levels. We asked Mandarin-English bilinguals to name common household objects in their L1 and L2 via forced choice instead of free production. Monolingual-preferred choices were presented, eliminating memory retrieval demands and keeping all offered options at a high level of activation. For comparison, monolinguals of each language performed the same task in their native language. Monolingual and bilingual patterns remained distinct, although differences for the bilinguals’ L1 were substantially reduced. This outcome suggests that bilinguals’ naming patterns in production reflect cross-language influences on both meaning representations and processing.

Email: Barbara Malt, barbara.malt@lehigh.edu

4:10-4:25 (258)
Is Preparation for a Language Switch Like Preparation for a Task-Switch? AURELIU LAVRIC, STEPHEN MONSELL, AMANDA CLAPP, HEIKE ELCHLEPP, and ANTONIA EAST, University of Exeter. — As with switching between tasks, switching output language results in a “switch cost”. Do task-set control mechanisms generalize to selection of language for production? One robust correlate of a task switch is a preparatory positive-polarity brain potential, whose amplitude predicts effective preparation for a switch, making it a likely “signature” of advance task-set reconfiguration. So far there are no reports of this potential from EEG studies of language switching. We asked fluent German-English bilinguals to name pictures, with language specified on every trial by an auditory cue. The cue was transparent (“Deutsch” or “English”) or opaque (musical fragment). With little opportunity for preparation (100 ms cue-stimulus interval), the switch cost was small for transparent cues, but large for opaque cues; it reduced for opaque cues when CSI=1500 ms. Crucially, there was a robust switch-induced EEG positivity during the long CSI; its magnitude predicted the effectiveness of preparation, as in task-switching.

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4:30-4:45 (259)
Language Control and Executive Functioning. KENNETH PAAP, HUNTER JOHNSON, MORGAN BOCKELMAN, REGINA ANDERS, and ROMAN MIKULINSKY, San Francisco State University, OLIVER SAWI, University of Connecticut. — More than 200 SESU students completed 3 standard switching tasks. We replicated Friedman, et al’s report of significant correlations between the switching costs derived from each task. This substantial level of convergent validity felicitously contrasts with the dismal levels reported for common measures of inhibitory control and monitoring. There were no group differences in any of the 3 tasks for either mixing or switching costs. The cumulative evidence overwhelmingly favors the conclusion that there is no bilingual advantage in switching ability. Participants also responded to 2 category fluency probes, 2 verbal fluency probes, and 2 probes to alternate between 2 categories and between 2 letters. Consistent with previous research monolinguals generated more correct responses in these tasks. Of more interest is the new finding that none of these verbal fluency tasks correlate with any of the measures of switching ability. These findings do not align with the clinical and neuroimaging evidence suggesting that verbal ability
may be more strongly reflected in category than in letter fluency scores, and that, conversely, executive functioning may be more strongly reflected in letter fluency scores. Email: Kenneth Paap, kenp@sfsu.edu

4:50-5:05 (260)
Look, Mamá, No Switch-Costs: Lexical Accessibility Drives Cost-Free Voluntary Language Switches. DANIEL KLEINMAN and TAMAR GOLLAN, University of California, San Diego (presented by Tamar Gollan). — Bilinguals often switch languages spontaneously even though experimental studies consistently reveal robust switch costs. We investigated if bilinguals can suspend top-down control to allow lexical accessibility to drive language selection, revealing cost-free switches. Eighty-seven Spanish-English bilinguals repeatedly named a set of 9 pictures. In a voluntary block, they were told to use whichever language seemed easiest for each picture at first presentation, but then to use that same language every subsequent time that picture appeared. Cued switches were elicited for comparison in a separate block. In the voluntary block, bilinguals switched languages more often, named pictures faster, and showed significantly smaller (non-significant) switch costs, than in the cued block. Although bilinguals clearly can engage powerful monitoring of language membership, they can also apparently suspend this system to enable cost-free switches. Switching may be more efficient overall than implied by cued switching studies, particularly if accessibility can also drive non-linguistic task selection. Email: Tamar Gollan, tgollan@ucsd.edu

5:05-5:25 (261)
The Roles of Cross-Language Item Phonological Similarity and Executive Functions on Multilingual Language Control. ALISON TSENG, SARAH PERRET, JARED LINCK, ERICA B. MICHAEL, and EWA GOLONKA, University of Maryland (presented by Jared Linck). — Previous studies show that cross-language phonological similarity and executive functions impact multilingual speech production, but it is unclear how these factors interact. The current language-switching study examines whether multilinguals’ switch costs differ as a function of item-specific cross-language phonological similarity, and whether such differences impact the contributions of executive functions. 64 English-dominant multilinguals switched languages pseudo-randomly while naming pictures in three languages, and completed tasks measuring inhibition, attention shifting, and working memory updating. We developed a novel continuous measure of an item’s cross-language phonological similarity and applied it to 40+ language triads. L2 and L3 naming latencies were related to the phonological similarity of translation equivalents across all three languages, suggesting considerable cross-language interactivity. Planned analyses will explore potential interactions between cross-language phonological similarity and executive functions. We consider the interplay between language similarity and language control, and discuss implications for models of multilingual speech production. Email: Jared Linck, jlinck@umd.edu

Cognitive Offloading
International North, Saturday Afternoon, 4:10-5:10
Chaired by Evan F. Risko, University of Waterloo

4:10-4:25 (262)
Task Based Modulation of Offloading in a Perceptual Task. EVAN F. RISCO and TIMOTHY L. DUNN, University of Waterloo. — Individuals often attempt to offload cognitive demands. An important goal in understanding cognitive offloading is to determine how individuals decide whether to rely solely on internal processes or to adopt an external (non-cognitive) strategy. When individuals are asked to read rotated text they often spontaneously physically rotate in an attempt to normalize the stimulus and offload demands associated with stimulus rotation. Previous research has suggested that the decision to use this strategy is sensitive to the magnitude of rotation costs. However, this research has relied on stimulus-based manipulations that have left open alternative explanations. In the present investigation we demonstrate that manipulating task demands (i.e., comparing more and less working memory intensive tasks) without altering the stimulus display can influence the spontaneous use of this offloading strategy. Results are discussed within a developing account of the decision to offload. Email: Evan F. Risko, efrisko@uwaterloo.ca

4:30-4:45 (263)
Expanding the Cognitive Environment: Memory Dynamics Under the Influence of Technology. BENJAMIN STORM and SEAN MICHAEL STONE, University of California, Santa Cruz, AARON BENJAMIN, University of Illinois. — The ways in which we learn, remember, socialize, and solve problems have all been profoundly affected by technological innovation. In this talk, we present new research exploring the interactions between memory and computers, focusing in particular on how people use computers as a form of cognitive offloading. In one set of studies, we show that saving old information to a computer makes it easier to learn new information. In another set of studies, we show that using the Internet to retrieve information influences a person’s willingness to search memory in the future. People who were forced to use the Internet to search for answers to general-information questions were less likely to use their memory (and more likely to use the Internet) to respond to additional questions. These results indicate that the calculus of memory retrieval is affected by the ready availability of storage capacity and information provided by digital technology. Email: Benjamin Storm, bstorm@ucsc.edu
Offloading Delayed Intentions Into the External Environment: The Role of Metacognition. SAM GILBERT, University College London. — In everyday life, we often create reminders and other perceptual cues for intended behaviours. However, experimental studies investigating fulfilment of delayed intentions typically disallow this type of strategy, forcing participants to use a purely internal representation of behavioural plans. In this talk I will describe a set of studies investigating an ‘intention offloading’ task, whereby participants have the option on each trial to set reminders for intended behaviours. Results indicate that subjective confidence and objective memory ability make independent contributions to participants’ propensity to set reminders. Furthermore, the task predicts participants’ fulfilment of a real-world intention embedded within their everyday activities over the course of a week, with better predictive validity than more traditional prospective memory tasks. These findings suggest the importance of considering metacognitive factors influencing strategic offloading of delayed intentions, in order to understand behavioural organisation in everyday life. Email: Sam Gilbert, sam.gilbert@ucl.ac.uk

Business Meeting
Joliet, Saturday Afternoon, 5:10-6:00
Chaired by Robert Logie, University of Edinburgh

Presentation of the
2015 Clifford T. Morgan Best Article Awards
COLIN MACLEOD, Chair, Publications Committee, University of Waterloo

Business of the Psychonomic Society
ROBERT LOGIE, Chair, Governing Board, University of Edinburgh
Testing a Novel Theoretical Account of the Testing Effect: Successful Retrieval Practice Reduces Tip-of-the-Tongue. WILLIAM J. HOPPER and DAVID E. HUBER, University of Massachusetts, Amherst (presented by David E. Huber). — The benefits of retrieval practice were first observed nearly 100 years ago and yet there are surprisingly few formal explanations of why retrieval practice reduces forgetting. We developed a novel theoretical account of the testing effect based on the global match memory models. These models assume a two-stage process for recall: in stage one, a specific memory is sampled (or located) based on the available retrieval cues; in stage two, the details of that memory are recovered. If recovery fails, the test-taker may experience a tip-of-the-tongue (TOT) state. We propose that successful retrieval practice results in recovery learning, which reduces TOT. However, there is a short-term cost to retrieval practice, and unrecovered memories remain unrepairable (i.e., in a TOT state) until new retrieval cues are used. In a free recall task, we confirmed that retrieval practice increases the ease of recovery, as measured with cumulative recall latencies. In a cued-recall task, we confirmed that a change of cues between retrieval practice and the final test can rescue previously unrecovered items (i.e., a release from TOT) of cues between retrieval practice and the final test can rescue previously unrecovered items (i.e., a release from TOT) until new retrieval cues are used. In a free recall task, we confirmed that retrieval practice increases the ease of recovery, as measured with cumulative recall latencies. In a cued-recall task, we confirmed that a change of cues between retrieval practice and the final test can rescue previously unrecovered items (i.e., a release from TOT) for an immediate final test (but less so for a delayed test). Email: David E. Huber, DEHuber@psych.umass.edu

8:40-8:55 (267)
Enhancing Conceptual Learning Through Feedback. BRIDGID FINN, Educational Testing Service. — Conceptual learning is enhanced when examples are presented during initial encoding (Rawson, Thomas & Jacoby, 2014). In addition, concept-learning research has found that variability increases learning of the underlying concept (Posner & Keele, 1968; Wahlheim, Finn & Jacoby, 2012). Feedback during a test provides another learning opportunity, which is bolstered when the feedback is more elaborately processed (Finn & Metcalfe, 2010). The presented research investigated whether providing novel conceptual examples as feedback promoted long-term conceptual learning. Participants studied psychology terms and definitions along with an example of the concept. During an intervening test a novel example was presented and participants attempted recall of the corresponding term. Feedback provided either the correct term alone or the correct term and an additional example. On the final test (immediately or 24-hours later) novel examples were presented for term recall. Self-guided feedback choices were also measured to investigate self-regulation of the error correction process. Email: Bridgid Finn, bfinn@ets.org

9:00-9:15 (268)
Multiple-Choice Testing Can Increase Accessibility to Related Non-Tested Marginal Knowledge. ELISE A. BYRON and JERI LITTLE, Hillsdale College (presented by Jeri Little). — Answering multiple-choice questions improves accessibility to marginal (i.e., stored but difficult to retrieve) knowledge tested by those questions. Here, we examine whether multiple-choice questions can also improve accessibility to related non-tested marginal knowledge. Participants answered multiple-choice questions, each with two plausible incorrect alternatives and one fictitious alternative that was constructed to look plausible (albeit unknown to participants). Then, on a cued-recall test, participants answered related questions pertaining to plausible previously incorrect alternatives, related fictitious questions, and unrelated control questions. Participants correctly answered more questions pertaining to plausible incorrect alternatives than control questions. They were not, however, more likely to provide previously incorrect alternatives — fictitious or plausible — as responses to fictitious questions, suggesting that the recall benefit for related questions arises as a consequence of increased accessibility to stored knowledge, not just reasonable guesses. The findings have implications for the retrieval processes that occur when individuals answer multiple-choice questions. Email: Jeri Little, jerilittle@gmail.com

9:20-9:35 (269)
Does Testing Enhance Spontaneous Mediation in Paired-Associate Learning? JAMES NEELY, SUNY-Albany, KIT WING CHO, University of Houston-Downtown, MICHAEL K. BRENNAN, SUNY-Albany. — Pyc and Rawson (2010) had subjects report the mediators they used when learning
and retrieving Swahili cue–English target pairs. Compared to restudying, testing enhanced long-term recall of the mediator to the cue and of the target to the cue (but only if the mediator had been recalled to the cue). This finding led to the mediation-effectiveness hypothesis (MEH) that testing increased target recall by enhancing mediational processes rather than by strengthening the cue-target association. In our experiment, we did not request mediator report during learning and review but used Pyc and Rawson's final-test procedure of having subjects first recall the mediator and then the target using Carpenter's (2011) English cue-target pairs which had previously yielded data congruent with the MEH when mediator report was not requested and mediation would have been spontaneous. We found no testing effect for mediator recall and equal testing effects for target recall whether or not the mediator was recalled. Thus, the MEH was not supported when mediation was not requested and mediation would not be especially useful.

Email: Kit Wing Cho, kitwcho@gmail.com

**Discourse Processes**

*Continental C, Sunday Morning, 8:00-9:40*

**Chaired by Stephanie A. Borrie, Utah State University**

**8:00-8:15 (270)**

**Disordered Speech Disrupts Conversational Entrainment: A Study of Acoustic-Prosodic Entrainment and Communicative Success in Populations With Communication Challenges.** STEPHANIE ANNA BORRIE, Utah State University, NICHOLA LUBOLD, Arizona State University, HEATHER PON-BARRY, Mount Holyoke College. — Conversational entrainment, a pervasive communication phenomenon in which dialogue partners adapt their verbal and nonverbal behaviors to align more closely with one another, is considered essential for successful human interaction. While well-established in other disciplines, this phenomenon has received limited attention in the field of speech pathology and communication breakdowns in clinical populations. This study examined acoustic-prosodic entrainment, as well as communicative success, in three distinctly different dialogue groups: (i) healthy native vs. healthy native speakers (Control), (ii) healthy native vs. foreign-accented speakers (Accented), (iii) healthy native vs. dysarthric speakers (Disordered). Dialogue group comparisons revealed significant group differences. Most notably, the Disordered dialogues were characterized by significantly less entrainment than the Control dialogues. Further, a positive relationship between entrainment indices and communicative success was identified. These results suggest that the study of conversational entrainment in speech pathology will have essential implications for both scientific theory and clinical application in this domain.

Email: Stephanie Anna Borrie, stephanie.borrie@usu.edu

**8:20-8:35 (271)**

**Unexpected Text Motion Influences Discourse Expectations.** ELSI KAISER, University of Southern California. — Is linguistic expectation-generation influenced by perceptual cues unrelated to meaning, e.g. text motion? We conducted a sentence-completion task with implicit-causality verbs, which create an expectation that the next sentence is an EXPLANATION for the first (e.g. Zack fascinated Amy. He is an amazing storyteller, Garvey/Caramazza 1974). Target sentences were STATIC, scrolled from RIGHT-TO-LEFT, moved UPWARD from bottom to top of screen, or DOWNWARD from top to bottom (between-subjects). Humans are better at following horizontal than vertical motion, and better at downward than upward (Ke et al. 2012). English writing also facilitates R-to-L. From less to more unusual, the conditions are: [static,R-to-L]<downward/upward. Does unusual motion make people expect unusual discourse? Targets had implicit-causality verbs (e.g. “Zack fascinated/admired Amy.” NP1/2 balanced) without connectives. People wrote continuations. Upward motion resulted in fewer explanations than right-to-left (p<.02) and static (p<.05, mixed-effects logistic regression, downward motion n.s.). This suggests visuo-spatial cues can modulate discourse expectations.

Email: Elsi Kaiser, emkaiser@usc.edu

**8:40-8:55 (272)**

**Language Validation: Effects of Discourse Focus and Distance.** MURRAY SINGER, KEVIN G. SOLAR and JACKIE SPEAR, University of Manitoba. — Readers are sensitive to text congruence. For example, reading times reflect readers’ attention to subtle relations between (a) the target, The coach believed/knew that the boys had eaten oranges, and (b) its antecedent, Today, they ate oranges/apples cycling to practice (Singer, JML, 2006). However, phenomena such as the Moses Illusion indicate that readers overlook discrepancies between presupposed (given) sentence information and prior text or world knowledge. Regardless, reading times were inflated similarly by mismatching (APPLES–ORANGES) given versus new target sentence information in brief narratives (Experiments 1 and 2). In Experiment 3, given target information exhibited the same Matching X Factivity interaction (BELIEVED [nonfactive] versus KNEW [factive]) previously documented for new targets. Experiment 4 yielded comparable given and new consistency effects with more text between target and antecedent than in the other experiments. We relate the findings to the distinctive roles of given versus new discourse information and to principles of validation.

Email: Murray Singer, m_singer@umanitoba.ca

**9:00-9:15 (273)**

**Having a Larger Social Network Leads to Better Global Comprehension.** SHIRI LEV-ARI, Max Planck Institute for Psycholinguistics. — Does having a larger social network improve one’s linguistic skills? In general, variability in input has been shown to improve learning. Here we test whether individuals with larger social networks have better global comprehension. Experiment 1 exploited the natural variation in individuals’ social network size, and showed that having a larger network predicted better comprehension of restaurant reviews. Experiment 2 manipulated social network size by exposing participants to 40 naturally-elicited product reviews with novel word substitutions that came from either 2 or 8 real reviewers (randomly sampled for each participant). At test, all participants read reviews by novel
Sunday Morning

9:20-9:35 (274)
The On-Line Comprehension of Metaphoric Referential Descriptions by Bilingual Speakers. ROBERTO HEREDIA, ANNA BARBARA CIESLICKA, PATRICIA GONZÁLEZ, and RAY GARZA, Texas A&M International University. — How do bilinguals comprehend metaphorical descriptions? This presentation focuses on referential or anaphoric metaphor, where a metaphorical description (e.g., "creampuff") makes reference to an antecedent describing a "cowardly boxer", as in "I cannot believe it, the creampuff didn’t even show up (to the fights)" (Heredia & Muñoz, 2015; Stewart & Heredia, 2002). We report data from a series of online experiments utilizing the cross-modal lexical priming task and eye-movements to explore whether Spanish-English/English-Spanish bilinguals comprehend metaphorical descriptions directly (i.e., figurative interpretation first) or indirectly (i.e., literal and then figurative). We discuss the importance of utilizing sensitive “real-time” measures of bilingual figurative language processing. We conclude by providing a possible answer to the question of how bilinguals might comprehend metaphorical referential descriptions in relation to direct vs. indirect models, and Gioras’ (2003) Graded Salience Hypothesis, as well as Cieslicka’s (2006) Literal Salience Model of Bilingual Figurative Language Processing. Email: Roberto Heredia rheredia@tamiu.edu

Decision Making
International North, Sunday Morning, 8:00-9:40
Chaired by Christian C. Luhmann, Stony Brook University

8:00-8:15 (275)
Socially Transmitted Memory Biases: Influences on Decision Making. MICHAEL T. BIXTER, KELLI L. JOHNSON, SUPARNA RAJARAM, and CHRISTIAN C. LUHMANN, Stony Brook University (presented by Christian C. Luhmann). — Work shows that social influences on behavior are pervasive, but little is known about the underlying mechanisms. We investigate the social transmission of information as one potential explanation using methods borrowed from the literature on collaborative memory. Participants encoded a list of categorized words. Participants in the Biased condition encoded items from half of the lists deeply and from the other half of the lists shallowly. Participants in the Unbiased condition encoded all items deeply. Biased and Unbiased participants then collaborated to retrieve items before individually completing both a category-based decision task and a final, individual retrieval task. Results indicated that initially Unbiased participants became more biased after interacting with a Biased partner, both in the decisions they made and in the items they ultimately retrieved. These results indicate that memory, and memory biases, can be transmitted through social interaction and that these biases can influence subsequent decision making behavior. Email: Christian C. Luhmann, christian.luhmann@stonybrook.edu

8:20-8:35 (276)
Verbal, Facial, and Vocal Framing: Cue Use in Risky Choice. X.T. WANG and STEVEN GARELIK, University of South Dakota. — Verbal framing effects have been widely studied, but little is known about how people react to multiple framing cues in interpersonal communication where verbal messages are often accompanied by facial and vocal valence cues. We examined joint and differential effects of verbal, facial, and vocal framing on risk preference in hypothetical monetary and life-death situations. In the combined factorial condition (2 verbal frames x 2 tones of voice x 4 basic facial expressions x 2 task domains), each scenario was presented by both a written and auditory message with a photo of the messenger’s face. Compared to classic framing effects resulting in preference reversal, combined frames shifted risk preference without reversal. Moreover, a happy facial expression eliminated framing effects. A positive tone of voice increased risk-seeking preference only in females. When the valence of facial and vocal cues was incongruent with verbal frame, verbal framing effects were significant. In contrast, when emotional cues were congruent with verbal frame, framing effects disappeared. These results suggest that verbal framing effects are most evident when other valence cues are incongruent and/or ambiguous. Email: X.T. Wang, xtwang@usd.edu

8:40-8:55 (277)
Modeling Choice and Response Time in the First Person Shooter Task. TIMOTHY PLESKAC, Max Planck Institute for Human Development, JOSEPH CESARIO, Michigan State University. — The decision to use deadly force by police officers is a critical decision made under uncertainty. The First Person Shooter Task has been used to investigate the possible biases people have in choosing to shoot an individual. During the task, participants are shown an image of an individual who is holding either a gun or a small item. Participants are instructed to shoot if the individual is holding a gun; otherwise they indicate a decision to not shoot. Researchers have found that participants tend to shoot Black individuals (armed and unarmed) more frequently than White individuals. Participants are also faster to shoot unarmed Black individuals, but slower to not shoot unarmed Black individuals. Typically, stereotypes have been argued to act as a cue in a heuristic process during this task that systematically biases the decision to shoot or not. I will show that drift diffusion models provide a more richer account of the decision to shoot or not shoot. When the models are fit using Bayesian estimation techniques they show how stereotypes impact the information that is used to make the decision, and how a motivation to control the appearance of prejudice also simultaneously impacts the same decision. Email: Timothy Pleskac, pleska@msu.edu

60
The Triple-Stopping System for a Sequential Decision Task: The Cast-Net Stopping Rule Model. MARIO FIFIC, Grand Valley State University. — In this study we compared single stopping rules models to the Cast-Net stopping rule model. The Cast-Net model assumes that several stopping rules can be used simultaneously to determine the stopping point in an information search and to proceed to making a final decision. We analyzed whether the Cast-net model would pay the price for being more complex when compare to single stopping rule models (critical difference, fixed-sample size, and runs). The models were compared under different decision making conditions (time pressure and reliability of recommendations). The model fitting procedure was conducted on full data stopping-value distributions, by simultaneously fitting the correct and incorrect responses. Across a variety of experimental conditions the general findings supported the validity of the Cast-Net model. These results challenge many decision making models that utilize only one type of a stopping rule, and may provide a new direction in the exploration of cognitive computational models. Email: Mario Fific, fificm@gvsu.edu

Evidence Accumulation in a Complex Task: Making Choices About Simultaneously Appearing Multi-Attribute Stimuli Under Time Pressure. HECTOR PALADA, ANDREW NEAL, and ANITA VUCKOVIC, University of Queensland, RUSSELL MARTIN, Defence Science Technology Organization, ANDREW HEATHCOTE, University of Newcastle (presented by Andrew Heathcote). — Accumulation models transform observed choices and response times into psychologically meaningful constructs (e.g., the strength of evidence, degree of caution). Standard versions of these models were developed for rapid (~ 1 second) choices about simple stimuli, and have recently been elaborated to some degree to address more complex stimuli and response methods. However, the elaborations can be difficult to use with designs typically available in applied settings. We apply two standard accumulation models – the diffusion (Ratcliff & McKoon, 2008) and the LBA (Brown & Heathcote, 2008) – to the detection of heterogeneous multi-attribute targets in a simulated unmanned-aerial-vehicle operator task. Despite responses taking 2s or more and complications from realistic features such as a complex target classification rule, interruptions from a navigation task and time pressured choices about simultaneously available potential targets, these models performed well descriptively. They also provided a coherent psychological explanation of the effects of decision uncertainty and workload manipulations. Our results support wider application of standard evidence accumulation models to decision-making in applied settings. Email: Andrew Heathcote, andrew.heathcote@newcastle.edu.au

Individual Differences in Working Memory Capacity Predict Action Monitoring and Context Updating Under Speed- Versus Accuracy-Stress Conditions. JASON WATSON, JAMES COLEMAN, and DAVID STRAYER, University of Utah. — In our study, individuals with high and low working memory capacity (WMC) performed a high congruency version of the Eriksen flanker task under both speed- and accuracy-stress conditions. We recorded and analyzed event-related potentials, spectral EEG, and behavioral measures of accuracy and reaction time, with particular emphasis on comparing the WMC groups on both the error-related negativity (ERN) and positivity (Pe) following errors committed under speed versus accuracy stress. Consistent with the literature, the results indicated a larger ERN with both high WMC and with accuracy stress (but no WMC \times condition interaction). However, there was a speed-accuracy stress by WMC interaction for the Pe, where those with high WMC engaged in context updating following errors under accuracy but not speed instructions, and those with low WMC appeared to inefficiently exert control, updating task goals in both conditions. Results will be discussed in relation to individual differences in WMC and theories of attentional control. Email: Jason Watson, jason.watson@psych.utah.edu

Prospective Memory Commission Errors: A Selective Age-Related Increase and Selective Strategy-Related Decrease. JULIE BUGG, Washington University in St. Louis, MICHAEL SCULLIN, Baylor University, RACHEL RAUVOLA, Macalester College. — Recent studies highlight the importance of examining commission errors, the erroneous performance of a previously relevant prospective memory (PM) intention. We had young and older adults encode a PM intention to press a key when a target word appeared during an ongoing lexical decision task. During the “Active PM” Block, 0 or 4 target words were shown. Immediately thereafter participants were instructed the PM task was finished and should not be performed again. Then, in the “Finished PM” Block, targets were (re)presented and commission errors were recorded. An age-related increase in commission errors was found selectively in the 4-target condition, which may reflect older adults’ difficulty in controlling habit-driven responding. Further experiments showed that forgetting practice but not preparatory instructions decreased commission errors for both age groups. The findings highlight the interplay of spontaneous retrieval and cognitive control in PM forgetting, and offer a translational strategy for minimizing commission errors. Email: Julie Bugg, jbugg@wustl.edu
Different Levels of Learning Interact to Shape the Congruency Sequence Effect. DANIEL WEISSMAN and ZOE W. HAWKS, University of Michigan, TOBIAS EGNER, Duke University. — The congruency effect in Stroop-like tasks is often reduced after incongruent relative to congruent trials. Moreover, this congruency sequence effect (CSE) is influenced by learning related to concrete stimulus and response features as well as by learning related to abstract cognitive control processes. There is an ongoing debate, however, over which of three theoretical accounts best explains interactions between these learning processes. To make this distinction, we orthogonally manipulated the expression of these learning processes in a novel factorial design involving the prime-probe arrow task. We found that these processes interacted in an over-additive fashion to influence CSE magnitude, and that this interaction was not driven by the size of the congruency effect. These findings support an episodic retrieval account of the CSE, wherein repeating a previous-trial stimulus feature facilitates the retrieval and use of previous-trial control processes, thereby boosting control in the current trial. In contrast, they do not fit with accounts wherein (a) CSE magnitude is determined by the size of the congruency effect or (b) control processes are recruited only when low-level associative mechanisms cannot underlie performance. Email: Daniel Weissman, danweiss@umich.edu

A New Method for Quantifying Attention: Results Support Optimizing Theory. GENE HEYMAN, Boston College. — We evaluated whether individuals allocate attention optimally or according to a sub-optimal probability matching rule. To answer this question, it is necessary to measure attention allocation on a continuous scale. As no such method was available, we developed a procedure and mathematical model that generated the desired quantitative measures. Subjects tended to deviate from probability matching as predicted by optimizing. Factors that promote reward maximizing in behavioral studies promoted attention allocation ratios that maximized correct answers in this study. Our approach also predicts the frequency of correct guesses and the relationship between attention allocation and response times. The results were consistent with these two predictions, as well as the assumptions of the mathematical model. The methodological significance of this study is that if provides a continuous quantitative description of attention allocation that hitherto had not been available. The results suggest that the principles that govern the allocation of choice also govern the allocation of attention. Email: Gene Heyman, heymang@bc.edu

Task Switching and Executive Control in Pigeons. LEYRE CASTRO and EDWARD WASSERMAN, University of Iowa. — Flexibly adjusting one’s behavior depending on the task at hand is a hallmark of executive function. In two experiments, we explored pigeons’ cognitive flexibility to concurrently perform two complex tasks: a numerosity discrimination (where number was the relevant dimension and variability was the irrelevant dimension) and a variability discrimination (where variability was the relevant dimension and number was the irrelevant dimension). The flexibility of pigeons’ behavior was evidenced by their rapid, on-demand switching between tasks within training sessions. In addition, when the magnitudes of the relevant and irrelevant dimensions were congruent, pigeons’ accuracy was higher than when the magnitudes were incongruent. Thus, the irrelevant dimension facilitated target discrimination performance when its magnitude matched the magnitude of the correct choice. Pigeons’ cognitive flexibility — even in the absence of a prefrontal cortex — indicates that other avian brain areas can support behaviors emblematic of executive control. Email: Leyre Castro, leyre-castroruiz@uiowa.edu

The Tale Of Amodal Cognitive Control Processes: Modality Matters. DENISE NADINE STEPHAN and IRING KOCH, RWTH Aachen University. — Modality compatibility refers to the similarity of stimulus modality and the modality of response-related sensory consequences. In a series of experiments to examine modality-specific influences in task switching participants switched either between two modality compatible (auditory-vocal/visual-manual) or two modality incompatible tasks (auditory-manual/visual-vocal). Switch costs were increased in incompatible compared to compatible tasks. We suggest that the modality compatibility effect is based on cross-talk of central processing codes due to ideomotor “backward” linkages between the anticipated response effects and the stimuli indicating this response. According to this generalized ideomotor idea, the modality match between response effects and stimuli would prime selection of a response in the compatible modality. Therefore performance would be facilitated when switching between compatible tasks, whereas between-task crosstalk would hinder performance when switching between modality tasks. This modality-specific crosstalk in task switching is also discussed with regard to other modalities (i.e., tactile stimuli, pedal and oculomotor responses). Email: Denise Nadine Stephan, stephan@psych.rwth-aachen.de

Categorization/Conceptualization

Continental B, Sunday Morning, 8:00-10:00

Chaired by Tyler Davis, Texas Tech University

From Concrete Examples to Relations: The Role of the Frontal Pole in Relational Category Learning, TYLER DAVIS, Texas Tech University, MICAH GOLDWATER, Northwestern University, JOSUE GIRON, University of Sydney. — Neuroimaging has revealed many brain regions involved with learning categories that are defined by concrete features. Less is known about the neural basis of relational category learning, which is thought to depend more upon higher-order reasoning processes that abstract away from the physical examples of the category. In the present study, we scanned participants while they learned categories of visual arrays defined either by features or relations (whether all array items were the same). Consistent with previous
work on higher-order reasoning, we found that the frontal pole (FP) was activated during relational categorization. Moreover ventral portions of FP were found to have a graded representation of same that varied continuously with the entropy of the array whereas dorsal portions made a binary distinction between same and different. These results suggest that FP may play a central role in relational abstraction and converting continuous, example-based representations into an abstract binary decision. Email: Tyler Davis, thdavis5@gmail.com

8:20-8:35 (287)
Teaching Real-World Categories at Low and High Levels of a Hierarchy. ROBERT NOSOFSKY, CRAIG SANDERS, and ALEX GERDOM, Indiana University, TOSHI MIYATSU and MARK MCDANIEL, Washington University in St. Louis. — Suppose that one's goal is to teach students to classify at a high superordinate level (e.g., igneous, metamorphic, sedimentary rocks). Each superordinate category is divided into subtypes (some examples of igneous rocks are granite, rhyolite, and obsidian). Is it better to train directly at the high superordinate level, or might learning benefit through indirect training at the subtype level? Our research suggests that the answer depends on whether the category structure is compact or dispersed. We use multidimensional scaling (MDS) procedures to characterize the similarity structure of alternative rock categories. Formal models of classification are used in combination with the MDS procedures to predict learning at different levels of the category hierarchy in experiments that vary the structure of the to-be-learned categories. Email: Robert Nosofsky, nosofsky@indiana.edu

8:40-8:55 (288)
Categorization Expertise Without Training. BRETT ROADS and MICHAEL MOZER, University of Colorado (presented by Michael Mozer). — We are interested in human-machine cooperative categorization systems that enable novices to perform difficult tasks such as skin-lesion diagnosis (e.g., Aldridge et al., 2011). Leveraging the human visual system's ability to judge similarity, individuals are asked to compare a query image to sets of reference images and to select the best matching reference from each set. When references are well chosen, this procedure yields an implicit categorization of the query image. To choose references that maximize categorization accuracy, we perform simulations with a predictive model of similarity-based choice. A key obstacle to prediction is the fact that attention can dynamically shift among visual feature dimensions leading to choice uncertainty. Incorporating this uncertainty into the model allows for the selection of robust references. We perform a series of experiments with two stimulus types (rectangles, faces) and nine categorization tasks to validate the model and to demonstrate the model's potential to boost performance. Novice participants achieve high accuracy, even when the categorization task switches from trial to trial. Email: Michael Mozer, mozer@colorado.edu

9:00-9:15 (289)
The Development of Categorization: Attention, Decision, and Representation. VLADIMIR SLOUTSKY and SOPHIA DENG, Ohio State University. — We examined the development of categorization, with a specific focus on how category representation changes across development. In Experiment 1, 4-year-olds and adults learned categories that had a single deterministic feature and multiple probabilistic features. They were then tested with categorization and recognition tasks. Whereas adults relied on the deterministic feature, 4-year-olds relied on multiple probabilistic features. Also, adults remembered the deterministic feature better than the probabilistic features, whereas children remembered all the features equally well. In Experiment 2, participants' attention was directed to either the deterministic feature or to the probabilistic features. In Experiment 3 they categorized on the basic of the deterministic feature and remembered primarily this feature, whereas in Experiment 3 they categorized on the basic of the probabilistic features and remembered primarily these features. In contrast, in 4-year-olds only categorization decisions were responsive to instructions, but they remembered all the features equally well. These findings are discussed in relation to theories of categorization and the changing role of attention in category learning across development. Email: Vladimir Sloutsky, sloutsky.1@osu.edu

9:20-9:35 (290)
Individual Variation in Concepts: A Disconnect Between Intensions and Extensions. JAMES HAMPTON, City University London, ALESSIA PASSANISI, Kore University. — Exemplars and attributes of common categories were rated for typicality and importance respectively across two occasions. Consistency across occasions for a particular category was greater than consensus on each task, providing evidence for stable and systematic individual variation in concept representations. Furthermore, the similarity between individuals for each task and each category correlated between occasions. However similarity between individuals’ exemplar typicality judgments did not correlate with similarity between individuals’ attribute importance judgments. The results suggest a disconnection between the conceptual resources that are used for the two tasks and challenge an assumption common to many theories of conceptual representation in memory, namely that beliefs about intensions determine beliefs about extensions. Email: James Hampton, hampton@city.ac.uk

9:40-9:55 (291)
Future-Oriented Thought and its Relation to Wellbeing. JASON SCOTT SHEPARD and PHILIP WOLFF, Emory University (presented by Phillip Wolff). — Future-oriented thought has been found to be associated with a range of positive characteristics, such as higher levels of happiness, life satisfaction and health, as well as negative characteristics, such as anxiety, worry, and fear. We offer an explanation for the apparent contradictory quality of future-oriented thought. In Study 1 we used Latent Dirichlet Allocation to identify different ways of talking about the future from a large corpus
of blogs. In Study 2, we asked participants (n = 404) to perform a mind wandering task as well as complete several behavioral and mental health surveys. Participants’ mind wanderings were automatically analyzed for references to the future. Certain ways of talking about the future were associated with positive behavioral and mental health characteristics, whereas other ways of future were not associated with such characteristics. These studies demonstrate how big data techniques can be used to reveal the nature of the relationship between language, cognition, and wellbeing.

Email: Phillip Wolff, pwolff@emory.edu

### Picture Processing

**Marquette, Sunday Morning, 8:00-9:40**  
Chaired by Michelle Greene, Stanford University

**8:00-8:15 (292)**  
How Many Objects Does it Take to Understand a Scene?  
MICHHELLE GREENE, Stanford University, Minerva Schools at Keck Graduate Institute. — A visual scene may contain dozens of objects, yet observers can recognize a scene as quickly as they can recognize a single object. These facts present a puzzle: how do we recognize a scene if not through its objects? Using the fully labeled scene database of Greene (2013), I present the results of simulations testing several hypotheses about how scene categorization can arise from object recognition. I then compare the patterns of errors from the simulated observers to those of human observers. I observe: (1) The recognition of a single object is insufficient to produce human-level scene understanding; (2) With an average of 40% of a scene’s objects recognized, one can recognize the scene, but (3) This recognition scheme cannot predict the patterns of errors produced by human observers, suggesting that human scene understanding does not arise from sequential object sampling.  
Email: Michelle Greene, mrgreene09@gmail.com

### Tracking the Growth of Evidence in a Visual Comparison Task

**8:20-8:35 (293)**  
The Hierarchical Structure of Scenes in Memory: The Role of Background and Foreground Information.  
MONICA S. CASTELHANO, Queen’s University. — How are scene representations stored in memory? Scene representations have a hierarchical structure with background elements providing a scaffold for more detailed foreground elements. To further investigate the representation of each, we used chimera scenes, in which the central block of objects belonged to one scene category (foreground), and the surrounding structure belonged to another (background). We used a contextual cueing paradigm and emphasized the relative importance of each by having the target placed on either the background or foreground. In a transfer block, we found that while changing the background for background targets was highly detrimental to search performance, neither changing the foreground nor the background was highly detrimental for foreground targets. These results indicate that the hierarchy may not be as straightforward when different elements are emphasized. Results will be discussed in the context of the sparse-to-rich continuum of theories of scene representations in memory.  
Email: Monica S. Castelhano, monica.castelhano@queensu.ca

### Category Cues and Boundary Extension

**8:40-8:55 (294)**  
Category Cues and Boundary Extension.  
TIMOTHY L. HUBBARD, Unaffiliated, SUSAN E. RUPPEL, University of South Carolina, Upstate. — Whether boundary extension for an upcoming scene could be influenced by expectations regarding the category (i.e., content) of that scene was examined. In Experiment 1, observers viewed a scene containing a bird, car, church exterior, kitchen interior, or natural landscape. Prior to presentation of the scene, observers viewed a one-word verbal (written) cue identifying the category of the upcoming scene. This cue was valid on 80% of the trials and invalid on 20% of the trials. Boundary extension occurred, but was not influenced by cue validity. In Experiment 2, observers viewed the same stimuli as in Experiment 1; for one group of participants, scenes were blocked by category, and for the other group of participants, scenes were ordered randomly. Boundary extension occurred, but was not influenced by whether scenes were blocked by category or randomly ordered. Implications for the relationship of attention and boundary extension, and for theories of boundary extension, are considered.  
Email: Timothy L. Hubbard, timothyleehubbard@gmail.com

### Words as Priors: How Language Programs the Mind

**9:00-9:15 (295)**  
Tracking the Growth of Evidence in a Visual Comparison Task.  
THOMAS BUSEY and BRANDI EMERICK, Indiana University, JOHN VANDERKOLK, Indiana State Police, Fort Wayne. — Many applied tasks involve a comparison between visual images. For example, the Boston Bombing case was solved primarily through the manual comparison of images of the bombers with faces from other databases. Of course, no two pictures or impression are identical, and thus the examiner must make judgments about the likelihood of the two images deriving from the same source. In the present work we collected data from fingerprint examiners when they performed a visual comparison task not unlike a latent print examination. In the first stage we asked examiners to select regions they thought might be diagnostic. In the second stage we showed these regions one at a time and asked for a judgment of whether the two came from the same source (identification) or different sources (exclusion). We fit models based on signal detection theory to summarize the results. We found that, contrary to a model of holistic or configural processing, evidence seems to grow linearly with the number of regions. We track the growth of evidence in favor of exclusion or identification, which some may find counterintuitive. The design addresses how weak and strong evidence is interpreted and has some surprising results about how weak evidence is evaluated.  
Email: Thomas Busey, busev@indiana.edu

### Words as Priors: How Language Programs the Mind

**9:20-9:35 (296)**  
Words as Priors: How Language Programs the Mind.  
GARY LUPYAN, University of Wisconsin-Madison, BASTIEN BOUTTONNET, Leiden Institute for Brain and Cognition, PIERCE EDMISTON, University of Wisconsin-Madison. — A common assumption among linguists and psychologists is that although language is critical to our ability to share our thoughts, it plays a minor, if any, role in generating, controlling, and structuring them. However, a growing body of research
has been showing language to modulate mental processes previously thought to be thoroughly nonlinguistic. Here, we focus on the role of labels in visual categorization which we have previously shown to be facilitated by labels. Simply hearing a category label (e.g., “dog”) improves categorization of named items in comparison to familiar and unambiguous nonverbal cues (e.g., a dog bark). Using ERPs, we show that this label advantage has a perceptual locus: hearing a word modulates the earliest stages of visual processing — a result consistent with the idea that words act as high-level priors, cues that program the visual system into a more categorical state. What is special about labels? Unlike all other perceptual cues, words are unoptimized. This property allows people to form a unique cue-to-referent association that allows labels to activate mental states in ways not achievable in the absence of language. With language, human minds become programmable.

Email: Gary Lupyan, lupyan@wisc.edu

Recognition II
Marquette, Sunday Morning, 10:00-12:00
Chair by Timothy F. Brady, University of California, San Diego

10:00-10:15 (297)
The Role of Meaning in Visual Memory: The N170 Predicts Memory for Ambiguous Mooney Faces. TIMOTHY F. BRADY, University of California, San Diego, VIOLA S. STORMER and GEORGE A. ALVAREZ, Harvard University. — Identical information is easier to remember if it is conceptually meaningful rather than arbitrary (e.g., the Baker-baker effect). Here, we show that a neural measure of how meaningful a visual stimulus is to a particular participant can predict whether an identical visual stimulus will be remembered or forgotten. We asked participants to remember a sequence of Mooney-face images while recording EEG activity, focusing on the N170, a measure of face processing. We designed the stimuli so that for each image, some participants would see a face while others would not (e.g., Wiseman & Neisser, 1974). We found that images that elicited larger N170s were more likely to be remembered than those that elicited smaller N170s — even when the exact same image elicited larger or smaller N170s across participants. Thus, images processed as a face are remembered better than identical images that are not processed as a face.

Email: Timothy F. Brady, tbrady@wjh.harvard.edu

10:20-10:35 (298)
Finding a Target Among Foils Is Faster Than Finding a Foil Among Targets. RICHARD SHIFFRIN, Indiana University. — After study of a word list four (4AFC) or two (2AFC) choices were presented, either one target with three foils, or one foil with three targets. Other conditions used two choices (2AFC). Accuracy was equal when searching for a target or a foil. Response time was much faster for target search in both 4AFC and 2AFC. Our account: Study sometimes causes unusually strong memories. These do not occur for foils. Thus memory strengths for targets are much more skewed than foils toward high values that produce very fast RTs. This concept was instantiated with a parallel race among the four (or two) alternatives toward a target and foil boundary. In the target condition a response is emitted when the first process reaches the target boundary, or if none do, the last to reach the foil boundary. Foil search is the same, reversed. A sample is taken from the skewed target distribution for each target, and from the symmetric foil distribution for each foil. This model accounts for the accuracy and response time findings in the various conditions.

Email: Richard Shiffrin, shiffrin@indiana.edu

10:40-10:55 (299)
Does the Strength-Based Mirror Effect Persist Under Conditions Inhospitable to Criterion Shifts? GREGORY J. KOOP, Eastern Mennonite University, AMY H. CRISS, Syracuse University, ANGELINA M. PARDINI, Eastern Mennonite University. — In single-item recognition, the strength-based mirror effect (SBME) is reliably obtained when encoding strength is manipulated between lists or participants. Current debate surrounds whether this effect is due to differentiation (e.g., Criss, 2006) or criterion-shifts (e.g., Hicks & Starns, 2014). When encoding strength is mixed within-list, producing a mirror effect has proven fickle. The literature suggests two broad conditions needed to elicit strength-based criterion shifts: awareness on the part of the participant that memory quality has changed, and a sufficient number of trials to adjust the criterion. The present work tests these assumptions, and examines whether a SBME persists when these conditions are not met. In Experiments 1 and 2, participants are given fewer trials than needed for criterion-shifts. Experiments 3 and 4 test participants’ expectations about memory quality following a levels-of-processing strength manipulation (cf. Benjamin, 2003). Results and implications for memory theory will be discussed.

Email: Gregory J. Koop, gregory.koop@emu.edu

11:00-11:15 (300)
Reductions in Sequential Dependencies in Recognition Memory Testing. KENNETH J. MALMBERG, University of South Florida, JEFF ANNIS, Vanderbilt University, CHAD DUBE and KERI ERB, University of South Florida. — When a series of similar decisions are made and accuracy is challenged, there are positive correlations between the current response and prior responses/stimuli. Sequential dependencies such as these are found in recognition memory testing, for instance (Malmberg & Annis, 2012). Over the decades, there have been a number of models proposed to account for sequential dependencies in the perception literature. One class assumes that they serve an adaptive role in biasing responses toward recent responses/stimuli (Triesman & Williams, 1984). Other models assume that information from prior trials carries over to subsequent trials (Brown et al., 2008). Our model assumes that carryover occurs but only when attention lapses (Annis & Malmberg, 2013). Here we present the results of several experiments that test this assumption by manipulating the allocation of attention via task switching and motivation via feedback in the form of social comparison. The results indicate that such manipulations greatly reduce and sometimes completely eliminate sequential dependencies in recognition memory testing.

Email: Kenneth J. Malmberg, malmberg@usf.edu
Rapid Acquisition of Novel Information: Is Disjunctive Syllogism Necessary for Fast Mapping? HILLARY ABEL, ANNA DRUMMEY, HARRISON STOLL, and IRENE P. KAN, Villanova University (presented by Irene P. Kan). — We investigated two possible mechanisms that may mediate the rapid acquisition of novel words and their corresponding referents (i.e., fast mapping, FM). In the standard paradigm that examines FM, a novel label is presented alongside a novel object and a familiar object, and subjects are asked to identify the item that corresponds to the novel label. Acquisition of name-object pairing is subsequently assessed. One possible mechanism underlying FM is disjunctive syllogism: the active rejection of the familiar item, which allows for the novel object-to-label mapping (e.g., “I know this is a cricket, so “torato” can’t be referring to that; it must refer to the unfamiliar item.”). Another possible mechanism involves activation of a relevant semantic network (e.g., insect) into which the novel concept can be incorporated. We found that semantic network activation alone is sufficient, and that active rejection is not necessary, for the rapid acquisition of novel object-name associations. Email: Irene P. Kan, irene.kan@villanova.edu

11:40-11:55 (302) Learning During Study and Test: A Joint Evaluation of List Length Effects and Output Interference. AMY H. CRISS, Syracuse University, ASLI KILIC, Middle East Technical University, KENNETH J. MALMBERG, University of South Florida, JESSICA FONTAINE, Pepperdine University. — Understanding interference in episodic memory is critical. Studies have shown a small and somewhat unreliable decrease in accuracy when items are added to the study list, called the list length effect (LLE) and a rather large and robust decrease in accuracy when items are added to a test list, termed output interference (OI). We simultaneously evaluate the effects of adding items during study and adding items during test. The data show a detriment to performance when items were added at any stage and the harm from adding items during study was less than the output interference that resulted from testing. Feedback presented during test served as a moderator. When feedback was present, OI was smaller in magnitude and the size of the LLE was larger. Within the REM model, this suggests that feedback encourages a strategy of adding new traces to the memory rather than updating traces during test. Email: Amy H. Criss, amy.criss@gmail.com

Phonological Processing of Complex Noun Phrases: The Roles of Word and Phrase Frequency. ANTJE MEYER, Max Planck Institute for Psycholinguistics, ZESHU SHAO, Max Planck Institute for Psycholinguistics, Nijmegen, JEROEN VAN PARIDON, Leiden University. — Janssen and Barber (2012) reported two studies on the production of complex noun phrases (Spanish and French noun-adjective and noun-noun phrases). They found that production latencies depended only on the frequencies of the phrases, but not on the frequencies of the individual words. This pattern may be seen as evidence for lexical storage of phrases and against the traditional “words & rules” view of the representation of linguistic knowledge. We will discuss a series of experiments on the production of Dutch adjective-noun phrases. We replicated the phrase frequency effect seen by Janssen and Barber, but also found a robust effect of the frequency of the first word of the phrase. We argue that the phrase frequency effect arises during the conceptual preparation of the utterance and that the results are consistent with the view that phrases are composed by combining individual words, in line with the “words & rules” view. Email: Antje Meyer, antje.meyer@mpi.nl
of talker sex or word frequency on AXB perceptual similarity, convergence on individual acoustic attributes was susceptible to these effects in complex ways, and model talkers elicited varying degrees of phonetic convergence. Mixed effects regression models confirmed the complex relationship between acoustic and perceptual measures of phonetic convergence. Email: Jennifer S. Pardo, pardo@optonline.net

11:00-11:15 (306)
Is Prediction a Viable Comprehension Strategy in Reading? STEVEN G. LUKE, Brigham Young University, KIEL CHRISTIANSON, University of Illinois. — Efficient language processing may involve generating expectations about upcoming input. Prediction involves advance conscious activation of a single word, which comes with a cost when wrong, while anticipation involves non-conscious, less specific (and potentially cost-free) expectations (DeLong, Troyer & Kutas, 2014). To explore whether prediction could facilitate reading, a large-scale survey provided cloze scores for all 2689 words in 55 different text passages. Highly predictable words were quite rare (5% of content words), and most words were actually unexpected, suggesting that a prediction strategy would be costly. An eye-tracking study showed a sensitivity to predictability but no mis-prediction cost. There was robust evidence for anticipation in reading: semantic and morpho-syntactic information was highly predictable even when word identity was not, and this information facilitated reading above and beyond the predictability of the full word form. Thus, readers in most instances may anticipate upcoming words, but likely do not predict them. Email: Steven G. Luke, steven_luke@byu.edu

11:20-11:35 (307)
Masked Repetition Priming in a Semi-Cursive Script (Arabic). MANUEL PEREA, Universitat de València, REEM ABU MALLOUH and MANUEL CARREIRAS, BCBL, Basque Center on Cognition, Brain, and Language. — A central issue for models of visual word recognition is whether their orthographic coding schemes can be generalized beyond the Roman script. Here we focus on a semi-cursive script—Arabic—in which, for a given word: 1) some of the constituent letters can be connected, creating subwords, and 2) the form of each letter may differ depending on its position in the subword (initial, middle, final, isolated). We conducted a series of masked repetition priming lexical decision experiments in Arabic, in which identity primes could be physically and nominally the same as the target (except for size) or only nominally the same, but physically different in several manners. Unlike findings in the Roman script (e.g., CRASH-CRASH = crash-CRASH = cRasH-CRASH < unrelated conditions), results in Arabic only showed an advantage for the physically identical pairs over the other conditions. We discuss the implications of these findings for orthographic input schemes. Email: Manuel Perea, mperea@uv.es

11:40-11:55 (308)
The Double Identity of Doubling in Phonology. IRIS BERENT, Northeastern University, OUTI BAT-EL, Tel-Aviv University, VERED VARNIN-NUSBAUM, Western Galilee College. — Every natural language exhibits duality of patterning. Words are constructed from meaningful units (morphemes), which, in turn, comprise of meaningless phonological elements (e.g., segments, syllables). Here, we ask whether meaningful and meaningless patterns are preferentially subject to distinct sets of constraints. To address this question, we exploit the structural ambiguity in the interpretation of phonological doubling. Phonological doubling (e.g., bloglog) is open to two competing interpretations — as either purely phonological forms with identical elements, or as a complex morphological structure that exhibits reduplication. Our experiments show that responses to doubling (bloglog) shift radically, depending on the level of its analysis — phonological identity or morphological reduplication. Remarkably, these structural preferences emerge spontaneously, despite minimal experience with reduplication in speakers’ native language. These results suggest the existence of universal constraints that preferentially target the morphological vs. phonological levels. We discuss various explanations for the origins of these restrictions. Email: Iris Berent, i.berent@neu.edu

Working Memory III
Williford, Sunday Morning, 10:00-12:00
Chaired by Valerie Camos, Universite de Fribourg

10:00-10:15 (309)
Long-Term Representations Do Not Moderate the Effect of Attentional Refreshing on Working Memory. VALERIE CAMOS, Universite de Fribourg, GEROME MORA, Université de Bourgogne, VANESSA LOAIZA, University of Zurich. — Relations between long-term memory (LTM) and working memory (WM) have always been a field of intense debate in psychology. Nowadays, WM models remain opposed on this question, conceiving WM either as the activated part of LTM or as a distinct memory system. Despite the importance of the question, studies are scarce, and little is known about the impact of effects known for affecting LTM on the maintenance of information in WM. The present study aimed at examining how LTM effects would affect the maintenance of verbal information in WM, and specifically how they would modulate attentional refreshing, which is a major mechanism of WM maintenance. In four experiments, participants had to maintain memoranda varying either in frequency (high- vs. low-frequency words), lexicality (words vs. non-words) or level of processing at encoding (shallow vs. deep) while performing concurrent tasks in complex span tasks. Refreshing was manipulated through different variations of the concurrent attentional demand. Although frequency, lexicality, and level-of-processing affected recall from WM, they never interacted with the experimental manipulations of refreshing. These findings shed light on the relations between WM and LTM, and on refreshing. Email: Valerie Camos, valerie.camos@unifr.ch
How Many Objects Changed? An Array Memory Technique Shows a Potential Consequence of Metamemory. NELSON COWAN, KYLE O. HARDMAN, J. SCOTT SAULTS, CHRISTOPHER L. BLUME, and KATHERINE M. CLARK, University of Missouri. MACKENZIE A. SUNDAY, Vanderbilt University. — We briefly presented on every trial an array of 5, 7, or 9 colored squares, followed by another, probe array in which 0,1,2…n objects changed color. The task was to estimate how many objects changed. On some trials, in an otherwise-empty retention interval, we asked participants how many colors they thought they remembered (a metamemory judgment). A mathematical model yielded a refined estimate of how many items were adequately represented in working memory. The model accounted for the detailed distribution of responses, but only by incorporating metamemory responses. Participants overestimated the number of colors in working memory, which made their change detection biased toward saying few changed. For example, 1 detected change out of 4 colors assumed to be in working memory yields a smaller subjective estimate of the actual number of changes than would 1 detected change out of, say, only 2 colors assumed to be in working memory. Email: Nelson Cowan, cowann@missouri.edu

Using a Betting Game to Reveal the Rich Nature of Visual Working Memories. DARYL FOUGNIE, New York University Abu Dhabi, ANISH KANABAR, TIM BRADY, and GEORGE ALVAREZ, Harvard University. — When we ask people to hold a color in working memory, what do they store? Do they remember colors as point estimates (e.g., a particular shade of red) or are memory representations richer, such as uncertainty distributions over feature space? We developed a novel paradigm to measure the uncertainty of a working memory. Participants were shown a set of colorful circles and, after a brief memory delay, asked about one of the objects. Rather than reporting a single color, participants placed multiple bets to create distributions of confidence in color space. The dispersion of bets was correlated with performance, indicating that participants' internal confidence guided bet placement. Furthermore, memory performance improved, relative to the first response, when averaging across multiple bets, showing that memories contain more information than can be conveyed in a single response. Thus, memory representations are more than noisy point estimates; they are surprisingly rich and probabilistic. Email: Daryl Fougnie, darylfougnie@gmail.com

The Role of Selection in the Relation Between Language and Spatial Cognition. HILARY E. MILLER, HALEY VLACH, and VANESSA SIMMERING, University of Wisconsin, Madison (presented by Vanessa Simmering). — Children's spatial language production has been shown to predict their spatial skills, but the mechanism underlying this relation is still a source of debate. Across two experiments, we examine whether skills in selecting task-relevant spatial information underlie this relation. In Experiment 1, we tested whether children's ability to select relevant language cues in the moment of a task is more predictive of their spatial performance than is their productive spatial vocabulary. Children's selection of relevant cues (both spatial and non-spatial) was more predictive of their spatial performance than was their productive spatial vocabulary. In Experiment 2, we are testing whether this relation between selection in language use and spatial skills is not specific to language but is reflective of more general processes of attending to and remembering relevant spatial information. These findings suggest that selection is an important process underlying the relation between language and spatial cognition. Email: Vanessa Simmering, simmering@wisc.edu

Context, Category Learning, and Cognitive Control: Environmental Context Affects the Learning of Rule-Described and Non Rule-Described Categories. JOHN PAUL MINDA, RUBY T. NADLER, RACHEL R. RABI, and EMILY G. NIELSEN, University of Western Ontario. — Category learning involves the coordination of core cognitive processes like perception, attention, procedural memory, working memory, executive functions, and declarative memory. Certain environmental factors can affect these core processes and thus interfere with participants' ability to learn new categories. In several experiments, we asked participants to learn a set of rule-described (RD) or non-rule-described categories (NRD). Learning RD categories is thought to rely heavily on working memory and executive functions in order to formulate the rule and test hypothesis whereas learning NRD categories relies more on procedural memory. We then systematically manipulated the environmental context and measured participants' ability to learn these categories. We found that positive mood induction significantly improved performance on RD categories. However, being in a state of “ego depletion” reduced performance in RD categories. Both manipulations had no effect on NRD performance though these manipulations did affect participants' strategy selection. Ambient background noise, which may enhance creativity, had no effect on learning in either case. Email: John Paul Minda, jpminda@uwo.ca

Buffer Versus Embedded Processes Approaches to Phonological Short-Term Memory. RANDI CHRISTINE MARTIN, HEATHER DIAL, QIUHAI YUE, and ANDREW CRIS HAMILTON, Rice University. — Neuropsychological and neuroimaging data were brought to bear to address buffer vs. embedded processes approaches to phonological short-term memory (STM). The embedded processes approach assumes that STM consists of the activated portion of long-term memory whereas the buffer approach assumes the existence of STM capacities dedicated to the retention of specific codes. According to the embedded processes approach, the degree of phonological processing disruption should predict the degree of phonological STM deficit and the brain regions involved in phonological maintenance should be those involved in phonological processing. Our data showed little relation between the degree of disruption...
of speech processing and the degree of phonological
STM deficit. Also, brain regions in the inferior parietal
lobe associated with phonological STM in voxel-based
lesion symptom mapping and in fMRI of healthy subjects
dissociated from those involved in phonological processing.
The results are thus more consistent with the buffer approach.
Email: Randi Christine Martin, rmartin@rice.edu

Emotion and Cognition
Continental B, Sunday Morning, 10:20-12:00
Chairied by Daniel Bernstein, Kwantlen Polytechnic University

10:20-10:35 (315)
Visual Hindsight Bias Occurs for Only Some Emotional
Faces. DANIEL BERNSTEIN, Kwantlen Polytechnic
University, RAGAV KUMAR, University of Victoria, ELINA
BIRMINGHAM and GRACE IAROCCCI, Simon Fraser
University. — Visual hindsight bias (VHB) is the tendency
to report knowing the identity of a degraded visual stimulus,
such as a blurry object or face, when one has seen the clear
version of the stimulus. In a naïve condition, participants
identified anger, sadness, fear, happiness, and disgust in
blurry faces that clarified on a computer monitor. Next, in
a hindsight condition, participants saw the clear version
of each face, and then tried to recall the precise level of
blur at which they identified the emotion during the naïve
condition. In several experiments, participants showed
robust VHB for disgust by identifying this emotion at a
blurrier level in the hindsight condition than in the naïve
condition. Participants showed no VHB for happy faces.
These results reveal that VHB occurs for only some emotions.
Email: Daniel Bernstein, daniel.bernstein@kwantlen.ca

10:40-10:55 (316)
Gender Differences in Emotional Empathy. VICTOR
KUPERMAN, CONSTANCE LUISA IMBAULT, and DAVID
SHORE, McMaster University. — Previous research suggests
that women are more empathetic than men (Baron-Cohen,
2002; Schulte-Rüther et al., 2008). We used a slider tool
with either a male or female figure to measure approach and
avoidance responses to word stimuli on a continuous scale.
A gender-balanced cohort of participants were asked to
move the figure towards or away from words known to elicit
different valence ratings in men and women (Warriner et al.,
submitted). In one condition, they responded as themselves,
and in another as the opposite gender. Surprisingly,
when responding for the other gender male participants
accurately reflected responses given by women, but females
did not change their response patterns to match men. We
argue, in line with Rutherford (2004), that females, as the
choosier sex, do not need to empathize with males, the
subordinate group, and hence reveal less awareness of male
emotional responses than males do of female responses.
Email: Victor Kuperman, vickup@mcmaster.ca

11:00-11:15 (317)
How Your Mood Influences Your Eye Fixations Over
Classical Portrait Paintings: A Case of Motivated
Perception. ERIC YANN LAURENT, ANNE-LAURE MARX,
and NICOLAS NOIRET, University of Franche-Comté. —
Previous research, generally contrasting a neutral face (or
scene) with an emotional (e.g., happy, sad) face (or scene)
reported 'mood-congruent' perceptual biases in young adults,
with a preference for happy content under happy mood and
for negative content under sad mood. In Experiment 1, we
validated a portrait-painting database by measuring emotions
experienced by 90 participants during a free-viewing task of
144 portraits from the 19th century. In Experiment 2, 100
participants were individually tested following a (happy,
neutral, or sad) mood induction procedure. They were eye-
tracked while they freely viewed a series of 12 paintings related
to three emotional (i.e., negative, neutral, positive) categories.
Participants under the happy mood condition avoided critical-
emotional areas of interest (eyes and mouth) and focused
more than those under sad mood on picture background,
whatever the emotional category of the stimulation. The
proposed paradigm reveals that mood-induced visual search
is more consistent than usually thought, and highlights
hedonic regulation strategies ("keep-mood", "change-mood")
that influence what is gazed within a visual scene.
Email: Eric Yann Laurent, eric.laurent@univ-fcomte.fr

11:20-11:35 (318)
Emotional Arousal Impairs Memory Only When the
Input Information Competes With Each Other. MICHIKO
SAKAKI, University of Reading, ALLISON PONZIO,
University of Southern California, TAJII UENO, Nagoya
University, MARA MATHER, University of Southern
California. — Emotional events often interrupt on-going
processing of other non-emotional stimuli (Dolcos &
McCarthy, 2006). These impairing effects have been explained
by the trade-off effect, such that enhanced processing of emotional stimuli leaves fewer resources available for other concurrent stimuli (Pessoa, 2009). In contrast, our
recent model, Glutamate Amplifies Noradrenergic Effects
(GANE) model, provides different explanations. According
to GANE, emotional arousal induces norepinephrine which
biases the competition in favor of high priority information.
Thus, GANE predicts that arousal impairs processing of
other stimuli only when they have low priority. Consistent
with this prediction, we found that arousal impairs memory when the input information competes with each other and therefore has low priority. In contrast, arousal
did not impair memory when the input information has
high priority. A computational model based on GANE
also reproduced these patterns. These results suggest that
how arousal impacts memories depends on their priority.
Email: Michiko Sakaki, m.sakaki@reading.ac.uk

11:40-11:55 (319)
Modeling Hypocrisy and Dishonesty in Service Academy
Honor Systems. Implications for a Corporate Model.
MEREDITH ORTIZ, JAMES ORAKER, and FREDERICK
MALMSTROM, University of the Rockies, JASON
MACGREGOR, Baylor University (presented by Frederick Malmstrom). — This study examined the extent of both dishonesty and subsequent hypocrisy from surveys completed by 2,465 graduates of all three major U.S. service academies (Army, Navy, Air Force) from 1959 through 2010. Results indicated major increases in admitted dishonesty by both cadets and midshipmen over the past half-century with toleration of dishonesty by fellow cadets and midshipmen as the greatest contributing factor to violations of their honor codes. Further analyses revealed significance for two distinct types of hypocrisy (1) Self-deceptive, and (2) Opportunistic. Self-deceptive hypocrisy was by far the most prevalent, whereby individuals rationalize and discount their own dishonest behaviors. Results support the Modularity model proposed by Kurzban (2010). Our results propose a statistical model for examining the basic ingredients leading to self-deceptive hypocrisy. Results support the Modularity model whereby individuals rationalize and discount their own dishonest behaviors. Results support the Modularity model proposed by Kurzban (2010). Our results propose a statistical model for examining the basic ingredients leading to corruptive dishonesty and subsequent corruption. Tolerance of dishonesty appears to be the most promising seed element. Email: Frederick Malmstrom, fmalmstrom@earthlink.net

Action and Perception
Continental C, Sunday Morning, 10:00-12:00
Chairied by Mounia Ziat, Northern Michigan University

10:00-10:15 (320)
Potters Make Shorter Clay Pots at the Wheel When Their Vision, Touch, or Hearing Is Reduced. MOUNIA ZIAT, CHERYL KONIECZNY, MIN KYUNG PARK, and BRIAN KAKAS, Northern Michigan University, DAVID ROSENBAUM, Pennsylvania State University. — When potters throw a vessel on a wheel, they use visual, proprioceptive/tactile, and auditory feedback. We asked 24 ceramics students to throw a vessel on a potter's wheel when all possible pairs of these three sensory modalities were attenuated and, in the control condition, when none of the modalities were attenuated. The conditions were tested in a counterbalanced order over subjects. The heights of the vessels were reduced in the attenuated conditions compared to the control condition and to an equal degree in all three attenuation conditions — when vision and touch were attenuated, when vision and hearing were attenuated, and when touch and hearing were attenuated. This outcome may reflect a change in the height at which adequate control of the growing vessel is reached. Email: Mounia Ziat, mziat@nmu.edu

10:20-10:35 (321)
Reflexive Spatial Attention to Goal-Directed Reaching Is Modulated by Saccadic and Manual Responses. BENNETT BERTENTHAL, ALEXIS BARTON, and SAMUEL HARDING, Indiana University. — Crostella et al. (2009) report that reflexive shifts of visuo-spatial attention are triggered by social cues through a sensorimotor mirroring process. This mirroring process also applies to the observation of goal-directed actions, and thus reflexive orienting to these actions might also modulate visuo-spatial attention. In a series of experiments, we tested whether visuo-spatial attention is influenced by the presence of an irrelevant goal-directed reaching action during testing in a spatial cuing paradigm with a colored stimulus cue presented at different stimulus onset asynchronies (SOAs). The direction of the reach was either congruent or incongruent with target location. Response times to the congruent target were facilitated at short SOAs for both saccadic and manual responses, but at longer SOAs the irrelevant reaching stimulus interfered with the saccadic response. We present a model suggesting how the temporal dynamics of predictively tracking a goal-directed reach could account for these results. Email: Bennett Bertenthal, bbertenthal@indiana.edu

10:40-10:55 (322)
When You and I Are One: Fluency and the Synchrony-Liking Relationship. KIMBERLY QUINN, DePaul University, JULIANE HONISCH, University of Reading, DAGMAR FRASER, University of Birmingham, MARK ELLIOTT, University of Warwick, JOHN CACIOPPO, University of Chicago. — When behavioral elements synchronize, they may create a perceptual unit. This kind of perceptual chunking has been shown to ameliorate cognitive load, increasing perceptual fluency and resource availability. We examined whether interpersonal synchrony produces fluent processing, as indexed by the flexible allocation of attention, and whether this fluency contributes to positive social outcomes. Participants were 3D motion-tracked while bouncing in time with an auditory metronome and watching video of a task partner bouncing synchronously or asynchronously, or not moving at all. Participants also reported orally whether letters presented randomly in the periphery of the large projected screen were ps or qs. Response time did not differ with condition; however, probe identification accuracy was facilitated in the synchronous condition. Synchrony also elicited more positive reactions to the task partner. These results are compatible with the reasoning that synchrony leads to fluent processing of a task partner’s movements by creating a single unitized motor representation that encompasses both one’s own and one’s partner’s movements, and that this fluency contributes to the beneficial outcomes of synchrony. Email: Kimberly Quinn, kquinn17@depaul.edu

11:00-11:15 (323)
Predictive Coding in Action Observation. PATRIC BACH, Plymouth University. — Action understanding is conventionally described as a bottom-up process where others’ actions are “directly matched” to corresponding motor or goal representations of the observer. More recent work, however, indicates that perception in general is predictive and guided by top-down expectations. I will report data from two experimental paradigms demonstrating such effects during social perception. They show, first, that observers’ visual perception of others actions is routinely altered by information about others’ intention, biasing it towards these goals. Second, these forward predictions cause a tactile representation of the observed action, even if the action outcomes are not fully visible and have to be inferred from prior information. These data argue against bottom-up views of social perception and favour recent models that one’s conscious
experience of others’ actions emerges dynamically from bottom-up sensory information and top-down expectations. Email: Patric Bach, patric.bach@plymouth.ac.uk

11:20-11:35 (324)
Losing Control in Action-Specific Effects: Evidence for Bayesian Integration. JESSICA K. WITT, ZACHARY KING, and NATHAN L. TENHUNDFELD, Colorado State University. — Spatial perception of distance, size, and speed of an object is influenced by the perceiver’s ability to act on the object. For example, objects appear to move faster when they are more difficult to catch. Despite many demonstrations of these so-called action-specific effects on perception, little research has determined the underlying mechanism. Here, we consider Bayesian integration of optical information with action-relevant information such as ease to catch the target. To test this interpretation, we varied the control that participants had over the action with the idea that more control would equate to more certainty about the action. We found reduced effects of one’s ability to catch the target on perceived speed of the target when the action cues were less reliable. The results are consistent with a Bayesian integration mechanism. Email: Jessica K. Witt, jessica.witt@colostate.edu

11:40-11:55 (325)
A Critical Evaluation of Evidence for Embodiment of Word Meaning. CORSON ARESHENKOFF, DANIEL N. BUB, and MICHAEL E. J. MASSON, University of Victoria (presented by Michael E. J. Masson). — Embodied accounts of meaning representation hold that word meaning is grounded in sensory-motor experiences. These experiences are deemed to be an intrinsic and necessary component of meaning. In support of this view, research has found rapid motor priming effects for words like hawk or shoe, which differ as to whether they are typically associated with an up or down spatial location. In keeping with these findings, we show that words connoting an up or down spatial location produce vertical perturbations of left/right movements applied to a computer mouse. We further show, however, that such effects are contingent on including up and down movements in the response set. Without such movements to coerce aspects of vertical location from word meaning, no vertical perturbation effects occur. This finding calls into question the validity of various demonstrations of the influence of word meaning on actions as support for embodiment of meaning. Email: Michael E. J. Masson, mmasson@uvic.ca

False Memory and Eyewitness Identification
Waldorf, Sunday Morning, 10:20-12:00
Chaired by Mark Howe, City University London

10:20-10:35 (326)
Can False Memories Bias Solutions to Ambiguous Problems? MARK HOWE, City University London, SARAH GARNER, Police Foundation London. — Research shows that false memories can prime insight-based problem solving tasks by increasing solution rates and decreasing solution times. The present research investigated whether false memories could also bias solutions to ambiguous insight-based problem solving tasks. Compound remote associate task (CRAT) problems with two correct answers, a dominant and a non-dominant solution, were created. Prior to solving CRAT problems, participants were given DRM lists whose critical lures were also the non-dominant solution to half of the CRATs. As predicted, when false memories served as primes, both solution rates and times were facilitated for non-dominant over dominant CRAT solutions. This biasing effect was only found when participants falsely recalled the critical lure, and not when participants did not falsely recall the critical lure, or when they were not primed. Results are discussed with regard to spreading activation models of solution competition and current theories of false memory priming effects. Email: Mark Howe, drmark1.howe@gmail.com

10:40-10:55 (327)
Emotion Can Change the Boundaries of a Remembered Scene. NANCY FRANKLIN, Stony Brook University, SUNY, SARA MILLER, Georgia Tech. — After viewing a scene containing an incomplete object, people misremember the object as more complete and the surrounding context as more extended (Intraub & Richardson, 1989). We examined memory for neutral scenes that people viewed after having been induced to experience emotions (e.g., anger, sadness) associated with approach or avoidance biases. If anger induces approach bias, creating anticipation of a more close-up encounter, this may impact encoding and memory for the scene, and boundary extension may be reduced or reversed. In contrast, if sadness induces withdrawal bias, memory may show enhanced boundary extension. Scenes with inherent emotional valence (e.g., Jewish headstone with swastika graffiti), as well as scenes with barriers that would prevent approach within the context of the scene itself, further tested the generality of these effects. Our results suggest that even a moderately felt, unrelated emotion can distort the apparent distance of objects from one’s vantage point. Email: Nancy Franklin, nancy.franklin@stonybrook.edu

11:00-11:15 (328)
Aging, Confidence, and Misinformation: Recalling Information With the Cognitive Interview. CHAD DODSON, University of Virginia. — Younger and older adults witnessed a simulated robbery, received misleading information about the event and then were interviewed with the Cognitive Interview about their memory for the robbery. Older adults were disproportionately more confident than younger adults in the accuracy of incorrect information that they recalled than correct information. This age-related increase in high-confidence errors occurred even when compared to younger adults who were matched with older adults on the overall amount and accuracy of the information remembered about the robbery. Interestingly, retrieval warnings to disregard the misinformation were just as effective in older adults as compared to younger adults at reducing the reporting of misleading information. Finally, across the multiple retrieval stages of the Cognitive Interview the final retrieval stage is roughly half as effective for older adults relative to younger adults at eliciting previously unreported information. Email: Chad Dodson, cchodson@virginia.edu
The Relationship Between Confidence and Accuracy for Eyewitness Identifications Made From Simultaneous and Sequential Police Lineups. JOHN WIXTED, University of California, San Diego, LAURA MICKES, Royal Holloway, University of London, JOHN DUNN, University of Adelaide, STEVEN CLARK, University of California, Riverside, WILLIAM WELLS, Sam Houston State University. — Previous laboratory-based mock-crime studies have often been interpreted to mean that (a) confidence associated eyewitness identifications from a lineup is an unreliable indicator of accuracy and (b) sequential lineups are diagnostically superior to traditional simultaneous lineups. Largely as a result, juries are often encouraged to discount eyewitness confidence, and up to 30% of law enforcement agencies in the U.S. have switched to using the sequential lineup procedure. We conducted a field study of actual eyewitnesses who were assigned to simultaneous or sequential photo lineups (administered in double-blind fashion) in the Houston Police Department over a one-year period. Identifications were made using a 3-point confidence scale, and a signal-detection model was used to analyze and interpret the data. The results suggest that confidence in an initial eyewitness identification from a fair lineup is a highly reliable indicator of accuracy and that simultaneous lineups are, if anything, diagnostically superior to sequential lineups.

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Eyewitness Identification: Which Results Matter for Which Decision-Makers? LAURA MICKES, Royal Holloway, University of London. — Two analyses – receiver operating characteristic (ROC) analysis and confidence-accuracy characteristic (CAC) analysis – are useful for investigating variables that affect the accuracy of eyewitness identifications. Two groups of decision-makers interested in the results of these types of investigations include: policymakers and triers of truth (e.g., jurors). Which type of analysis matters the most to which type of decision-maker? The answer is largely dependent on whether the variable in question is a system or estimator variable. ROC analysis, which measures discriminability, is critical for understanding system variables that affect eyewitness accuracy (e.g., lineup format). Thus, policymakers should be attuned to the results of ROC analysis when making decisions about system variables. CAC analysis, which measures the confidence-accuracy relationship, is critical for understanding the effect of estimator variables on eyewitness accuracy (e.g., exposure duration). Thus, triers of truth should be attuned to the results of CAC analysis.

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POSTER SESSION I
Thursday Evening
Salon D
Viewing 4:00 p.m.-7:30 p.m., Author Present 6:00 p.m.-7:30 p.m.

• VISION I •

(1001)
Age-Related Differences in Gaze Behavior During Judgments of Egocentric Distance. COURTNEY P. WALLIN, George Washington University, JORDAN P. GOODISON and RICHARD FLEMING, University of Wallongong, DANIEL A. GAJEWSKI and JOHN W. PHILBECK, George Washington University. — Previous research indicates age-related differences in egocentric distance judgments, with older adults reporting targets to be farther away than younger adults in certain conditions. To determine whether such differences may be due to age-related changes in gaze-behavior strategies, we monitored the eye movements of older (65-85 years) and younger adults (18-24 years) executed during 5-second previews of targets for distance judgments made via two response modes (blindwalking and verbal report). Response sensitivity was greater with verbal report than with blindwalking (mean slope = 1.29 vs. 1.06) and less biased (mean error = -0.5% vs. -17%), but there were no effects of age on performance. Nevertheless, preliminary eye tracking analyses do suggest an age-related difference in gaze behavior while judging target distance, including an increased tendency for older observers to explore the foreground. Fine-grained analyses of gaze behavior and possible accounts for these age-related differences will be discussed. Email: Daniel A. Gajewski, gajewski1@gwu.edu

(1002)
Feature-Location Binding in 3D: Does the ‘Spatial Congruency Bias’ Extend to Depth Position? NONIE J. FINLAYSON and JULIE D. GOLOMB, The Ohio State University. — A coherent representation of our visual environment requires that we bind features of an object with its spatial location. Recent research has revealed that two objects sharing the same location are more likely to be judged as the same identity (Golomb et al., 2014). This “spatial congruency bias” is automatic, unique to location, and suggests that an object's features are bound to its location. Here we examined how depth information is incorporated into feature-location binding. Across a series of experiments, participants judged whether two objects were the same or different depth, color, or 2D location (horizontal or vertical). We found that 2D location biases both color and depth judgments. Depth position does not bias 2D location judgments, but may possibly affect color judgments. These results suggest that depth information is not as fundamental as 2D location, but might be prioritized above other features. Email: Nonie J. Finlayson, nonie.j@gmail.com

(1003)
The Small Context Ebbinghaus Illusion Appears Larger on the Right Visual Field. AYAKO SANEYOSHI, Teikyo University. — In two experiments, the effect of left and right alignment sequence of figures on Ebbinghaus illusion was investigated. In experiment 1, PSEs (points of subjective equality) of context small and large Ebbinghaus illusion presented on the left and right visual fields were compared. I found that the context small Ebbinghaus illusion figure was perceived larger when positioned on the right visual field than on the left visual field. In experiment 2, I investigated whether the result was caused by decreasing of illusion on the left visual field or increasing of illusion on the right visual field. The illusion figures were presented on the right, left and center visual fields. In the result, the illusion effect increased when they were presented on the right visual field. The hemispheric asymmetry for different spatial frequencies processing and the role of spatial frequency in the visual illusion were discussed. Email: Ayako Saneyoshi, a-sane@main.teikyo-u.ac.jp

(1004)
Competition Makes Observers Remember Faces as More Aggressive. LAURA E. THOMAS and BENJAMIN BALAS, North Dakota State University. — People use facial appearance to predict social behavior, but can social context also influence face perception? Leveraging a link between competition and aggression, we investigated the effects of competitive interactions with confederates on participants' performance in a face reconstruction task. Participants played a game either in competition or cooperation with confederates and were then asked to create facial portraits of these confederates by arranging their component features into their best estimate of an accurate configuration. Across two experiments, participants who played in a competitive context reconstructed faces in a more aggressive configuration—with higher width-to-height ratios—than did participants who played cooperatively or alone. This result demonstrates that the social perception of faces is not merely a feed-forward process, but instead that the social contexts in which people interact can shape memory for faces. Email: Laura E. Thomas, laura.e.thomas@ndsu.edu

(1005)
Outlier Representations in Visual Short-Term Memory. AYSECAN BODUROGLU and IREM YILDIRIM, Bogazici University. — Ensemble representations are argued to foster efficient processing of outliers. However, limited research has investigated outlier representations in visual short-term memory. We investigated outlier representations using displays of heterogeneously sized circles in which half the displays had an obvious outlier in size; in the rest the largest/smallest item was unique yet not an outlier given the distribution of items in the display. Participants reported either mean or outlier size (largest/smallest item). We found that representations were
more accurate when an item was an outlier than when not. Also, mean size estimations were more erroneous only when there was a larger outlier. In displays with an outlier, a bias towards the local mean emerged, suggesting that outliers were somewhat downplayed. This bias remained even when viewers were encouraged to concurrently focus on the ensemble along with the outlier. We conclude that outliers are efficiently processed and partially discarded in ensemble representations.

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(1006)
Categorical and Temporal Grouping in Recognition-Induced Forgetting. ASHLEIGH M. MAXCEY, Tennessee State University, REHAB DAHAB, Manchester University, GEOFFREY F. WOODMAN, Vanderbilt University. — Recent evidence has shown that recognizing objects stored in visual long-term memory hurts memory for related objects, called recognition-induced forgetting (Maxcey & Woodman, 2014). In these studies, related objects are grouped by semantic category. However, the relationship between objects in many real-world visual recognition tasks may be temporal rather than categorical. The goal of the present study is to determine whether temporally grouped objects suffer recognition-induced forgetting as do categorically grouped objects. To this end, we presented pairs of objects to remember in a recognition-induced forgetting paradigm. The pairs were either from different semantic categories (e.g., a green car and a yellow vase) or the same semantic category (e.g., a blue vase and a red vase). If temporally related objects suffer recognition-induced forgetting, practicing one object from a pair of objects will impair memory for the other object in the pair, regardless of their semantic relationship. The results showed that temporally related objects only suffered from recognition-induced forgetting when the pairs were from the same semantic category.

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(1007)
Using the P300 to Evaluate Camouflage Effectiveness. MARIANNA EDDY, AMANDA HOLMES, JULIE CANTelon, and TAD BRUNYE, US Army NSRDEC & Tufts University. — Across species, the ability to camouflage oneself can be critical for survival. This study examined the neural signatures of successful camouflage in order to provide a method for assessing the effectiveness of military camouflage. Two different camouflage patterns were presented, the Army Combat Uniform Universal Camouflage Pattern (UCP) and the Operation Enduring Freedom Camouflage Pattern (OCP), in woodland and desert environments while participants were asked to detect when a camouflage pattern was present in the scene while event-related potentials were recorded. These targets were infrequent (20%) in order to elicit a P300 response. We found that in the desert environment OCP far outperformed the UCP in terms of detection rates. In addition to having lower detection rates, OCP also had smaller amplitude P300’s and the peak latency was later compared to the UCP. In the woodland background no differences in amplitude or latency were found. This study demonstrates that the P300 can be used to assess the effectiveness of camouflage.

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(1008)
Further Support for the Emmer’s Law-Based Explanation of the Poggendorff Illusion. UMUR TALASLI and ASLI BAHAR INAN, Atılım University. — Our earlier explanation of the Poggendorff illusion via Emmer’s Law (Talasli & Inan, 2014, November) argued for shrinkage of the occluding entity in the cortical representation, thereby eliminating the collinearity of the occluded transversals. In the present study, we test the validity of our theory in two new experiments. In Experiment 1, by using a ring-like occluding structure, we predicted the reversal of the Poggendorff illusion. The results provided support for our theory, where the transversal outside the ring appeared lower than its physically collinear continuation which was inside the ring. In Experiment 2, we demonstrated another new variant of the Poggendorff illusion, where the transversals are vertically oriented and occluded by a structure that allows them to be seen through triangular perforations. The obtained results of both reversal and vertical displacements as predicted provided further support for our theory.

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(1009)
Using Steady-State Visual Evoked Potentials (SSVEPs) to Measure Signal Enhancement and Noise Suppression During Object Recognition. BRANDI EMERICK, THOMAS BUSEY, and BRIAN O’DONNELL, Indiana University (Sponsored by Thomas Busey). — SSVEPs provide a way to track responses to specific stimuli. Brain responses are recorded with EEG while periodic stimuli are presented. Brain regions involved in processing a particular stimulus entrain to its presentation frequency, allowing differentiation of responses to separate stimuli, including stimuli that are superimposed. This technique was used to measure brain responses to degraded images presented in noise. During each trial, participants pressed a button to indicate object recognition (if it occurred) and provided difficulty ratings. This allowed us to track signal enhancement and noise suppression during object recognition, as brain responses to signal and noise were effectively tagged by the presentation frequency for each. This can be applied to characterize visual perception deficits exhibited by clinical populations. For example, we used this method to compare visual processing of signal and noise across cannabis users and nonusers.

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(1010)
Exploring the Perception of Vastness, Openness, and Ruggedness. DEVIN M. GILL and JEANINE STEFANUCCI, University of Utah, ROBERTA KLATZKY, Carnegie Mellon University, WILLIAM B. THOMPSON, University of Utah (Sponsored by Jeanine Stefanucci). — Many people have experienced a vast space that seems to extend without limits, making one feel like a small element within that space. Almost nothing is known about the perceptual processes of
this phenomenon. This study explored the contribution of the visual properties openness and ruggedness (Oliva and Torralba, 2001) to a sense of vastness. Participants' ratings of 131 environmental images were assessed; first in terms of vastness and then in terms of openness and ruggedness. Both visual properties are positively significantly predictive of vastness; however, the contribution of openness exceeds that of ruggedness. Ruggedness does play an important role in the overall model. In particular, images with high ruggedness ratings have greater judged vastness than predicted by their openness, whereas the judged vastness of images with low ruggedness is less than predicted by openness. Overall, these data suggest that vastness in environments can be predicted by openness and ruggedness.

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(1011)
Rescaling of Perceived Space in Virtual Reality.
ZACHARY DANIEL SIEGEL and JONATHAN KELLY, Iowa State University (Sponsored by Jonathan Kelly). — Egocentric distance is commonly underperceived in virtual environments, sometimes by up to 50% of actual distance. Studies have shown that walking through a virtual environment with feedback can improve blind-walking judgments of distance, but it is unclear whether this improvement is caused by recalibration of the walking response or a rescaling of perceived space. This study examined the effect of walking with feedback on blind-walking judgments and size judgments, which provide a more implicit measure of perceived distance. Both blind-walking and size judgments improved as a result of walking with visual feedback, especially for distances farther than those used in the walking interaction. These results suggest that the effect of walking with visual feedback is at least partially due to rescaling of the perceived environment, and that rescaling also characterizes distances beyond the walked area.

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• ACTION I •

(1012)
Action Selection Is Sensitive to the Location of a Potential Social Partner. JILL A. DOSSO and ALAN KINGSTONE, University of British Columbia. — The presence of another can modulate a person’s peripersonal (i.e. reachable) space. It is unknown, however, whether factors that affect peripersonal space can impact action selection and execution within it. We investigated if the presence of a potential social partner within peripersonal (reachable) space would shape participants’ performance on a semi-structured reaching task. We found that when another individual was located within rather than outside a participant’s peripersonal space, participants’ reaches were directed closer to the self (away from the other person) and less distributed. These results suggest that the presence of others may shape not only the size of peripersonal space but also the nature of the actions performed within it.

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(1013)
Coordination of Cognitive and Physical Effort. CORY ADAM POTTS and DAVID ROSENBAUM, Pennsylvania State University (Sponsored by David Rosenbaum). — Despite research on cognitive effort and physical effort, little work has compared the two. We compared cognitive and physical effort by asking participants to do what seemed easier: count aloud to a specified number (10 or 50), or walk some distance (1.2 m or 3.6 m) while manually reaching along the way for a bucket some distance from the walk path (.2 m or .4 m) to carry the bucket to a table. For a measure of physical effort, we relied on previous work that expressed combined walking and reaching distance in terms of a single physical effort measure. We were able to express the effort of counting each additional digit relative to the effort of adding a unit of physical effort. Our cross-modal 2-alternative-forced-choice method holds promise for shedding light on the coordination of cognitive and physical effort.

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(1014)
New Avenues for Investigating the Prospective Sense of Agency. NURA SIDARUS, Institute of Cognitive Neuroscience, University College London, JANET METCALFE, Columbia University, PATRICK HAGGARD, Institute of Cognitive Neuroscience, University College London (Sponsored by Janet Metcalfe). — The sense of agency refers to the feeling that we are in control of our actions and, through them, of events in the outside world. Many studies have shown the importance of a retrospective comparison between expected and actual consequences of our actions. When there is a mismatch, and something that we did not expect happens, our sense of agency is reduced. Recent studies have revealed an additional, prospective component to the sense of agency, related to a metacognitive signal about the fluency of action selection. When action selection is paradigm fluid, and we “just know what to do,” the sense of agency over the consequences of our actions is stronger than when action selection is dysfunctional or difficult. We present evidence that these effects are present across manipulations of action selection in several tasks, from subliminal action priming, to the Eriksen flanker task, to a more ecological video game.

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(1015)
Parallel Streams Versus Integrated Timing in Multi-Limb Rhythms. EMANUELE RIZZI and RICHARD JAGACINSKI, Ohio State University, STUART KLAPP, California State University, East Bay (Sponsored by Richard Jagacinski). — Skilled drummers performed a 4:3:2 polyrhythm with two hands and one foot. Patterns of temporal covariation were used to infer relatively independent parallel timing and integrated timing relationships between each pair of limbs. Parallel timing was more prevalent between hand and foot than between the two hands, and parallel timing generally increased with speed of performance. Different combinations of integrated and parallel timing were found among the three limbs. These results can be interpreted in terms of a Gestalt
principle known as Korte’s Third Law, which can be extended from the perceptual domain into the perceptual-motor domain. This principle indicates that perceived velocity is a key factor in determining whether a sequence of events is represented as a single integrated pattern or as multiple parallel patterns.

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(1016)
Comparing Performance and Coordination Dynamics of Dyads and Individuals in a Computer Control Task. DANIEL S. SCHLOESSER and JIUYANG BAI, Illinois State University, DREW H. ABNEY, University of California, Merced, J. SCOTT JORDAN, Illinois State University. — Individuals and pairs pressed computer keys to keep a moving square stimulus within a rectangle. The A-key and L-key caused the dot to move right or left while the key was pressed. Pressing both keys caused the stimulus to move upward, while pressing neither key caused downward movement. Individuals produced significantly less turn-point variability in the outer two quadrants of the rectangle, while pairs did so in the middle two. Individuals also let significantly more time pass between A-key and L-key presses (i.e., coast-times) than pairs. These differences occurred because pair members could not anticipate their partner’s press, and therefore pressed their own key as quickly as possible (Knoblich & Jordan, 2003). Recurrence quantification analyses revealed pairs’ task performance increased when maximum recurrence progressed away from a lag of zero. Additional analyses suggested stronger temporal coupling for individuals, providing preliminary support for the benefits of stable, loosely coupled systems.

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(1017)
Crossed Hands and the Syntax-Space Effect. TIMOTHY WOOD BOITEAU and AMIT ALMOR, University of South Carolina (Sponsored by Amit Almor). — Previous studies have suggested a grounding of syntax in spatial processing, specifically with transitive actions moving from left-to-right (Chatterjee, 2001; Maas & Russo, 2003; Talmy, 2000). We have shown that this effect is only present when responding with the left hand (Boiteau & Almor, in submission). This may be due to either hemispheric processing differences or the function of processing stimuli in different manuospatial frames. In the present experiment we manipulated hand positioning (crossed vs. normal) to test these two alternatives. Again, the effect was only present when responding with the left hand, but became reduced when the left hand responded towards the right side of space. Our results indicate contributions of both hypotheses in creating the syntax-space effect.

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(1018)
Grasp Selection for Minimal Object Manipulations: The Role of Control and Preferred Postures. OLIVER HERBORT, Julius-Maximilians-Universität Würzburg. — When humans grasp objects, the grasps are adjusted to the intended object manipulation. It has been suggested that the function of such anticipatory grasp adjustments is to enhance the control over the object. This is thought to be achieved by selecting grasps that result in preferred arm postures during the object manipulation. To test whether grasp selections result in specific preferred postures during object manipulations, participants were asked to grasp a dial and rotate it by various angles. Participants twisted their arms considerably before grasping the dial, even when the upcoming dial rotation was minimal (5°). Consequently, grasp selection did not lead to a preferred arm posture at any point during some object manipulations. To test whether grasp selections enhance control, the effect of the grasp on the efficiency of dial rotations was examined. Spontaneously selected grasps were more excursed than necessary to maximize dial rotation speed. However, this apparent overshoot might be explained by participants’ sensitivity to the variability of their grasps.

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(1019)
Variability and Location of Movement Endpoint Distributions: The Influence of Instructions for Movement Speed and Accuracy. ABHISHEK DEY and ANDREW SLIFKIN, Cleveland State University (Sponsored by Andrew Silkin). — An influential theory of motor control predicts that targeted hand movements should be aimed at the target center and that the range of movement endpoints should match the range permitted by the target (Meyer et al., 1988). Centering the distribution on the target center and expanding variability to the limits of the target boundaries allows for maximization of movement speed. Silkin and Eder (2015) found that those predictions held over a range of small target widths. However, with further increases in target width, movement variability increasingly underestimated the variability permitted by the target and the center of the distribution increasingly underestimated the target center. In particular, the amount of unused space within the target region was highly predictive of the location of the distribution center. Here, we tested that relation when variability was manipulated through task instructions that emphasized either movement accuracy, both movement accuracy and speed, or movement speed.

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(1020)
Cueing Methods Moderate the Interaction Between Action Plans. JAMES MILLER, LISA FOURNIER, LAWRENCE BEHMER, and CHARLOTTE KONING, Washington State University (Sponsored by Lisa Fournier). — Executing an action can be delayed if it partly overlaps (vs. does not overlap) with another action plan maintained in memory. This interference is referred to as a partial repetition cost. This study examined whether partial repetition costs are influenced by action plans generated from environmental cues that vary in how closely they resemble the means and end state of the action goal. Action plans were generated from three different cue types: a hand executing task-relevant key presses, a dot moving across task-relevant keys, or static symbols arbitrarily mapped to key-press sequences. The required actions (key-press sequences) were similar across cue types, and the cued actions either did or did not overlap. Results showed that partial repetition costs were greater for the hand and...
• ACTION AND PERCEPTION I •

(1021) A Failure of the Ebbinghaus Illusion to Influence Task Performance. MATTHEW RASMUSSEN and LAUREN LORENZ, Elmhurst College, NATALIA CASTRO, JULIA DALY, and DONATA TASKUNAITE, Saint Xavier University, JOSHUA KELLER and JESSICA BERGER, Aurora University. — The Ebbinghaus Illusion (EI) creates the perception that a center circle is larger when surrounded by smaller circles than when surrounded by larger circles. Witt, Linkenauger, and Proffitt (2012) used the EI to influence golf putting performance. Performance was found to improve when the participants putted to a hole that was surrounded by the smaller circles. Our research group was interested in extending this research. However, in four separate experiments we failed to replicate such an effect. That is, when the performance from the small surrounding circles was compared to the performance of the large surroundings circles, the small surrounding circles failed to produce an increase in participants’ performance. The current experiment utilized a tossing and dart throwing task which may interact differently with the EI than a putting task. However, this unsuccessful replication brings into question the power of the EI to influence performance across various tasks. Email: Matthew Rasmussen, matthew.d.rasmussen@gmail.com

(1022) Active Operation Facilitate Perception of the Variance of Visual Response Motion. SACHIYO UEDA, Ochanomizu University, REIKO YAKUSHIJIN, Aoyama Gakuin University, AKIRA ISHIGUCHI, Ochanomizu University (Sponsored by Akira Ishiguchi). — Human observers have abilities to extract the statistical information of environment effectively. Regarding passive perception, many studies have explored abilities such as making statistical summary representations. In real life, however, human operators actively interact with the environment and deal with specific objects or systems. It is conceivable that operators can obtain useful information about the conditions of the operating system by accumulating information over time about the relationship between their operations and the system’s responses. In particular, amplitude of operation-response variance is important information because it can indicate damaged or possible high-risk conditions of the operation system. In this study, we conducted an experiment for discriminating the operation-response variance to investigate psychophysical characteristics of them. The results suggested that active operation-based observation facilitated the perception of the variance of visual motion, compared with passive observation. Finally, we proposed a model to explain information-processing mechanisms underlying perception of operation-response variance. Email: Sachiyo Ueda, g1070304@edu.cc.ocha.ac.jp

(1023) Does an Individual’s Preferential Weighting for Inertial Versus Effector-Specific Information Generalize Across Spatial Orientation Tasks in the Absence of Vision? BENJAMIN CHIHAK and TARYN STREASICK, Aquinas College. — Individuals perceive and update their spatial orientation using information from a number of sensory systems (e.g. visual information, vestibular cues, proprioceptive information, etc.) Coordination between these systems allows individuals to navigate through their environment smoothly and efficiently. Past research into azimuthal orientation has specifically examined the relative influence of biomechanically-driven proprioceptive information and vestibular information during rotational tasks. Bruggeman et al., (2009) rotated blindfolded participants on a motorized turntable apparatus in such a manner that participants’ biomechanical and vestibular modalities provided conflicting information. Participants’ reported direction of rotation indicated whether proprioceptive or vestibular information received preferential weighting when cues conflicted. The present study expands this research by comparing participants’ performance on the turntable task with their performance on a series of imagined walking tasks to identify the extent to which modality preferences (proprioceptive vs. vestibular) generalize to other spatial orientation tasks in the absence of vision. Email: Benjamin Chihak, ben.chihak@aquinas.edu

(1024) Proximal and Distal Effects in Action Plan Representation. JONATHAN GALLIMORE, Embry-Riddle Aeronautical University, LISA FOURNIER, Washington State University. — This study examined whether stimulus cued action plans can be represented by proximal (motor movements) and distal features (perceptual effects). Participants planned a response (A), executed an intervening response (B), and then executed the first response (A). We manipulated the action overlap between response A and B (partial or no action overlap) and spatial compatibility of proximal and distal features for response A (distal features were spatially compatible or incompatible with proximal features). The degree of partial repetition cost (PRC) measured whether distal features were learned for response A. Results showed that PRC was larger when proximal and distal features were spatially compatible compared to incompatible. These results suggest that stimulus cued action plans can be represented by proximal and distal features consistent with the Theory of Event Coding but inconsistent with Herwig, Prinz, and Waszak (2007). Email: Jonathan Gallimore, gallimoj@erau.edu

(1025) The Effects of Restricted Peripheral Field on Spatial Learning While Navigating. ERICA M. BARHORST, KRISTINA M. RAND, WILLIAM B. THOMPSON, and SARAH CREEM-REGEHR, University of Utah. — Research suggests that spatial learning while navigating with severely degraded acuity and contrast sensitivity demands the use of limited cognitive resources (Rand, Creem-Regehr, & Thompson, 2015). Peripheral vision is important to successful navigation, both for obstacle avoidance and for perceiving
spatial layout during locomotion. In a series of studies, we examined how restricted peripheral field during navigation influences spatial memory. Participants walked on novel real-world paths wearing goggles that restricted the field-of-view to severe (4 or 15 degrees) or mild angles (60 degrees) and then pointed to remembered target locations using a verbal reporting measure. Only the most severe restriction (4 degrees) showed impairment in pointing error compared to the mild restriction (within-subjects). We will discuss possible accounts to explain the memory impairment at this severe level of restriction and propose future work exploring strategy use for navigating with different types of vision loss.

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(1026)

What Can Explain Illusion Effects on Grasping? A Multi-Lab Preregistered Study. KARL KOPISKE, University of Hamburg, NICOLA BRUNO, Università di Parma, CONSTANZ HESSE, University of Aberdeen, THOMAS SCHENK, Ludwig-Maximilians-Universität Munich, VOLKER FRANZ, Universität Hamburg (Sponsored by Volker Franz). — Twenty years ago, it was reported that grasping is immune to the Ebbinghaus/Titchener illusion. This has been interpreted as strong evidence that size is calculated differently for actions than for perception, supporting the idea of two qualitatively different streams of visual processing for perception and action. However, later studies consistently found effects of Ebbinghaus stimuli on grasping. Therefore, a debate arose as to whether these motor effects are caused by the perceptual illusion or by independent mechanisms in the motor system. Furthermore, some studies have emphasized the mere existence of illusion effects in grasping, while others have emphasized their size relative to perceptual effects. We quantified the effects, and tested the possibility of motor effects of Ebbinghaus stimuli in a preregistered study conducted in four different laboratories with N=144 participants. We found strong evidence of true perceptual effects of Ebbinghaus stimuli on grasping and discuss the size of these effects.

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(1027)

Influence of Instructions on Female Performance on a Virtual Morris Water Maze. LACE PADILLA, SARAH CREEM-REGEHR, JEANINE STEFANUCCI, and ELIZABETH A. CASHDAN, University of Utah (Sponsored by Sarah Creem-Regehr). — Previous research using the Morris water maze (a virtual environment navigation task adapted from the animal spatial cognition literature) has established a reliable sex difference in the ability to return to a hidden target, notably in the use of distal (far) cues. Building on this large body of work, the current study focuses on the strategies that females use to return to a location from memory by manipulating task instructions. Preliminary data suggests that when instructed to attend to specific cues in a virtual environment, females improved in the distal cue condition compared to when no instructions were given. This work suggests that, in addition to individual differences in navigation abilities, strategies used to locate a hidden target may also contribute to female performance on a virtual Morris water maze task. A focus on explicit strategies could have implications more generally for training to improve performance on complex spatial tasks.

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• EMOTION AND COGNITION •

(1028)

Relations Between Emotion, Memory, and Time Perception. LAURA W. JOHNSON, Pomona College, DONALD G. MACKAY, University of California, Los Angeles. — Participants performed two types of duration judgments on taboo and neutral words: prospective, which instructed them to attend to time at the beginning, and retrospective, which asked for time judgments as a surprise at the end. Their prospective judgments underestimated the durations of taboo relative to neutral words, especially for words they later recalled in a surprise free recall task. These findings suggested that emotion-linked memory encoding took priority over estimating durations, so that participants recalled taboo words better than neutral words, but taboo words were perceived as shorter because attention was directed away from time. With retrospective judgments, participants overestimated the durations of taboo relative to neutral words, as if enhanced recall of ongoing events caused overestimation of the durations of those events in retrospect. Overall, present findings suggest that the same emotion-linked memory encoding processes can cause underestimation of durations in prospective tasks but overestimation in retrospective tasks.

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(1029)

What Color Is Your Anger? JENNIFER MARIE BINZAK FUGATE, COURTNEY FRANCO, and WEC JEANNIE EMMANUEL, University of Massachusetts-Dartmouth, THALYTA BASTOS, Universidade de Pernambuco-UPE. — Different colors evoke different emotions. Yet very little empirical data exist to explore the reverse relationship – what colors do people associate with “basic” emotions? According to some theories of emotion, each emotion is a natural kind, with its own behavioral, physiological, and neural signature. Such theories suggest that there might be universality in color-emotion pairings. Seventy-seven English-speaking adults completed an online survey to assess (among other things): 1) whether there is universality among the colors associated with an emotion (indicator of consistency), and 2) whether each emotion is associated with a different color (indicator of specificity). Participants assigned a different color to each of 10 emotions (from 23 perceptual color swatches). For nine of the 10 emotions, participants selected one or two color(s) statistically more frequently than other colors (i.e. consistency). For these colors, however, participants assigned only four of them statistically more to one emotion than to other emotions (i.e. specificity). The results are more consistent with theories that treat emotions as created constructs, shaped by one’s folk psychology, rather than as natural kinds.

Email: Jennifer Marie Binzak Fugate, jfugate@umassd.edu
Patterns of Anxiety Across Math, Science, and Writing

RICHARD SMITH and FABIO LEITE, The Ohio State University (Sponsored by Fabio Leite). — Cognitive psychology and cognitive neuroscience have recently developed a keen interest in the phenomenon of mind-wandering. The consistent findings are that people mind-wander frequently, and mind-wandering is associated with decreased cognitive performance. But why do people mind-wander so much? Previous investigations have focused on cognitive abilities like working memory capacity and attention control. But presumably an individual’s tendency to worry, feel anxious, and entertain personal concerns also influences mind-wandering. In order to test this hypothesis, we investigated individual differences in mind-wandering, executive abilities, and personality with a focus on neuroticism. The results showed that neurotic individuals tended to report more mind-wandering during challenging cognitive tasks, lower working memory capacity, and poorer attention control. Thus the domain of personality, and more specifically the trait of neuroticism, adds an additional source of variance in the tendency to mind-wander, and can potentially further our understanding of the relationship between mind-wandering and cognitive abilities.

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The Neurotic Wandering Mind.
MATTHEW KYLE ROBISON (Graduate Travel Award Recipient) and NASH UNSWORTH, University of Oregon (Sponsored by Nash Unsworth). — Cognitive psychology and cognitive neuroscience have recently developed a keen interest in the phenomenon of mind-wandering. The consistent findings are that people mind-wander frequently, and mind-wandering is associated with decreased cognitive performance. But why do people mind-wander so much? Previous investigations have focused on cognitive abilities like working memory capacity and attention control. But presumably an individual’s tendency to worry, feel anxious, and entertain personal concerns also influences mind-wandering. In order to test this hypothesis, we investigated individual differences in mind-wandering, executive abilities, and personality with a focus on neuroticism. The results showed that neurotic individuals tended to report more mind-wandering during challenging cognitive tasks, lower working memory capacity, and poorer attention control. Thus the domain of personality, and more specifically the trait of neuroticism, adds an additional source of variance in the tendency to mind-wander, and can potentially further our understanding of the relationship between mind-wandering and cognitive abilities.

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(1033)
Feeling Happy and (Over)Confident: The Role of Positive Affect in Metacognitive Processes.
YAEL SIDI and RAKEFET ACKERMAN, Technion-Israel Institute of Technology, AMIR EREZ, University of Florida (Sponsored by Rakefet Ackerman). — Decades of research in psychology did not resolve the question whether positive affect improves or harms cognitive functioning. In this research, we examined whether metacognitive processes could inform this debate. In two experiments, we manipulated positive affect and social motivation and examined the effects of these variables on answering general knowledge questions, which allow flexibility in detail level of the answers. Participants induced with positive affect, by a picture-tagging task, gave more accurate answers than participants that were shown neutral pictures. While regulation of effort and answering strategy were not influenced by positive affect, metacognitive monitoring was clearly affected. Specifically, participants in the positive affect condition were more confident in their answers, and exhibited larger overconfidence, demonstrating an unreliable monitoring process. However, increased social motivation allowed overcoming this deficiency in monitoring. Practical and theoretical implications for both affect and metacognition bodies of literature are discussed.

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(1031)
RACHEL G. PIZZIE and DAVID KRAEMER, Dartmouth College (Sponsored by David Kraemer). — Despite ongoing research on how anxiety manifests in classroom settings, little is known about why anxiety develops around specific academic domains and not others. Here we investigated how patterns of anxiety are maintained across prevalent self-report measures of math, science, writing, test, and trait anxiety. Using linear regression and factor analysis, we found that math, science, and test anxieties are consistently linked, generally sharing 40-60% of the variance in responses. Writing anxiety was less closely related to other anxieties. This strong relationship between test, science and math anxieties is likely due to a reliance on questions regarding tests in each subject. In order to identify questions that uniquely predict anxiety in each academic domain, we used item-wise factor analysis across multiple scales for each domain. Drawing from these results, we present an abbreviated yet comprehensive measure of academic anxiety that includes math, science, writing, testing, and general affect subscales.

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The Cognitive Processing of Emotional Words in Lexical and Memory Decisions: A Diffusion Model Analysis.
RICHARD SMITH and FABIO LEITE, The Ohio State University at Lima (Sponsored by Fabio Leite). — Response times (RTs) and accuracy in lexical decision and recognition memory tasks (across 57 participants) were compared among emotion-evoking (viz., sexual, fear, and disgust) and neutral words. For recognition memory, correct responses to previously studied sexual words produced slower RTs than words from all other categories and higher accuracy than fear-eliciting and neutral words. For lexical decision, threatening (i.e., fear and disgust) words produced faster RTs than sexual words, and disgust-evoking words produced faster RTs than neutral words. On average, participants responded more accurately to fear-inducing words than to sexual and neutral words. Fitting a diffusion-process cognitive model to the data produced evidence for a difference in the cognitive processing of sexual words and fear-inducing words, relative to other categories, at the test phase of recognition memory decisions and in lexical decisions, respectively. Email: Richard Smith, smithr16@miamioh.edu
pictures. For the pictures with negative valence, recall was similar between the low and high meaningfulness pictures. These results did not support the notion that meaningfulness plays a role in remembering stimuli with negative valence. Email: Hajime Otani, otani1h@cmich.edu

(1035)
Effects of Inter-Group Biases on Ensemble Representations of Facial Expressions. PINAR ALDAN, IREM YILDIRIM, MÜGE ÖZVAROL and SEMRA AVIAR, Bogazici University (Sponsored by Ali I. Tekcan). — It is known that viewers can readily form ensemble representations of visual displays. Specifically, both low-level (size, orientation) and high-level features, like faces can be represented as summary (ensemble) statistics even when the individual item representations are not as accurate. The current research addresses effects of group identity (gender) and emotion (anger and happiness) on the accuracy of ensemble representations formed for faces. We also investigated individual differences, empathy skills and gender stereotypes for their impact on attentional biases in the formation of ensemble representations. We found that angry faces lead to more accurate ensemble representations than happy faces. Especially, when the threatening expression appeared on male faces, estimations for mean emotion were better. Additionally, male participants were influenced by group identity more, such that their mean estimations were influenced by their in-group. Further implications of gender stereotypes were discussed. Email: Müge Ozvarol, mugeozvarol@gmail.com

(1036)
Lateralization for Expression and Perception of Facial Emotions: Evidence From Eye Tracking Methodology. SEDA EROGLU, TUBA ADSUZ, and SONIA AMADO, Ege University. — Recent research reveals contradicting findings about the hemispheric dominance for the perception and expression of emotional faces. In this study two questions are addressed: 1) is there a hemispatial advantage for the expression of different emotions (anger, fear, happy, sad, neutral); 2) is there a hemispatial difference in the attention and search strategies for the identification of emotional faces. 98 subjects participated in the study where participants evaluated the expressiveness of two chimeric emotional faces (Right/right and left/left of the same person same emotion) of five emotions. While evaluating the faces for 3 seconds, eye movements were recorded. Response choices for right and left chimeric faces revealed a right hemispatial advantage for the expression of fear, and left hemispatial advantage for the expression of happiness and sadness, while no advantage for angry faces. Initial attention and sustained attention parameters of eye tracking data are being analyzed to reveal the attention and search strategies used to evaluate emotional intensity. Email: Sonia Amado, Sonia.amado@ege.edu.tr

(1037)
Effect of an Emotional Induction Procedure on Phonological Working Memory Capacities in 5th Graders. MICHAEL FARTOUKH, CNRS UMR 7320/Université Nice Sophia Antipolis, LUCILE CHANQUOY, Université Nice Sophia Antipolis. — The influence of emotions on working memory (WM) capacity has been investigated with conflicting results. According to Ellis and Moore model (1999), and to previous research, positive and/ or negative emotions could be responsible for an inhibitory effect on WM capacities. However, this effect remains unexplored in children. The present study examined the effect of an emotional induction procedure on phonological WM capacities in 5th graders. After a first phonological WM span test, a collective emotional induction procedure was carried out, then a second WM span test was performed. Results showed an effect of negative emotional induction procedure on children capacities leading to a decrease in score. These results, in line with those observed in adults, allowed us to observe a link between emotional induction and variations in children's phonological WM performances for the very first time. These results could be consistent with Ellis and Moore's (1999) explanation that negative emotions are liable to cause intrusive thoughts and/or ruminations. Email: Michael FARTOUKH, fartoukh@unice.fr

(1038)
Cheaters Used the Left Hemiface to Increase Facial Trustworthiness. MATIA OKUBO, KENTARO ISHIKAWA, AKIHIRO KOBAYASHI, and HIKARU SUZUKI, Senshu University. — The left hemiface is emotionally more expressive than the right hemiface and facial trustworthiness is correlated with positive emotional expression. Therefore, the left hemiface should look more trustworthy than the right hemiface when people express a positive emotion. Right-handed participants (N = 81) were asked to pose as trustworthy as possible for a photograph used in an economic game. Cheaters, relative to cooperators, were more likely to show the left side of their smiling faces when their photographs were taken. Moreover, cheaters who showed left side of their smiling faces were rated to be as trustworthy as cooperators by independent raters (N = 28). On the other hand, cheaters who showed the right side of their faces were rated to be less trustworthy than cooperators. These results suggest that cheaters cunningly used the left hemiface to exploit others in social interactions. Email: Matia Okubo, mokubo@psy.senshu-u.ac.jp

(1039)
The Impact of Instructions, Response Options, and Explicit Knowledge of Authenticity Cues in Smile Judgment. MÉLANIE PERRON, ANNIE ROY-CHARLAND, and SIU YUN KUA, Laurentian University. — Authentic smiles are characterized by the simultaneous symmetrical activation of the Duchenne marker and the lip corner puller. In simulated smiles, the Duchenne marker is less often activated and activation of both muscles is more often asymmetrical. Research indicated that individuals are sensitive to these cues. However, the level of sensitivity varies between studies. The current study examined the role of explicit knowledge of the morphological cues, testing instructions and response options in variations in judgment results. Results revealed an impact of instructions: the authentic smiles judged as happier than authentic and the asymmetrical smiles judged as more authentic than happy.
When using a scale, smiles without the Duchenne marker are judged as happier and more authentic than when using yes/no questions. For explicit knowledge of cues, participants accurately report using the cues as a function of the smiles. However, they also report using cues that do not vary.

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• ASSOCIATIVE LEARNING I •

(1040)
Differentiation of Stimulus-Response Binding and Incidental Association Learning. BIRTE MOELLER and CHRISTIAN FRINGS, Trier University. — A single response to a stimulus results in short lived binding between stimulus and response (i.e., event file), and also ignored stimuli can be bound to a response, given to another stimulus (i.e., distractor-response binding). The repetition of similar stimulus-response pairings results in longer lasting associations between stimuli and responses. We analyze whether or not binding is identical with association learning processes, and present evidence that short lived bindings can be distinguished from learning. Participants always responded to target letters that were flanked by response irrelevant distractor letters. In Experiment 1 (N=67), distractor-response binding effects were larger for horizontal than for vertical distractor-target configuration, while stimulus configuration did not influence association learning. In Experiment 2 (N=36), the response-stimulus interval (RSI, 500 ms vs. 2000 ms) had opposing influences on SR-binding and association learning. Binding effects resulted only for short RSIs, while learning was only possible with long RSIs. Hence, modulating factors influence SR-binding and incidental association learning differently. We conclude that binding and learning should be treated as distinct processes.

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(1041)
The Role Of Language in Categorical Statistical Learning. MARTIN ZETTERSTEN and GARY LUPYAN, University of Wisconsin-Madison (Sponsored by Maryellen MacDonald). — When presented with picture sequences, people are able to learn statistical regularities between them, generalizing the learned patterns not only to new sequences that follow the same statistical structure, but also to sequences of words (Brady & Oliva, 2008). Here we show that learning such regularities may depend in part on activation of verbal category labels. In two studies, participants viewed sequences of pictures while performing a repeat-detection task. We then tested participants’ knowledge of the category-level patterns from the sequence and their memory for individual items. People showed impressive memory for individual exemplars, but only learned category-level patterns for categories instantiated by highly nameable images. In a follow-up study, simply asking people to attend to categories helped participants learn categorical regularities among images that were less nameable. Memory was unaffected. Overall, these results suggest that language may play a role in facilitating statistical learning at more abstract, categorical levels.

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(1042)
Borrowing From Aliens: Cryptomnesia in Verbal and Visual Creativity Tasks. ARLO CLARK-FOOS, University of Michigan, JODI L. PUCHALSKI and ROBERT SIEGLE, University of Michigan Dearborn. — Unconscious plagiarism is when remembered information is mistaken as an original creation. Previous research has investigated how features of the source (e.g., credibility) may affect unconscious plagiarism (Perfect & Stark, 2008). In this experiment, pairs of participants were asked to collaboratively generate novel drawings of space aliens (visual) and novel fictional stories (verbal). One week later, participants were asked to recall their own contributions to each task, generate new ones, complete a source test, and answer questions about their interest in visual and verbal creativity. Using a composite plagiarism score which reflects degree of plagiarism (as opposed to frequency) we demonstrate consistently high rates of plagiarism in both the alien and story tasks, with higher rates in the former, F(2, 27) = 8.06, p = .008, η2p = .23, but nearly non-existent plagiarism during the source test. We discuss how interest in these tasks may affect one’s probability of plagiarism.

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(1043)
Having Your Fears Confirmed: ERP Correlates of Experiencing an Instructed Contingency. GAETAN MERTENS, JAN DE HOUWER, and TOM EVERAERT, Ghent University (Sponsored by Jan De Houwer). — Fear conditioning procedures, that is, the pairing of a conditioned stimulus (CS) with an aversive unconditioned stimulus (US), can change the early sensory processing of the CS as evidenced by ERP. Similar modulations of early sensory processing have been obtained by merely providing CS-US contingency instructions. So far, however, no study has investigated whether direct experience of instructed contingencies adds to the effects of the instructions. To address this question, we instructed participants in a series of blocks about the contingency between two CS+s and a shock (US). A third CS was instructed to be safe. Novel CSs were selected in each block and only half of the instructed CS+s were actually paired with the US. Our results indicate that, compared to a CS-, early sensory processing (N1) of an instructed CS+ was amplified whereas later processing (P3) of an instructed CS+ was attenuated. Pairing the instructed CS+s with a shock both attenuated (P1) and amplified (N1) early stimulus processing and further attenuated later processing (P3).

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(1044)
Words Suffice—Exploring Instructed Stimulus-Response Associations. CHRISTINA PFEUFFER, University of Freiburg, KAROLINA MOUTSOPOULOU, and FLORIAN WASZAK, Université Paris Descartes, ANDREA KIESEL, University of Freiburg (Sponsored by Andrea Kiesel). — Previous studies on item-specific priming have established the independence of two distinct components of acquired stimulus-response associations: Stimulus-Action (S-A) and Stimulus- Classification (S-C) associations. Here we demonstrate that merely instructing S-A and S-C mappings...
leads to associative learning and influences later behavior. More specifically, we demonstrate that item-specific switches in S-A and S-C mappings between a prime and a later corresponding probe independently affect reaction time and accuracy both when participants act upon prime stimuli as well as when participants are merely instructed about actions and classifications mapped to stimuli during prime trials. The present experiment is the first to show that both S-A and S-C associations can be instantiated by mere instruction, allowing for optimal behavioral flexibility. Furthermore, we are the first to demonstrate that even instructions without action relevance or intention of later use affect participants’ subsequent behavior. Email: Christina Pfeuffer, christina.pfeuffer@psychologie.uni-freiburg.de

(1045) Different Neural Mechanisms Underlie Sequential and Spatial Statistical Learning. ANNE WALK, Eastern Illinois University, CHRISTOPHER CONWAY, Georgia State University. — Statistical learning has been demonstrated in both sequential and spatial domains. Previous reports of transfer of learning between space and time (Turk-Browne & Scholl, 2009) and demonstrations of learning across senses (Kirkham, Slemmer, & Johnson, 2002) have been taken as evidence that learning is domain-general. However, it is possible that different mechanisms underlie serial versus sequential statistical learning. We measured event-related potentials while participants completed visually equivalent sequential and spatial tasks: black and white shapes were paired together in time (sequential task) or space (spatial task). A late positive component was elicited in both tasks. However, in the sequential condition, greater amplitudes were observed for familiar pairs, whereas in the spatial condition, greater amplitudes were observed for novel pairs. These findings run counter to the view that statistical learning is completely domain-general, instead indicating that people process information differently depending upon whether the dependencies are presented spatially or sequentially. Email: Anne Walk, amwalk@eiu.edu

(1046) Causal Learning From Transitions and States. KEVIN SOO and BENJAMIN ROTTMAN, University of Pittsburgh (Sponsored by Benjamin Rottman). — Much existing research on elemental causal learning has focused on how causal strength is learned from the states of variables in cross-sectional contexts (e.g., the effects of a drug tested on different patients, with each outcome independent from the others). In longitudinal contexts (e.g., a single drug tested on a single patient over multiple days), the way a cause and effect change over time can be informative of the underlying causal relationship. We propose a framework for inferring the causal strength from different observed transitions, and compare the predictions to existing models of causal induction. In addition, we compare the predictions of our framework with models of associative (e.g., Rescorla-Wagner) and temporal-difference learning. Subjects observe a cause and effect over time, updating their judgments of causal strength after observing different transitions. The results show that some transitions have an effect on causal strength judgments over and above states, a prediction ignored by existing models. Email: Kevin Soo, kevin.soo@pitt.edu

(1047) Interference in Interleaved Prospective Memory. SADAF KAZI and FRANCIS DURSO, Georgia Institute of Technology (Sponsored by Francis Durso). — Prospective memory (ProM) involves remembering 1) that something has to be done and when (the intent), 2) what has to be done (the content), but also 3) associating the intent and content. We used paradigms from paired associate learning to change the intent-content association in interleaved ProM tasks. After encoding a ProM task (A-B), participants experienced a control interruption or an interruption that gave them a second ProM task. The second ProM task either presented a new trigger (C-B), a new content (A-D), or a new trigger and content (C-D). The retrieval of the original ProM task was then tested. Compared to the control interruption, ProM interruptions that presented a new content led to poorer detection of the trigger and poorer recall of the content of the original ProM task. In contrast, performance was comparable to the control interruption when the ProM interruption shared the content with the original ProM task. These results support a distinction between intent and content in ProM and demonstrate that it is important to consider intent-content associations for interleaved ProM. Email: Sadaf Kazi, sadaf.kazi@gatech.edu

(1048) The Integrative Advantage in Healthy Aging: How Can It Be Explained? PRITHA DHIR and MARIE POIRIER, City University London (Sponsored by Marie Poirier). — Four experiments examined the integrative advantage (IA) in young and older adults. In the IA, words that form a coherent phrase (e.g., monkey-foot) are better remembered than unrelated words. In Exp. 1, older and younger adults completed a paired-associate recall task; integrative pairs were better recalled than unrelated pairs, even when matched for level of association, suggesting that association is not responsible for the advantage. It was hypothesized that integrative pairs spontaneously invoke relational processing and that said processing is less effortful than for unrelated pairs. Experiments 2 and 3 compared recall with item-specific and relational orienting tasks. In Exp. 2, the IA was maintained, even in the item-specific processing condition. As the words of each pair appeared together on each side of the screen, integrative processing was perhaps still taking place. In Exp. 3, items were shown one at a time (or together) using the same orienting tasks. Item-specific processing abolished the IA in the one-at-a-time condition, suggesting that integrative encoding is spontaneous and easily induces relational processing. Across all experiments, older adults benefited more from the IA than younger adults. Email: Pritha Dhir, prithadhir@hotmail.com
(1049)

The Contributions of Memory and Executive Processes to Age Deficits in Causal Learning: An Individual Differences Study. JARED HOLDER, Centerstone Research Institute, SHARON MUTTER and STEVEN HAGGBLOOM, Western Kentucky University (Sponsored by Sharon Mutter). — Research suggests that age-related deficits in forming causal associations arise when older adults must shift their attention to relevant information that is absent from their environment (Mutter, Atchley, & Plumlee, 2012). Additional work has shown that individual differences in working memory account for variability in causal learning when participants are required to attend to absent information (Sewell & Lewandowsky, 2012). These individual differences likely emerged because working with absent information in causal learning requires similar processes to working memory. Individuals must retrieve relevant information (relying on memory), sustain and attend to that information (relying on executive processes), and manipulate the causal value of the information. In the present study, we investigated how individual differences in memory and executive processes contributed to age-related deficits in a retrospective revaluation task (Mutter et al., 2012). Our results showed that memory, but not executive processes, predicted retrospective revaluation for older adults. Neither were significant predictors for younger adults. Email: Jared Holder, jared.holder@centerstone.org

(1050)

Adapting to Stimulus-Response Contingencies Without Noticing Them. CARINA GIESEN and KLAUS ROTHERMUND, Friedrich-Schiller-Universität Jena. — Episodic stimulus-response (S-R) bindings emerge whenever a response is executed in temporal proximity to a stimulus and they are retrieved from memory by repeating the stimulus on a later occasion. To examine whether S-R binding and retrieval is sensitive to contextual influences, we manipulated contingencies between stimulus repetitions and response repetitions. In a sequential priming paradigm, stimulus repetitions were either predictive of response repetitions (positive contingency) or response changes (negative contingency) or were orthogonal to the response relation (no contingency). Results revealed that compared to the orthogonal condition, S-R binding and retrieval effects were larger under positive contingency but were reduced under negative contingency. The modulating effect of contingency on the strength of S-R binding and retrieval processes was not mediated by contingency awareness. These findings implicate that S-R binding and retrieval processes are implicitly tuned to adapt to contextual affordances that either promote or hinder the use of S-R bindings for efficient action regulation. Email: Carina Giesen, carina.giesen@uni-jena.de

(1051)

Cross-Modal Associative Learning of Color and Pitch. LINA FOUAD, MARYAM REHMAN, and MAHLIQA AZEEM, Elmhurst College, MELISSA BRANDON, Bridgewater State University, KATHERINE MOORE, Elmhurst College (Sponsored by Katherine Moore). — The purpose of this study was to determine if an association between a pitch and color can improve visual memory. To obtain a baseline for visual memory, subjects were exposed to series of colors and asked to recall their order. Subjects were then divided into a random group, in which random pitches sounded while colors appeared, or a matched group, in which colors and pitches were matched (e.g. 440Hz played every time red appeared). Finally, subjects completed a post-test similar to the pre-test. Contrary to our prediction that the association of a color and pitch would improve memory, there was no significant difference in recall between the random and control group. In fact, recall ability in both groups decreased dramatically when a second stimulus was introduced, indicating that the second stimulus hindered memory. Conditions for successful and unsuccessful associative memory will be discussed. Email: Lina Fouad, lina.a.fouad@net.elmhurst.edu

(1052)

Semantic Organization Across the Lifespan. DIRK WULFF, Max-Planck-Institute for Human Development, THOMAS T. HILLS, University of Warwick, RUI MATA, Max Planck Institute for Human Development (Sponsored by Rui Mata). — Researchers have begun to understand the development of early-life semantic memory, however, little to nothing is known about its development in later stages of life. To learn more about structural composition of semantic memory at different ages, we use graph-based methods to analyze verbal fluency data. Consistent with research on vocabulary size, we find that older adults graphs are composed of more words than those of younger adults. We also find meaningful differences in the connectedness of these graphs. In line with lifelong neuronal plasticity, our results highlight that the composition of semantic memory differs between younger and older adults. Memory decline in old age, pathological or not, must be reevaluated in light of these findings. Email: Dirk Wulff, dirk.wulff@gmail.com

(1053)

Reminding and Individual Differences. JACOB NEGLEY, COLLEEN KELLEY, and AVNER DACHOACH, Florida State University (Sponsored by Colleen Kelley). — Being reminded of a previous learning experience has been shown to produce proactive facilitation rather than proactive interference (Wahlheim & Jacoby, 2013). There are robust individual differences in the likelihood of being reminded. We used path analysis and mediation to examine the role of general memory abilities, Cognitive Reflection Test (CRT), working memory capacity (OSPA), fluid intelligence (Ravens), and the Need for Cognition scale (NFC) in predicting recollection of change (reminding) and performance on interference items in a proactive interference paradigm. Two models were tested. Results of the models indicate a positive relationship between CRT and recollection of change. Results also converge with contingency analyses used in previous studies of reminding and proactive interference demonstrating the importance of being reminded. Email: Jacob Negley, negley@psy.fsu.edu
Multiple Items in Working Memory Flexibly Guide Attention in a Visual Search Task. MORGAN BOTDORF, GAIL ROSENBAUM, and JASON CHEIN, Temple University (Sponsored by Jason Chein). — Previous research indicates that information held in working memory (WM) can guide attention in a visual search task. However, whether multiple items can be held within WM’s focus of attention (FOA), and hence guide attentional search, is a debated topic. We conducted a series of experiments wherein WM guided attention was tested. Results from two initial experiments indicated that multiple sequentially presented verbal (Exp. 1) and spatial (Exp. 2) items equivalently facilitated attentional search, and that the benefit was not dependent on serial position. Two further experiments tested whether an item’s status in WM, and the consequent impact on search, could be changed by marking the item as a likely search cue. Neither a verbal (Exp. 3) nor spatial (Exp. 4) marked stimulus further enhanced search speeds, despite resulting in improved recognition memory. Results suggest that visual search can be impacted by multiple items in a flexibly allocated FOA.

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Auditory Distraction in Children and the Role of Serial Order Processing. COREY I. MCGILL and EMILY MARIE ELLIOTT, Louisiana State University (Sponsored by Emily Marie Elliott). — Despite the large number of studies investigating the cause(s) of auditory distraction effects in adults, much less literature focuses on the effects in children. A well-known effect within the adult auditory distraction literature is the changing-state effect, in which auditory distractors that change appreciably lead to greater decreases in serial recall performance than distractors that are repeated. It is believed that automatic processing of the order information in sounds interferes with the rehearsal of order information in the serial recall task. To investigate this explanation of auditory distraction in a sample of children, direct measures of the changing-state effect on serial recall were included, along with separate tasks assessing rehearsal abilities and working memory capacity. Prior research has not included direct assessment of rehearsal abilities, and this addition makes a strong contribution to our understanding of the mechanisms of auditory distraction in children.

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Noise-Vocoded Speech and the Irrelevant Sound Effect. JOSH DORSI, University of California, Riverside, NAVIN VISWANATHAN, University of Kansas & Haskins Laboratories, LAWRENCE D. ROSENBLUM, JAMES W. DIAS, THERESA COOK, and DOMINIQUE SIMMONS, University of California, Riverside (Sponsored by Giordana Grossi). — In the Irrelevant Sound Effect (ISE), serial-recall-accuracy is reduced in the presence of auditory background speech as compared to white noise or silent backgrounds. A critical factor assumed to determine the extent of ISE is the changing-state complexity of the background (Tremblay et al., 2000). We investigate whether ISE is also sensitive to the information carried in the background. We used noise-vocoded speech (NVS), an acoustic transformation that preserves the intensity profile of speech within a number of amplitude channels. By varying the number of these NVS channels the changing-state complexity of background speech can be manipulated. Despite a linear increase in channels ISE varied in a non-linear fashion. In another condition, to preserve the complexity of the signal but distort phonetic information, we reversed two-thirds of the channels and found a trend of decreased ISE. Together, results suggest a complex role of information beyond changing-state complexity in ISE.

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The Role of Working Memory Capacity and Cognitive Load in Producing and Detecting Deception. TED MALDONADO and KEITH A. HUTCHISON, Montana State University. — This study examined the role of working memory capacity (WMC) in both the production and detection of deception. Prior to the experiment, participants truthfully answered 64 questions and completed tasks designed to measure WMC. Participants then took turns as speaker and detector. The speakers verbally responded to questions truthfully or deceitfully based on a randomly-determined sequence while the detector guessed the veridicality of these responses. For each block, the speaker was placed under either low or high cognitive load using a simple or complex spatial memory task. We found significant effects of both cognitive load and detector WMC, such that a high cognitive load impaired speakers’ ability to tell convincing lies and individuals high in WMC were overall more accurate at discriminating lies from truth. Of particular interest, ability to detect lies depended upon a complex interaction of detector WMC, speaker WMC, and speaker cognitive load.

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A Test of a Time-Based Resource-Sharing and Resource-Switching (TBR-S2) Model. FABIEN MATHY, Universite Nice Sophia Antipolis, NICOLAS GAUVRIT, Universite d’Artois. — The tasks generally used to test the Time-Based Resource-Sharing model (TBRS) have involved the regular alternation between processing and storage and/or use concurrent tasks that are strictly regular (i.e., directing attention away at regular intervals). Previous experiments and their interpretation may therefore have confounded the processing efficiency of participants with their ability to predict the time available to refresh their memory, potentially impairing the interpretation of developmental data (for instance, older participants could be twice as rapid as younger ones not only because they process and refresh items more rapidly, but also because they can better predict when to do so). We present several experiments using a concurrent Continuous Performance Task (CPT) in a complex memory span task, in which a more regular timing of the CPT (which is thus more predictable) was more beneficial to a group of young adults than it was to a group of 10-year-olds (in
Comparison to a more erratic CPT timing). Because our results show that performance is also determined by the rhythm with which attention is captured, the TBRs model should also be conceived and tested as a resource-switching model. Email: Fabien Mathy, fabien.mathy@unice.fr

**Effects of Proactive Interference in Working Memory in Bilingualism.** MARIA ROBBINS and JULIE ANNE HIGGINS, Manhattanville College. — Prior evidence suggests that bilingual individuals have enhanced executive functioning compared to monolingual individuals (Bialystok & Craik, 2010). An important executive control process is the ability to overcome interference. Here, we examine whether bilingual individuals are more successful at overcoming proactive interference (PI) in a reading span task. Participants performed a reading span task in which the amount of PI was manipulated. All participants showed higher reading span scores in the low, compared to high, PI condition. However, reading span scores did not differ between bilingual and monolingual individuals in either PI condition, suggesting that bilingual individuals were as susceptible to PI as monolingual individuals. These findings suggest that certain aspects of executive functioning, specifically the resolution of PI, may not be enhanced in bilingualism. Additionally, the working memory differences observed in bilingualism may not arise from enhanced ability to resolve PI. Email: Julie Anne Higgins, julie.higgins@mville.edu

**Differentiating Executive Functions and the Relation of Focality in Event-Related Prospective Memory.** TATSUYA SHIGETA, University of Illinois, DAWN MCBRIDE, Illinois State University (Sponsored by Dawn McBride). — Past Studies (e.g. Schnitzpan et al., 2013) have suggested that some aspects of executive function (EF) are involved in non-focal prospective memory (PM) performance. However, according to multi-process theory (McDaniel & Einstein, 2000) spontaneous retrieval of the PM cue can occur when the ongoing task is focal to the PM task. Thus, EF might be unrelated to PM performance in focal tasks. The current study tested this idea by examining a sample of college-aged subjects on three event-based PM (category/syllable judgment and facial recognition) and three EF (inhibition, task-switching, and working memory) tasks. Subjects were assigned to focal or non-focal conditions for the PM tasks. Some positive relationships were found between PM performance and executive function measures, but not all in the conditions predicted. The results call for further exploration of the key features of executive function important for PM performance. Email: Tatsuya Shigeta, tt.shigeta@gmail.com

**Emphasizing Attributes Affects Strategic Processing in VSTM.** RUIZHI DAI, AYANNA THOMAS, and HOLLY A. TAYLOR, Tufts University. — Strategic processing influences visuo-spatial working memory (VSTM) performance. For example, organizing objects into recognizable spatial configurations improves location memory. The present study extended previous research by manipulating both spatial organization and semantic association in a VSTM task. In three experiments, participants studied 5x5 grids containing five objects, within the context of a continuous recognition paradigm. Two levels of spatial and semantic relationships were compared in a factorial design. In Experiment 1, spatial and semantic relationships were randomly presented. In Experiment 2 and 3, we blocked trials by spatial organization and semantic association respectively, to highlight spatial or semantic information. We found that both spatial organization and semantic association improved participants’ VSTM when trials were randomized. However, when highlighting spatial or semantic relationships through blocking, the facilitative effect of the highlighted information was greatly reduced, suggesting an effect of highlighting on how participants apply spatial organization and semantic association in VSTM. Email: Holly A. Taylor, hollytaylor@tufts.edu

**Gesture’s Impact on Working Memory: Task Matters.** MARGARET WILSON and ACACIA OVEROYE, University of California, Santa Cruz. — Gesturing while speaking has been shown to benefit the speaker as well as listener. In particular, gesturing while explaining a solution to a problem can lighten load on working memory, improving performance on a secondary task (Goldin-Meadow et al., 2001). However, this has only been shown for a mathematical primary task. We investigated gesture’s impact when explaining three types of problems: algebraic factoring, solving analogies, and comparing faces. Our findings suggest that whether gesture relieves load, does nothing, or even increases load (perhaps by altering the depth of processing during explaining) depends upon the material to be explained. Email: Margaret Wilson, mlwilson@ucsc.edu

**Working Memory Capacity and the Benefits of Mental Imagery Practice on a Ring Toss Game.** SARAH KEVILLE and MATTHEW COLLINS, Nova Southeastern University. — A number of studies have documented the benefits of motor imagery on skilled performance but little research has examined how and why motor imagery is beneficial. For instance, those with higher working memory capacity (WMC) might show greater benefits due to their ability to sustain attention during motor imagery practice. In our study, participants in a physical practice group and a mental/physical practice group played a ring toss game attempting to score as many points as possible. The physical practice group physically practiced the game while the mental/physical practice group practiced using both physical practice and motor imagery. Participants completed the AOSMAN task to measure their WMC, as well as several tasks designed to measure individual differences in motor imagery and visual imagery including mental chronometry, image maintenance, and visual short-term memory tasks. We examined the relationship between working memory capacity, motor imagery, and visual imagery. Email: Matthew Collins, wc292@nova.edu
(1064)
The Role of Aging in Conjunctive and Relational Binding Processes in Visual Working Memory. DWIGHT J. PETERSON and MOSHE NAVEH-BENJAMIN, University of Missouri. — Age-related declines in the ability to bind distinct components within long-term memory are prevalent and well documented (Old & Naveh-Benjamin, 2008). However, the boundary conditions surrounding the observance of age-related binding deficits with respect to visual working memory (VWM) processes remain unknown. Recent evidence suggests that relational (e.g., item-location) binding declines with age, while conjunctive (e.g., shape-color) binding in VWM remains largely intact. We examined these boundary conditions in healthy younger and older adults using VWM change detection tasks performed under no load and articulatory suppression. Experiment 1 examined both intrinsic and extrinsic binding of shape-color conjunctions revealing that while no age-related deficit is observed under articulatory suppression, under no load, older adults’ VWM binding performance was impaired relative to younger adults. In Experiment 2, which examined relational binding between item and location, an age-related VWM binding deficit was again observed under no concurrent load, but disappeared under articulatory suppression. Email: Moshe Naveh-Benjamin, navehbenjaminm@missouri.edu

(1065)
Binding Asymmetry in Working Memory: An Investigation of the Role of Spatial Location and Feature Distinctiveness. JANE ELSLEY, Bournemouth University, FABRICE PARMENTIER, University of Balearic Islands, SIMON FERNEYHOUGH, Bournemouth University. — Elsley and Parmentier (2015) recently demonstrated binding asymmetry: given arrays of letters in locations, letters were bound to locations when the letters were to-be-remembered; but not when the locations were to-be-remembered. This paper contrasted two explanations for binding asymmetries. First, they may arise because some features are primary in a given modality following a set hierarchy (the hierarchy-hypothesis). Second, feature distinctiveness may drive asymmetry, with “harder” features bootstrapping to “easier” features to boost memorability (the distinctiveness-hypothesis). Using Elsley and Parmentier’s (2015) task with visuo-spatial stimuli, we found that shapes were bounded to locations when the shapes were task-relevant, and no evidence for binding when locations were task-relevant (Experiment 1). This pattern remained when feature difficulty was equated across tasks. Experiment 2 demonstrated that binding was not sensitive to manipulations of shape distinctiveness. These findings, supportive of the hierarchy-hypothesis, are discussed in terms of the role of spatial location in memory. Email: Jane Elsley, jelsley@bournemouth.ac.uk

(1066)
Residual Memory Performance During Dual-Tasking. JASON DOHERTY, The University of Edinburgh, NELSON COWAN, University of Missouri, ROBERT LOGIE, The University of Edinburgh (Sponsored by Candice Coker Morey). — In psychology, working memory (WM) is often treated as the “gold standard” measure of mental ability. However, research into the structure and functional limits of WM often focuses on different research questions, and so different research groups will present models of which the core concepts vary or contradict the findings of others in the field. We present some work investigating different theories of WM, focusing on measuring participants’ sub-task performance in dual-tasking conditions. By comparing dual-task memory performance to performance in comparable single-task conditions we present evidence for “residual” verbal memory during dual-tasking. This residual memory performance, whilst lower than in single-task conditions, proves resistant to increases in sub-task load and to instruction to focus on a concurrent lexical decision task at the expense of memory rehearsal. Our research supports the existence of a verbal memory store which does not require active maintenance of memory traces yet can be supplemented by attentional resources when they are available. As such, our research goes some way to reconciling the debate between multiple-component and shared-resource accounts of WM. Email: Jason Doherty, j.m.doherty@sms.ed.ac.uk

(1067)
Distinguishing Between Low Precision and Guessing in Visual Working Memory. JOSHUA J. FOSTER, University of Oregon, KIRSTEN ADAM, University of Chicago, JEFFREY N. ROUDER, University of Missouri, EDWARD AWH, University of Chicago (Sponsored by Edward Awh). — Discrete-resource models hold that working memory (WM) can store a limited number of items, while continuous-resource models assert that mnemonic resources can be divided across an unlimited number of items. Only discrete-resource models predict guessing when putative item limits are exceeded. Testing this prediction has been challenging because random guesses have typically been indistinguishable from low precision memories. Here, we used a WM task in which guesses and low precision memories produce different empirical patterns. Subjects recalled the orientation of bars within circles whose quadrants were demarcated with alternating colors. Guesses clustered in the center of each quadrant and showed no relationship with the studied orientation, a pattern that cannot be explained by low precision memories. These “guessing bands” were dominant when subjects reported that they were guessing, and their prevalence correlated strongly with guessing estimates from a standard WM procedure. Thus, when small item limits are exceeded, subjects guess. Email: Joshua J Foster, joshua.james.foster@gmail.com
• FALSE MEMORY I •

(1068)
Spontaneous Explanations Exhibit an Inherence Bias: Evidence From a False-Recognition Paradigm. DANIEL STORAGE, University of Illinois at Urbana-Champaign, ANDREI CIMPIAN, University of Illinois (Sponsored by Andrei Cimpian). — According to Cimpian and Salomon (2014), everyday explanations are generated via a heuristic process that overuses information that’s easily brought to mind. Because this information often consists of inherent facts about the constituents of the explanandum, it is these facts (rather than extrinsic facts about context, history, etc.) that end up dominating our explanations. Although this account is mainly concerned with spontaneous, implicit explanations, the existing evidence for it comes from offline, experimenter-elicited explanations. Thus, 3 experiments (N = 604) tested whether spontaneous explanations exhibit an inherence bias as well. The experiments used a false-recognition paradigm in which participants were exposed to a series of facts and later asked to recognize which facts they had seen before. False alarms to never-before-seen explanations for the initial facts served as a measure of spontaneous explanation. Participants false-alarmed significantly more often to inherent than extrinsic explanations, as predicted by the inherence heuristic account. Email: Daniel Storage, storage2@illinois.edu

(1069)
Increasing Age-Related Memory Distortion via Stereotype Activation. AMY M. SMITH (Graduate Travel Award Recipient) and AYANNA THOMAS, Tufts University, MARIE MAZEROLLE, Universite de Poitiers (Sponsored by Ayanna Thomas). — Thomas and Dubois (2011) were the first to demonstrate the detrimental effect of age-related stereotyping on older adults’ false memory susceptibility. The present study extended the investigation into stereotype threat and false memories by examining the effect of threat on misinformation effect susceptibility. We employed a standard misinformation procedure in which young and older adults watched a video of a robbery, listened to a summary that contained details consistent and inconsistent with the video, and were tested on their memory for the video. Prior to the test, participants read either a negative or positive passage about age-related changes in memory. Older participants who read the negative passage demonstrated a greater misinformation effect than those who read the positive passage. These findings suggest that threatened older adults were less likely to successfully engage in effortful retrieval monitoring processes because threat diminished their executive control. Email: Amy M. Smith, amy.smith@tufts.edu

(1070)
Correcting False Memories. HILLARY MULLET (Graduate Travel Award Recipient) and ELIZABETH MARSH, Duke University (Sponsored by Elizabeth Marsh). — False memories are associated with confidence and feelings of reliving, likely making one’s errors difficult to notice. We argue that errors must be detected to be corrected; consistent with this argument, two experiments showed that false memories were nearly eliminated when conditions facilitated comparisons between one’s errors and corrective feedback (e.g., immediate trial-by-trial feedback that allowed direct comparisons between one’s responses and reality). However, knowledge that one had made an error was insufficient; unless the feedback message also contained the correct answer, false memories were repeated later. On the one hand, there is nothing special about correcting false memories: simply labeling an error as “wrong” is also insufficient for correcting misremembered facts or mistranslations. However, unlike these other types of errors—which often benefit from the spacing afforded by delayed feedback—false memories require a special consideration: learners may fail to notice their errors unless correction conditions specifically highlight them. Email: Hillary Mullet, hgm8@duke.edu

(1071)
False Memory in Immediate Serial Recall: Rapid Presentation and Task Repetition. GEORGINA TOLAN and GABRIELLE RITCHIE, Australian Catholic University, GERALD TEHAN, University of Southern Queensland. — This study investigated the convergence of semantic, phonological and episodic information in true and false recall within short-term memory. Forty participants completed two immediate serial recall tasks based on the DRM paradigm (Deese, 1959; Roediger & McDermott, 1995). Tasks comprised 40 6-word trials that were associatively related or unrelated and phonologically similar or dissimilar to a non-presented lure. Lists were presented at one word or four words per second. Participants either repeated the same task twice or completed two different tasks. The false memory effect was observed in short-term recall and greatest during conditions of semantic and phonological interference. Rapid presentation enhanced false recall but reduced true recall. Task repetition aided true recall when the same task was repeated. Repetition did not reduce false memory for either group. Findings are discussed in relation to psycholinguistic (R. C. Martin, Lesch & Bartha, 1999) and spreading activation (Oberauer, 2002) models of memory. Email: Georgina Tolan, anne.tolan@acu.edu.au

(1072)
A High-Density EEG Investigation of the Misinformation Effect: Differentiating Between True and False Memories. JOHN KIAT and ROBERT BELL, University of Nebraska (Sponsored by Robert Belli). — Uncovering the neural bases underlying the misinformation effect has the potential to make significant contributions to our understanding of human memory and its vulnerabilities. While these neural bases have been explored using fMRI (Okado & Stark, 2005), no study to date has yet investigated them using electroencephalography (EEG), a neuroimaging method with superior temporal resolution and a richer, more multidimensional data structure. In this study, an EEG suitable misinformation effect paradigm with a source monitoring measurement component was developed and tested on 22 participants using a high density 256-electrode EEG system. The results showed that in comparison to responses falsely reporting misinformation as
having been seen, correct responses of having seen actually presented items have a more positive voltage in time periods associated with ERP components linked with both familiarity (FN400) and recollection (Late Positive Component). Email: John Kiat, johnkiat@hotmail.com

(1073)
The Differing Effects of Domain Knowledge on False Memories. TRAVIS RICKS, CHASE MEIDINGER, and CODY LIESER, Bemidji State University. — These experiments explored when domain knowledge protects or makes individuals vulnerable to false memories. Participants studied five Deese-Roediger-McDermott (DRM) lists, a list of Major League Baseball (MLB) teams, and a list of National Football League (NFL) teams. After presentation of the seven lists a recall test was administered followed by a recognition test. Participants then completed an assessment of their baseball, football, and general knowledge. Independent of general knowledge, sports knowledge negatively and positively predicted false recognition and recall of sports, while having no effect on false recognition and recall of DRM lures. High sports-knowledge participants were more and less prone to false memories for sports-related information than were low-sports knowledge participants depending upon characteristics of the memory task. We provide a possible theory of how domain knowledge can make individuals more or less vulnerable to false memories. Email: Travis Ricks, tricks@bemidjistate.edu

(1074)
The Source of Distinctive Encoding Effects in the DRM Paradigm: Evidence From Signal-Detection Measures and Source Judgments. GLEN E. BODNER, University of Calgary, MARK J. HUFF, Washington University in St. Louis, RAYMOND W. LAMONTAGNE, University of Calgary, TANJEE AZAD, Kent State University. — Studying DRM lists using a distinctive encoding task reduces the DRM illusion. Reductions for both distinctively and non-distinctively encoded lists in a within group have been ascribed to participants using a distinctiveness heuristic in which they monitor their recollections for distinctive-task details. Alternatively, participants might simply set a stricter response criterion, which would be exceeded by distinctively studied list items more often than all other test items, including critical items. To evaluate these alternatives, we compared a within group who studied 5 lists by reading, 5 by generation, and 5 by imagery to a read group who studied 15 lists by reading. Distinctive encoding improved correct recognition while reducing the DRM illusion, in part by impairing relational encoding. Critically, the pattern of list-based source judgments provided by the within group provided new evidence that this group likely monitored their recollections for distinctive-task details rather than simply setting a stricter response criterion. Email: Glen E. Bodner, bodner@ucalgary.ca

(1075)
Process Effects of Discrete Emotions on False Memories for Pictures. SARAH BOOKBINDER and CHARLES BRAINERD, Cornell University (Sponsored by Valerie Reyna). — Although there has been prior work on how discrete emotions influence true and false memory, the retrieval processes that control those effects have not been identified. In the present research, we used a picture-memory paradigm combined with a mathematical model (conjoint recognition) that measures three distinct retrieval processes for true and false memory. Calm and disgusting pictures increased true memory, whereas sad and interesting pictures increased false memory. These discrete emotion effects were tied to different retrieval processes. For instance, the tendency of sad pictures to elevate false memory was due to the fact that they increased familiarity, but in contrast, the tendency of interesting pictures to elevate true memory was due to the fact that they increased recollection rejection. These data are consistent with the view that within the categories of positive and negative valence, the retrieval processes the produce emotion-memory effects are different for different discrete emotions. Email: Sarah Bookbinder, sb978@cornell.edu

(1076)
Mood and Emotional Regulation Effects on False Memories. DIANA M. STEAKLEY-FREEMAN and DAWN MCBRIDE, Illinois State University. — Researchers have investigated mood state as a contributor to false memory creation (e.g., Storbeck & Clore, 2005). Previous literature yields mixed results as to the nature of mood and false memory creation of valenced stimuli. Some studies (e.g., Pesta, Murphy, & Sanders, 2001) suggest that emotional stimuli elicit fewer false memories (FMs) than neutral stimuli regardless of mood state, whereas others (e.g., Ruci et al, 2006) found that mood state was an important predictor of valenced FMs. The present study tested (1) the effect of mood induction on FM creation for negative versus neutral lures and (2) the role of emotion regulation on memory errors. The results showed that participants in the elation-induction condition falsely recalled more negative than neutral lures. We found a similar trend for participants in the devaluative-depressed induction condition. Negative emotion regulatory efficacy was predictive of negative false memories, but not neutral ones. Email: Dawn McBride, dmcbride@ilstu.edu

(1077)
Leading Gestures: How Hand Movements Shape Memory. ACACIA OVEROYE and MARGARET WILSON, University of California, Santa Cruz (Sponsored by Margaret Wilson). — Memory is highly malleable. As demonstrated in Loftus & Palmer (1974), the words we use in questions can alter how a memory is reconstructed and influence the estimations people make about a scene. In our present research, we investigate whether non-verbal cues - gestures - can alter the way a person recalls different spatial relationships in a previously viewed picture. Findings suggest that certain gestures are able to actively shape how people reconstruct memories in order to answer estimation questions. Email: Acacia Overoye, overoyea@gmail.com
Consolidation and Reconsolidation of Emotional False Memories. KERRI A. GOODWIN, EVAN KLEIN, JOSH MILSTEIN, KIMBERLY CATES, and REBECCA JOHNSON, Towson University. — Memory activation and reactivation were manipulated to test the effects of consolidation and reconsolidation disruption on emotional DRM lists. We modified Hupbach et al.'s (2007) reconsolidation paradigm and the DRM word list paradigm in this study. On Day 1, participants learned and recalled emotional DRM lists (Palmer & Dodson, 2009). Either on Day 1 or 2, we played a fear-inducing audio stimulus to disrupt processes of consolidation (Day 1 disruption) or reconsolidation (Day 2 disruption). On Day 3, we retested participants memories for the original lists. Results showed different effects of consolidation versus reconsolidation disruption on positive, negative, and neutral false memories. Implications of alteration of negative and positive emotional memories are discussed. Email: Kerri A. Goodwin, kgoodwin@towson.edu

The Influence of Social Contagion on Taxonomic and Functional Memory Errors. LAURA E. PAIGE, Brandeis University, AYESCAN BODUROGLU, Bogazici University, SUPARNA RAJARAM, Stony Brook University, ANGELA GUTCHESS, Brandeis University (Sponsored by Angela Gutchess). — Prior work establishes that relationships between words in a list influence memory and are affected by individual differences like culture. We were interested in how the relationship of words to related lures, provided by a social source, impacts false memories. Participants studied words pairs that were taxonomic (e.g., squirrel & chipmunk), functional (e.g., squirrel & acorn), or unrelated (e.g., squirrel & boat) and later viewed incorrect re-pairings from either a social or nonsocial source. In study 1, Americans and Turks did not differ in false alarm type; functional false alarms were higher in the nonsocial than the social condition. In study 2, we tested Americans to assess whether the higher rate for functional false alarms would persist across a delay. Functional false alarms did not differ from taxonomic, nor did sociality of the source influence false alarms. The results suggest that the relationship between words and delays shape false memories. Email: Laura E. Paige, paigel@brandeis.edu

Biased Retelling for the Audience Induces False Memory. KAZUHIRO IKEDA, Shokei Gakuin University. — This study investigates the effects of positively biased retelling of the ending of a story on memory. Sixty-two participants were asked to develop a story using four Thematic Apperception Test (TAT) images. One-third of the participants retold the story with a happy ending for the main character (character bias group). Another one third retold the story in a positive perspective for the audience (audience bias group). The remaining participants simply recalled the original story again (control group). One day later, all participants were asked to correctly recall the original story. Finally, a recognition test was conducted using one of the TAT images that was shown during the initial retelling session. The result indicated that the participants belonging to biased retelling for the audience condition developed a false memory of the TAT image. This suggests that different types of biased retelling induce differential effects on memory performance. Email: Kazuhiro Ikeda, hiro272003@gmail.com

Social Contagion and the Role of Relative Judgments. KATHERINE HART and MICHELLE MEADE, Montana State University. — We examined relative judgments of self memory and partner memory on the magnitude of false memories in the social contagion of memory paradigm. Participants recalled household scenes in collaboration with a confederate, who suggested false items had appeared in the scenes. The perceived memory ability of the confederate was manipulated during a practice scene to imply poor, average, or superior memory. The participants’ memory was manipulated by varying presentation rate to create short (poor) relative to long (good) viewing durations. On subsequent individual recall tasks, participants falsely remembered the erroneous items suggested by the confederate. Furthermore, participants were more likely to accept falsely suggested items when they had a poor memory for the scene and when they believed the confederate had a superior memory. Interestingly, these results were absent on a recognition task suggesting that relative judgments in social contagion are influenced by retrieval conditions. Email: Michelle Meade, mlmeade@montana.edu

The Role of Self-Generation in False Memories for One's Own Lies. ERIC RINDAL and MARIA ZARAGOZA, Kent State University. — This experiment sought to assess the memorial consequences of lying. Participants were shown an eyewitness event and subsequently asked to fabricate lies about details they had never witnessed. In addition, to assess the role of self-generation in the development of false memory for one's own lies, participants also copied lies from a yoked partner. Their memory for the originally witnessed event was later tested using free recall and a yes/no recognition test. After four weeks, participants falsely recalled their own fabricated details as having occurred in the originally witnessed event but not those copied from a partner. On the yes/no recognition test participants falsely assented to both their own fabricated details as well as false details they had earlier copied. These results provide evidence that, over time, self-generated lies may be mistaken for truths. Email: Maria Zaragoza, mzaragoz@kent.edu

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• METAMEMORY/METACOGNITION I •

(1083)
Unskilled and Aware: Test Experience as a Cue for Metacognitive Judgment Adjustment. ELIZABETH A. GREEN and MICHAEL SERRA, Texas Tech University. — Often, low performers greatly overestimate their own performance, whereas high performers accurately predict their own performance. Under certain conditions, however, the unskilled may demonstrate awareness of their own shortcomings. In a series of three experiments, we manipulated the presence of cues that learners could utilize when making metacomprehension judgments. Participants studied eight texts, made metacomprehension judgments for each, completed tests on half of the texts, re-judged their metacomprehension, and then completed tests on the remaining texts. In accord with past findings, high-comprehension learners were consistently accurate at judging their own learning. In contrast, low-comprehension learners overestimated their own learning in situations where cues about their learning were sparse, but accurately adjusted their judgments when predictive cues such as practice-test performance were available. These results suggest that, given cues about their knowledge, even the most unskilled of test takers may become aware of their shortcomings.

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(1084)
Predicting Exam Performance: The Influence of Metacognitive and Motivational Factors. GABRIEL SAENZ and LISA GERACI, Texas A&M University, TYLER MILLER, South Dakota State University (Sponsored by Lisa Geraci). — When university students make grade predictions before an exam, they exhibit a consistent set of results. Low performers overestimate their performance and top performers underestimate their performance. In three studies we examined a variety of factors that might underlie students’ exam predictions. Results showed that metacognitive factors, such as prior exam performance and exam preparation, were not associated with students’ grade predictions. However, motivational factors, such as students’ desired grades or students’ lowest acceptable grades, were associated with grade predictions. Further, attempts to improve prediction accuracy by targeting metacognitive awareness (by providing feedback and information about effective study strategies) did not affect exam predictions or performance. Together, the results suggest that students rely on motivational factors when they predict their exam performance.

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(1085)
Eye Tracking Metacomprehension. AARON WONG and JARROD MOSS, Mississippi State University (Sponsored by Jarrod Moss). — Studies have found that metacomprehension accuracy tends to be poor due to the use of inappropriate cues when making metacomprehension judgments. The situation model approach to metacomprehension suggests that judgments based on cues at the situation model level would result in high metacomprehension accuracy. However, the current methods of assessing metacomprehension accuracy make it difficult to determine if readers use cues generated during reading for making judgments. One potential method of determining whether online cues are used is to use an implicit measure, such as eye movements. In particular, regressions are theorized to occur when there are difficulties integrating new information with the existing situation model. The current study assessed whether eye movements could be used as an implicit measure of metacomprehension. Participants either read texts once or reread texts while their eye movements were recorded. Number of regressions was found to be a significant predictor of test performance, and other eye tracking measures were also examined in relation to test performance and metacomprehension judgments. The findings suggest that eye movements can be used as an implicit measure of metacomprehension.

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(1086)
Do People Use Category Learning Judgments to Regulate Their Learning of Natural Categories? KAYLA MOREHEAD, JOHN DUNLOSKY, and NATHANIEL FOSTER, Kent State University. — We evaluated whether people used their monitoring of category learning to regulate subsequent study. Participants studied birds from different families, made category learning judgments (CLJs) for each bird family, and then decided which bird families to restudy. In contrast to the metamemory literature, means across individual correlations between CLJs and selection were close to zero, but this group-level analysis appeared to arise from two distributions of regulators: those who decided to restudy the more difficult-to-learn families and those who decided to restudy the easier-to-learn families.

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(1087)
Font Size, Physical Size, and Stimuli Type as Determinants of Metamemory Judgments and Recognition Performance. ALAN HARRISON, WILSON LESTER, KENNETH HAMMETT, HILLARY ERWIN, MICHAEL A. WALDON, JUSTIN CONNALLY, AMBER HARRIS, and JODI PRICE, University of Alabama in Huntsville. — We examined the role of stimuli type (consonants, molecules, and concrete noun pairs), font size (small 18 pt./large 48 pt. font), and physical size (small/ large as indicated by the size of circles surrounding the stimuli) in participants’ judgments of learning (JOLs), recognition performance, and retrospective confidence judgments (RCJs). JOLs, recognition and RCJs all differed by stimuli type, but only recognition performance and RCJs were influenced by font size. Participants recognized more items presented in large than in small fonts, which participants’ RCJs accurately tracked. Gamma correlations between JOLs and recognition showed no relationship; gammas between RCJs and recognition showed better resolution. That JOLs were unaffected by our manipulations, while recognition was affected by font size, runs counter to prior research where the opposite pattern has typically been found. Similar recognition
and RCJ patterns were observed for all three stimuli types, suggesting the meaningfulness of the stimuli was irrelevant. Email: Jodi Price, jodi.price@uh.edu

(1088)
Revisiting the Past to Predict the Future: A Comparison of Different Judgment Types for Predicting Future Recall.

ALISON ROBEY, University of Maryland, College Park, TOBY HAMOVITZ, DANIEL BUTTACCI0, and MICHAEL DOUGHERTY, University of Maryland (Sponsored by Michael Dougherty). — Previous research suggests that different types of confidence judgments made after retrieval assess memory differently, and differ both in terms of their ability to predict memory performance and in terms of their effects on actual retrieval accuracy (Dougherty et al., 2005). Specifically, when comparing retrospective confidence judgments (RCJ's, judgments about the past), judgments of learning (JOLs, judgments about the future), and a no judgment condition, Dougherty et al. (2005), found that although RCJ's were more predictive of both past and future retrieval, participants who made JOLs had better overall retrieval accuracy. The present study aimed to replicate these findings and explore a potential mechanism for the increased accuracy after making JOLs. Differences between RCJ's and JOLs in predicting recall performance were replicated (BF10 = 4.6); RCJs > JOLs), however retrieval accuracy did not vary as a function of judgment type (BF10 = 0.07). Email: Alison Robey, alisonrobey@gmail.com

(1089)
Effects of Item Order on Metacognitive Evaluations of Recognition Performance.

ABIGAIL JACKSON and ROBERT GREENE, Case Western Reserve University (Sponsored by Robert Greene). — Previous research has demonstrated a retrospective memory bias on metacognitive judgments in which participants rate their performance on tests of general knowledge more optimistically when easier test questions precede difficult questions than when difficult questions come first. In the present experiments, we extended this line of research to recognition memory by using repetition to manipulate difficulty. The finding that participants' estimates of performance was higher when easy items were tested first was replicated in episodic item recognition. However, a reversal of the effect was found in episodic associative recognition, where performance estimates were higher for tests on which difficult items preceded easier items. Specific recollections, if required on the test and available at the time of metacognitive judgment, will have a greater impact on test performance perception than early impressions. Email: Abigail Jackson, axj48@case.edu

(1090)
Predicting the Memory Performance of Others.

JONATHAN TULLIS, Indiana University, SCOTT H. FRAUNDORF, University of Pittsburgh. — Successful teaching, effective negotiations, and maintaining relationships depend upon accurately anticipating what others will remember. Across 3 experiments, we tested how precisely learners judge the mnemonic effectiveness of cues for supporting others' episodic memories. Learners either generated cue-target word pairs and made judgments of learning (JOLs) for others' memories or studied the pairs and made JOLs for themselves. Learners' JOLs for others were accurate, but less accurate than learners' JOLs for themselves. Further, learners' JOLs for others were influenced by different stimulus characteristics than learners' JOLs for themselves. For example, JOLs for others were influenced by how long it took the generator to create the cue, but cue generation time was unrelated to others' self predictions and eventual recall. While privileged access to idiosyncratic mnemonic experiences can improve the accuracy of metacognitive predictions for oneself, learners do not completely disregard uninformative idiosyncratic mnemonic experiences when judging cues for others. Email: Scott H. Fraundorf, scottfraundorf@gmail.com

(1091)
Font Formatting Affects JOLs for Pairs but not Definitions.

DEBBIE A. MAGREEHAN and MICHAEL SERRA, Texas Tech University (Sponsored by Michael Serra). — Manipulations of font formatting (font size; font clarity) can affect learners' judgments of learning (JOLs) for learning materials. For example, learners assign higher JOLs to information presented in a larger font compared to a smaller font even though font size does not affect memory. Research also suggests that it is not people's subjective experience of processing fluency that affects their JOLs, but rather their explicit beliefs about it. Although informative, most studies to date have used less realistic materials (word pairs) or strong manipulations of perceptual fluency (extreme font formatting differences) to examine such questions. In the present experiments, we replicated past effects of font formatting and people's beliefs about font formatting on their JOLs for word pairs, but we failed to find similar effects for definitions. Presumably, the intrinsic (and varied) difficulty of the definitions overrode people's beliefs about font formatting when judging their learning for those definitions. Email: Debbie A. Magreehan, debbie.magreehan@ttu.edu

(1092)

MICHAEL MUELLER and JOHN DUNLOSKY, Kent State University (Sponsored by John Dunlosky). — When people are asked to judge their future memory performance, they likely search for clues – including those that reveal differences in processing fluency – that will help them reduce their uncertainty in how well they will remember each pair. A critical prediction is that if people believe a cue will impact fluency, then they also will predict that the cue will influence memory, even when it does not impact either. To test this prediction, participants made predictions of future memory performance for words presented in different colors (blue or green), because color would not impact processing fluency. Some participants were led to believe that one color was easier to process than another, but nothing was mentioned about whether color was related to memory. People's judgments were significantly higher for the color that
had been associated with more fluent processing. Thus, beliefs about fluency being active for a cue can impact judgments.

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(1093)  Hey, Students—Say No To Slides! Taking Longhand Notes During Lectures Leads to Better Retention Than Annotating Lecture Slides. KATIE ALICE CORIA and PHILIP HIGHAM, University of Southampton (Sponsored by Philip Higham). — Modern technology means that most university students have access to printed lecture slides to annotate during classes which is replacing the once necessary practice of longhand note taking. What impact has this had? Some research suggests that printed slides enhance learning, but that result may derive mostly from slides acting as a revision aid. If encoding is considered in isolation, making notes is seemingly a “desirably difficult”, generative, retrieval-based task that should enhance memory. In this study, students viewed two lectures, one presented fluently and the other presented disfluently, whilst either annotating printed slides, taking notes for themselves, taking notes for others or passively observing. No notes/annotations were permitted as revision aids. At immediate and delayed test, both note-taking groups outperformed the observation and annotation groups and annotation provided no benefit over observation. At delayed test, the annotation group was particularly prone to forgetting material from the disfluent lecture, whereas the note-taking groups were not. These results suggest that note-taking is not only good for memory in the short term, but may aid retention of poorly-presented lectures over time.

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(1095)  Comparing Discrepancy-Reduction and Region of Proximal Learning in Computer-Assisted Learning. FRANCESCA R. ORTEGREN and MICHAEL SERRA, Texas Tech University (Sponsored by Kenneth G. DeMarre). — The discrepancy-reduction (DR) model of learning suggests that learners spend more time studying unknown information, whereas the region-of-proximal learning (RPL) framework posits that learners focus on almost-known information. Conditions of the task and the materials often determine the route learners prefer, but we do not currently know how students allocate their restudy time when learning from text materials or under conditions where restudy decisions are aided by a computer program. In the present experiment, participants read a text, answered practice-test questions, and either chose paragraphs for restudy (learner-controlled group) or were guided by the computer to restudy paragraphs that corresponded to unknown (DR-controlled group) or almost-known (RPL-controlled group) information. All participants then studied a second text controlling their own restudy as they saw fit. Results indicate that learners do not restudy only unknown information, but incorporate their confidence in practice-test answers into restudy decisions.

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(1096)  The Effect of Specific Learning Goals on Metamemorial Control in Older Adults. MEENEY LEE and AYANNA THOMAS, Tufts University, JOHN BULEVICH, Stockton College. — In the present study, we tested the hypothesis that providing external support could reduce metamemorial control deficits in older adults. In two experiments older and younger participants answered general knowledge questions and then were given the opportunity to study questions with accompanying answers. In Experiment 1, item difficulty and time to study were manipulated. In Experiment 2, point values were assigned to specific general knowledge topics. Results suggest that even when given the same goals, older and younger adults differ on how they control study: When time was limited, older adults learned difficult items to the same extent as young adults; however, older adults did it at the cost of easier items. Additionally, young adults strategically learned more items with higher point values than those with lower values, whereas older adults did not. The results suggest that older adults may set different internal goals to learn general knowledge.

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(1097)  Is Cognitive Functioning Important for Quality in Aging? A Five Year Follow-Up Study of Older Adults. MICHAEL RÖNNLUND and MARKUS NYSTROM, Umeå University. — A previous cross-sectional study, based on a large scale memory data base (the Betula study), indicated that subjective experiences of memory play a more important role for the individual’s experience of well-being and happiness, than more traditional objective measures of cognitive status (Nyström, Eriksson Sörman, & Nilsson, 2014). The present study is a longitudinal five year follow-up. The same factors as in the first study were controlled for (e.g., physical health, psycho-social aspects). The results indicated that the objective measures, at baseline, did not predict future happiness or well-being. The same was evident for the subjective measures, which contradicted the cross-sectional study. Further, the longitudinal changes in both (i.e., subjective and objective) memory measures were not associated with changes in happiness or well-being. To advance the understanding of factors relevant to the experience of happiness and well-being in elderly, the field would benefit from studies using complementary subjective cognitive measures, measures for subjective experiences of memory in longitudinal studies.

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(1098)  Mechanisms of Feeling of Knowing in Patients With Schizophrenia. ELISABETH BACON, Inserm, BENNETT LOWELL SCHWARTZ, Florida International University, MATHIEU PILLOT, Inserm. — Memory and awareness impairments are core symptoms of schizophrenia. In the current study, we investigate metamemory in schizophrenia, in particular, the feeling of knowing (FOK). FOK predicts the likelihood of recognizing currently unrepeated items. In healthy participants, FOK relies on the quantity of retrieved target-related information (Brewer et al., 2010; Koriat, 1993, 1995). Our study assessed the effect of retrieved
target-related information on FOKs in schizophrenia by controlling the amount of potentially-retrievable contextual information presented to patients. We varied the amount of contextual information accompanying drawings of imaginary animals. There were three information conditions: minimum (name and image), medium (name, image, and country), and maximum (name, image, country, diet and weight). Information condition did not affect recall accuracy. FOK increased with the retrieval of partial and contextual information, similar to the pattern seen in healthy adults. In spite of well-documented memory deficits in schizophrenia, patients showed normal patterns of FOK.

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Metacognitive Aptitude in ASD: Moving Beyond a Deficit Model. DAVID IAN DONALDSON and CATHERINE MARIE PEMBLE, University of Stirling. — A wealth of evidence links Autism Spectrum Disorders (ASDs) with poor performance on tests of Executive Function (EF) and Theory of Mind (ToM). In the wider cognitive literature, EF and ToM have both been linked with Metacognition (thinking about thinking), yet little is known about the metacognitive capacity of those with an ASD. Here we compare 14 adults with ASD, with 15 neurotypical controls, on measures of ToM (RME), EF (D-KEFS), Autism (AQ), IQ (WASI) and Metacognition (MCQ-30; adapted for linguistic difficulty). Our results indicate that not only is Metacognition unimpaired in ASD, but that adults with ASD demonstrate a distinct metacognitive profile, featuring a negative relationship between ToM and Metacognition. Given that this 'metacognitive boost' exists despite the presence of the expected deficits in ToM, EF and Verbal IQ, we suggest that theories of ASD must seek to account for both positive and negative aspects of the disorder.

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Patient History Questionnaires: Does Timing Affect Learning? BENJAMIN DAVID ENGLAND, University of California, Los Angeles. — A human learning and instruction model (H-LIM) is applied only when the transformation is present. The development of an internal model of a tool and its relationship to health behaviors (e.g., medication adherence and behavioral management) has grown, because it is the first one that can be directly intervened on. As such, identifying the educational practices that affect learning of medically relevant materials is important. Typically patients are educated and diagnosed in the same setting, which may alter learning: thinking about one's medical diagnoses before learning could act as a learning cue or alternatively cause distress that impairs learning. In the present experiment, participants studied general information and management/prevention strategies about, judged their learning for, and answered test questions for six different physical and mental health diagnoses (e.g., diabetes, skin cancer). Additionally, they completed an abbreviated patient history questionnaire either before or after studying and testing over the materials. Participants who completed patient history first performed higher than those who answered the history after encountering the study and testing materials.

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HUMAN LEARNING AND INSTRUCTION I

An Individual Differences Approach to Explicit and Implicit Processes in Sensorimotor Learning. MATHIAS HEGELE, University of Giessen, HERBERT HEUER, Bielefeld University. — Sensorimotor learning embraces implicit and explicit components. We contrast this two-component model with a three-component model by means of an individual-differences approach. Adaptive changes were tested under four conditions: (1) closed-loop test, presence of the rotation cued (initial adaptive shift), (2) open-loop test, presence of the rotation cued (adaptive shift), (3) open-loop test, absence of the rotation cued (after-effect), (4) test of explicit knowledge (explicit shift). After-effects and explicit shifts were uncorrelated. After regression on after-effects and explicit shifts, the residuals of the initial adaptive shifts and the adaptive shifts remained correlated, suggesting an additional implicit component of adaptation found only in the cued presence of the visuo-motor rotation. The two implicit components are consistent with the distinction between a change of the body schema giving rise to after-effects, and the development of an internal model of a tool that is applied only when the transformation is present.

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On The Benefits of Generating Anticipatory Errors: Is Semantic Activation a Necessary Condition? COURTNEY CLARK, ELIZABETH LIGON BJORK, and ROBERT ALLEN BJORK, University of California, Los Angeles. — Surprisingly, when participants are asked to study weakly associated cue-target word pairs, subsequent cued recall of targets is enhanced if participants try to predict what associate is to be learned for a given cue, even when those predictions are wrong (Kornell, Hays, & Bjork, 2009). No such benefits accrue for unrelated word pairs, however (e.g., Huelsner & Metcalfe, 2012), suggesting that pre-existing semantic relationships must be activated to see benefits of “errorful generation.” Recently, however, Potts and Shanks (2014) demonstrated such benefits using ostensibly unrelated pairs (e.g., obscure English words and one-word definitions, such as hispid–bristly), and hypothesized that the absence of errorful-generation benefits with unrelated pairs reflects subsequent interference from guesses made to familiar cues, whereas obscure words do not create meaningful interfering guesses. In our experiments, we tested this conjecture by using multiple-choice and backwards test formats to mitigate the role of such possible guess-interference at test.

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(1103)
**The Role of Retrieval Practice and Segmentation in Electronic Learning Environments.** WILLIAM BARRETT HUFFMAN, *University of Oklahoma,* SOWON HAHN, *Seoul National University* (Sponsored by Sowon Hahn). — A simulated online learning environment was developed to investigate the impact of retrieval practice and segmentation utilizing multimedia instruction. Using introductory level statistics material, participants were assigned to one of six learning conditions (2 segmentation types x 3 question types). During the initial learning period, participants viewed an instructional video and answered questions in different formats (open ended, multiple choice, or multiple evaluation) over the material either every two minutes or at the end of the session. After a 24-hour delay, it was found that all question types had a positive benefit on learning compared to a control group that received no questions during the initial learning phase. The two segmentation types did not yield a statistical difference, although individuals in the two minute-segmentation condition showed slightly higher scores. The present study demonstrated that retrieval practice is beneficial for long-term memory retention in an online learning environment. Email: William Barrett Huffman, WHuffman@ou.edu

(1104)
**Adding Instructional Supports to Train Transferable Skills with Games.** CELESTE PILEGARD and RICHARD MAYER, *University of California, Santa Barbara* (Sponsored by Richard Mayer). — Previous research has shown that Tetris experts are significantly better than non-experts at mentally rotating Tetris shapes, but nothing else (Sims & Mayer, 2002). The current experiment added lessons and worksheets focusing on problem-solving strategies in Tetris intended to facilitate the transfer of spatial skills trained in Tetris to non-Tetris cognitive tests. This manipulation was intended to keep Tetris players in the declarative stage of skill acquisition longer in order to facilitate the transfer of cognitive skills used in-game to non-game contexts. The experimental group started each of four Tetris training sessions with a Tetris problem-solving lesson and worksheet, then played Tetris for the rest of an hour. The control group played the game only. All groups took pre-training and post-training tests of mental rotation, visualization, spatial working memory, perceptual speed, and perceptual attention. This study takes a value-added approach to understanding how to train transferable spatial skills with games. Email: Celeste Pilegargard, pilegargard@psych.ucsb.edu

(1105)
**The Effects of Testing and Re-reading on Levels of Memory Representation.** KATHLEEN LARSON, *University of Nevada, Las Vegas,* NICOLE BIES-HERNANDEZ, *Northern Arizona University,* DAVID COPELAND, *University of Nevada, Las Vegas.* — We conducted two experiments to explore how practice testing and re-reading affect the levels of memory representation in text. In both experiments, people first read stories and then practiced (once or three times) by re-reading the stories or completing a free recall test. Afterward, they completed a final recognition memory test immediately or after a two day delay. This test used a signal detection analysis procedure developed by Schmalhofer and Glavanov (1986) to probe how much people rely on the surface, textbase, and situation model representations. Regardless of whether the final memory test was immediate or delayed, the results showed that there was more reliance on the surface and textbase levels for the re-reading than the testing condition; the results were mixed at the situation model level. This suggests that the type of practice to be recommended may depend on what level of representation is important. Email: David Copeland, david.copeland@unlv.edu

(1106)
**The Buy-One-Get-(Almost)-One-Free Effect of Learning Simplified Chinese Characters.** JENN-YEU CHEN and SU-CHING LIN, *National Taiwan Normal University.* — To address the issue of whether foreign learners of Chinese should be taught the simplified or the traditional forms of characters, a set of simplified Chinese characters selected from the Hanyu Shuiping Kaoshi (HSK) guideline and different in appearance from their traditional forms (k=998) were presented, one by one in isolation, for recognition to a group of senior high school students (n=261) in Taiwan who had learned the Chinese characters in their traditional forms. The results show an overall accuracy rate of 83%, with 33% of the simplified characters being 100% recognizable. In a follow-up study, the same set of characters in their traditional forms were presented for recognition to a group of senior high school students (n=64) in Mainland China who had studied the characters in their simplified forms. The results show an overall accuracy rate of 92%, with 71% of the traditional characters being 100% recognizable. The results suggest that the traditional characters contain more clues for recognition and that it might be more practical for foreign learners of Chinese to learn the simplified, instead of the traditional, characters to take advantage of the buy-one-get-(almost)-one-free effect. Email: Jenn-Yeu Chen, psyjyc@ntnu.edu.tw

(1107)
**The Effect of Cue Type on Word Form Recall in First-Language Vocabulary Learning.** NICHOLE RUNGE, MITCHELL SOMMERS, and JOE BARCROFT, *Washington University in St. Louis,* (Sponsored by Mitchell Sommers). — The present research was conducted to extend predictions of the TOPRA model (Barcroft, 2002) regarding input variability and second-language learning to novel first-language vocabulary learning. During the learning phase, low-frequency English words were shown with their definitions six times each. In the constant condition, the definition was the same definition at each of the six exposures, whereas in the variable condition, a different (but synonymous) definition variant was used at each exposure. Earlier work has found benefits of variable input for word form recall when participants are cued with a novel definition (Runge, Sommers, & Barcroft, 2014). Current research demonstrated that this was true for older adults, despite well-documented associative deficits. When the cue was a definition variant that was seen during
the learning phase, we found no effect of input variability on word form recall for either younger or older adults. Email: Nichole Runge, nrunge@gmail.com

(1108)
The Best Way to Learn Foreign Language Vocabulary: The Washington University Entry for the Memrise Prize. WALTER BERNARD REILLY, TOSHIYA MIYATSU, CAROLINA E. KÜPPER-TETZEL, and KHUYEN NGUYEN, Washington University at St. Louis, SHARDA UMANATH, Claremont McKenna College, JI HAE LEE, and MARK MCDANIEL, Washington University at St. Louis (Sponsored by Mark McDaniel). — This poster will present the method developed by one of the five finalist teams for the Memrise Prize (http://www.memrise.com/prize/), an international contest to develop the best protocol for learning foreign language vocabulary. Our protocol, capitalizing on research on the keyword method (e.g., McDaniel & Pressley, 1984), retrieval practice (e.g., Karpicke & Roediger, 2007), spacing (e.g., Dempster, 1987), and the restorative power of nature (e.g., Betro, 2005), was compared to the control group in which participants studied the word pairs repeatedly for an hour. After a one-week delay, participants in our theory-based protocol were able to recall on average the English translation of nearly half the 80 Lithuanian words they studied. By contrast, about a quarter of control group failed to recall even 5 words (d = .79). The details on how the memory-enhancing techniques were implemented in our protocol as well as its theoretical justification will be discussed. Email: Toshiya Miyatsu, toshiya.miyatsu@gmail.com

(1109)
Undermining Student Behavior: Differences in Choice and Learning. HILLARY S. WEHE and CAROL SEGER, Colorado State University. — Rewards can have a detrimental impact on students’ motivation to engage in learning tasks, affecting their study choices and consequent test performance. We tested the hypothesis that rewards will have no effect on short-term test performance, but will affect choice of whether to voluntarily spend time studying, and ultimately affect long-term test performance. Participants studied a set of Swahili-English word pairs. Half were offered a reward based on test performance and half were not. After the initial study phase, subjects were permitted to continue studying the words during two optional study periods: once the initial study phase, subjects were permitted to continue

(1110)
Building a Better Reader: Enhancing Foundational Knowledge. KATHLEEN ARNOLD and ELIZABETH MARSH, Duke University. — Reading comprehension is highly related to academic success. Prior research has shown that the amount of knowledge a reader has on a subject (e.g., biology) is indicative of how well they can comprehend a passage related to that area (Cromley, Snyder-Hill, & Luciw-Dubas, 2010). In a series of experiments, we investigated ways to improve prior knowledge to enhance subsequent reading comprehension. That is, prior to reading a complex science passage, we enhanced participants’ foundational knowledge through study or retrieval practice. When this intervention occurred immediately prior to reading the passage, comprehension failed to improve despite gains in foundational knowledge. However, when a delay was introduced between the intervention and the passage, reading comprehension was enhanced. These results suggest that presenting foundational knowledge immediately prior to reading may distract readers such that they focus on these basic concepts at the expense of the more complex information. Email: Kathleen Arnold, kathleen.arnold@duke.edu

(1111)
What Makes Generation a Desirable Difficulty? Comparison of Two Appropriate Processing Frameworks. DAVID B. BELLINGER and MARCI S. DECARO, University of Louisville. — Self-generating to-be-learned information is more difficult than just reading, but it aids memory (a “desirable difficulty”). The mnemonic benefit of generating has been separately attributed to material appropriate processing (MAP) and transfer appropriate processing (TAP). MAP occurs when the encoding task requires processing that is complementary, and not redundant, with that afforded by the learning material. TAP occurs when the processing induced by the encoding task matches the test. If examined simultaneously, will MAP and TAP differentially benefit learning? We manipulated MAP and TAP by crossing the learning material, encoding task, and type of questions required by the test. Relative to TAP, MAP led to higher memory test scores. With MAP, processing of either the encoding task or learning material matches that induced by the encoding task matches the test. If examined simultaneously, will MAP and TAP differentially benefit learning? We manipulated MAP and TAP by crossing the learning material, encoding task, and type of questions on immediate cued recall tests. Relative to TAP, MAP led to higher memory test scores. With MAP, processing of either the encoding task or learning material matches that required by the test. Thus, by completing a generation task that complements the learning materials, learners may benefit from both MAP and a different form of TAP. Email: Marci S. DeCaro, marci.decaro@louisville.edu

(1112)
How Is the Mnemonic Benefit of Retrieval Practice Affected by Dividing Attention? JOSH WHIFFEN and JEFFREY D. KARPICKE, Purdue University (Sponsored by Darryl W. Schneider). — A great deal of research has shown that dividing attention during encoding has a detrimental effect on learning. Similarly, retrieval appears to be negatively affected by dividing attention, though not to the same extent as encoding. However, until recently, most research had not explored how dividing attention during retrieval affects the mnemonic benefit of retrieval (i.e., retrieval practice).
The current set of experiments sought to investigate this question by manipulating whether subjects’ attention was divided or not during initial cued recall. Then, following a brief delay, subjects free recalled the words they had studied. The results indicated that, as expected, practicing retrieval under full attention was better than retrieving under divided attention, however, a closer look revealed that the benefit of retrieval was unaffected by dividing attention. In other words, if an item was correctly retrieved during initial recall the mnemonic benefit of having retrieved that item was the same regardless of whether attention was divided. Email: Josh Whiffen, jwhiffen11@gmail.com

Spatial Learning Strategies for Understanding a Scientific Text. LOGAN FIORELLA and RICHARD MAYER, University of California, Santa Barbara. — This study investigated the relationship between spatial ability, the use of spatial learning strategies, and learning from a scientific text. After completing two measures of spatial ability, students studied and took notes on a scientific text about the human respiratory system, and then completed retention, transfer, and drawing tests on the material. Students’ notes for each section of the lesson were coded based on one of five strategies: words only, list, outline, map, or diagram. Regression analyses indicated that spatial ability and use of high-spatial strategies (creating maps or diagrams) significantly predicted learning outcomes, with spatial strategy use explaining additional variance beyond spatial ability. Further, strategy use did not mediate the relationship between spatial ability and learning, suggesting that there may be two distinct paths—ability-based and strategy-based—for learning from a scientific text. Email: Logan Fiorella, fiorella@psych.ucsb.edu

How to Get the Point: Spatial Language Interacts With Gesture in Learning Topographic Maps. STEVEN M. WEISBERG, University of Pennsylvania, KINNARI ATT, Johns Hopkins University, NORA S. NEWCOMBE and THOMAS F. SHIPLEY, Temple University. — Spatial information can be conveyed using maps, gestures, and/or spatial language. Each method has advantages and weaknesses. In this study, we examined participants’ learning from topographic maps when point-and-trace gestures always highlighted the contour information on the maps, but the accompanying spatial language varied subtily. Key phrases focused either on visualizing the contour lines and imagining the terrain in 3D (Visualizing condition), or on analyzing the contour lines to determine how specific numerical values of elevation change (Analyzing condition). Tested on novel maps, participants differentially succeeded on test items requiring either visualizing shapes or analyzing elevation. Results augment our understanding of how communication modalities work together and how spatial information can best be conveyed. Email: Steven M. Weisberg, swweis@mail.med.upenn.edu

Building Mnemonics: A Technique for Remembering Architectural Styles. RUSSELL N. CARNEY, Missouri State University, JOEL R. LEVIN, University of Arizona, ALEXANDRIA C. BAIN, BAILEY J. MILL, ANDREW C. SCHNEIDER, REBECCA E. ALLINDER, SOPHIA R. PURSA, and KRISTIAN P. GILLILAND, Missouri State University. — Beyond its name-sake application, the face-name mnemonic (e.g., McCarty, 1980) has been successfully applied to the learning of artists and their paintings — the kind of task students face in courses such as art appreciation (e.g., Carney & Levin, 2003). The current study extended these findings by applying the technique to somewhat different content: buildings and their architectural styles. We randomly assigned students to one of three conditions: own best method, full mnemonic (name clues + described interactive images), and partial mnemonic (name clues + instructions to generate interactive images). After a brief introduction to their respective strategies, and paced study over 24 photos of buildings paired with their distinct architectural styles, students were administered a matching test (i.e., match style name with photo of building). Students in the two mnemonic conditions statistically outperformed students in the own best method condition on the matching test, both on Day 1 and after a 2-day delay. Our findings illustrate the versatility of the face-name mnemonic with regard to paired-associate tasks that involve a visual stimulus prompting a verbal response. Email: Russell N. Carney, russellcarney@missouristate.edu

Cognitive and Dispositional Predictors of Learning and Transfer. GILLIAN DALE and C. SHAWN GREEN, University of Wisconsin-Madison. — Nearly all humans show improvements on extensively practiced tasks, but benefits of this training are often not transferred to new tasks. Although there is work examining the characteristics of training tasks that produce either task-specific or task-general learning outcomes, there is little work examining the characteristics of individuals who show more or less specific learning. As such, the purpose of the current study was to identify individual predictors of both learning rate and transfer. Participants completed a predictor battery of cognitive tasks and dispositional measures, and then trained on four different tasks that tapped into perceptual, memory, motor coordination, and speed detection processes. Following training, they completed transfer versions of each training task. Individual differences on several dispositional and cognitive measures were predictive of overall learning rate and transfer, demonstrating that learning, and the ability to transfer learned information to a new task, is modulated by individual differences. Email: Gillian Dale, gdale2@wisc.edu
COGNITIVE CONTROL I

Automatic Stopping When Distracted. MAISY BEST (Graduate Travel Award Recipient), TOBIAS STEVENS, IAN P.L. MCLAREN, and *FREDERICK VERBRUGGEN, University of Exeter (Sponsored by Frederick Verbruggen). — Our previous work suggests that response inhibition can be triggered automatically via the retrieval of stimulus-stop associations from memory (Verbruggen & Logan, 2008). However, stop-signal training could also induce strategic changes in performance, as participants could learn to control their responses in anticipation of stop-signal presentation (proactive control). In two experiments, we investigated whether stimulus-specific stop training resulted in a shift from top-down control to bottom-up control (automatic inhibition), or a shift from top-down reactive control to top-down proactive control. When the stimulus-stop mappings were implicit (uninstructed), stimulus-stop learning did not interact with measures of proactive control. However, when the stimulus-stop mappings were explicit (instructed), we found evidence of training-induced strategic proactive control adjustments. We conclude that response inhibition can become an “automatic” bottom-up act of control, but that shifts in proactive control will play a role when the mappings are known. Email: Maisy Best, mjb246@exeter.ac.uk

Stimulus Specific Inhibitory Control Training Reduces Risky Bets During Gambling. WILLIAM A. BOWDITCH, *FREDERICK VERBRUGGEN, and I.P.L. MCLAREN, University of Exeter (Sponsored by I.P.L. McLaren). — Decision-making when gambling is thought to reflect an interaction between an automatic system and a control system that suppresses desirable yet risky choices. Indeed, tasks that require subjects to engage inhibitory control before or during gambling can reduce overall risk-taking. Furthermore, previous research has demonstrated that, after sufficient training, inhibitory control can become somewhat automatized: stimuli previously paired with the requirement to stop result in slower reaction times on trials that demand a response and in reduced commission errors on stop trials. However, to date, researchers have not yet considered how stimulus-specific stop training might transfer to risky decision-making. Here, we present evidence that stimulus-stop associations acquired in a stop-signal task stimulate safer bets in a later gambling task, but only for a relatively brief period. Email: William A. Bowditch, wb221@exeter.ac.uk

Reward History Leads to Prior Entry: Evidence From Temporal Order Judgements. JASON RAJSIC, HARENDRI PERERA, and JAY PRATT, University of Toronto. — Converging evidence shows that stimuli that have been associated with high rewards are selectively attended over stimuli that are associated with low rewards. If such high reward stimuli are preferentially attended, then high-reward stimuli should receive prioritized processing by the visual system and should be perceived as occurring earlier in time than low-reward stimuli. To test this hypothesis, we conducted two experiments. In the first experiment, we replicated the standard finding that high-reward stimuli are identified more quickly in a visual search task than low-reward stimuli, showing that our reward associated stimuli captured attention. In our second experiment, we presented the high and low reward stimuli in an adapted temporal order judgment task to determine if high-reward stimuli are perceived as occurring earlier than low-reward stimuli. Confiming our hypothesis, we founded a significant prior entry effect for high-reward stimuli, indicating that high-reward stimuli are prioritized in visual processing. Email: Jay Pratt, pratt@psych.utoronto.ca

Age Similarities in Cognitive Effort During Voluntary Emotion Regulation. MARIA J. DONALDSON and ERIC ALLARD, Cleveland State University (Sponsored by Naohide Yamamoto). — Older adults report employing cognitively demanding strategies, such as reappraisal, more frequently than younger adults. However, recent evidence has questioned the efficacy of such strategies in old age. To examine whether older adults are actually more encumbered by cognitive constraints during reappraisal, the present study examined cognitive effort during the execution of explicit emotion regulation tasks using blink rates during emotional video clip viewing. Younger and older adults viewed these clips (positive, negative, and neutral) in selective attention, reappraisal, and free viewing control conditions. Results showed a main effect of strategy, whereby both younger and older adults demonstrated higher blink rates during reappraisal relative to selective attention and passive viewing. These results suggest that while reappraisal was likely the more effortful regulatory strategy, exerted effort did not seem to differ between younger and older adults. We discuss these findings in terms of adaptive emotion regulation processes in old age. Email: Maria J Donaldson, m.j.donaldson@vikes.csuohio.edu

Switching Attention Between Hierarchic Auditory Stimulus Levels. SOPHIE NOLDEN and IRING KOCH, RWTH Aachen University. — We investigated intentional attention switches between hierarchic stimulus levels of the same auditory object. Tone sequences with 3 repetitive short patterns (local level) were combined to a long pattern (global level). The patterns could be either rising or falling, independently for each level. After a cue specifying the relevant stimulus level, participants indicated if the respective pattern was rising or falling. Participants made fewer errors when attending to the long pattern. They responded more slowly when switching from the long pattern to the short pattern, but not when switching from the short to the long pattern. Participants responded more slowly and with more errors in incongruent trials, especially when switching from the long to the short pattern. This study extends previous studies on intentional auditory attention switches and provides further evidence for distinct processing patterns between local and global temporal ranges in auditory sequences. Email: Sophie Nolden, sophie.nolden@psych.rwth-aachen.de
A great deal of research has sought to better understand this effect, including delineating its parameters and examining other aspects of the effect. However, all of this work has used visual stimuli, which leaves unanswered whether this effect is specific to that modality or whether it is a more general effect. The current work investigated whether the distractor devaluation effect generalizes to sound. In two experiments, participants performed an auditory attention task (e.g., a dichotic listening task, in which participants reported the ear to which a pre-defined target was presented). Next, participants rated the “cheeriness” of the target or the distractor sound. Of interest was whether a distractor devaluation effect would be observed for sound. The implication of the results are discussed with respect to theories of the distractor devaluation effect.

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Contextual Control of Attentional Sampling: Exploring the Role of Volition. NICHOLAUS P. BROSOWSKY, The Graduate Center, City University of New York, MATTHEW CRUMP, Brooklyn College, CUNY. — Contextual properties of the environment, through learning and memory processes, can rapidly and involuntarily adjust attentional control. Contextual properties of the current work will explore the obligatory nature of contextual cueing, specifically examining the role of volition in acquiring context-dependent attentional control in a bi-dimensional (colors vs. letters) stimulus sampling task. Subjects viewed briefly presented arrays of letters and colors presented above or below fixation, and identified specific stimuli given a task-cue associated to each location. Experiments 1 and 2 showed no contextual control over priority for sampling either dimension. Experiment 3 showed context-dependent prioritization when participants were instructed to voluntarily deploy different sampling strategies between contexts. Experiment 4 showed that context-specific sampling strategies also depend partly on non-voluntary learning processes.

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Mindfulness meditation often involves monitoring one’s ongoing thoughts and returning them to the present moment when they wander. Mindfulness meditation training (MMT) has been linked to cognitive benefits, including improved working memory and text comprehension, through increased attention control. The current study provided a stringent test that MMT impacts attention-monitoring processes by comparing two active meditation groups. One received only relaxation meditation training (RMT), and the other also received mindfulness instructions. Sustained attention, text comprehension, and working memory served as outcome measures. Consistent with the attention control account, only the MMT group reported significantly reduced mind-wandering during the sustained attention task. While both groups reported similar reductions in mind-wandering during text comprehension, MMT participants were less influenced by anxiety at post-test than RMT participants. No relations between training and working memory or reading comprehension accuracy were found. Results are discussed with respect to how specific task demands may determine the influence of mindfulness on cognition.

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Diversity of Cognitive Performance Among Static, Strategic and Interceptive Sport Expertise. ERIK CHIH-HUNG CHANG, ZAI-FU YAO, YEN-MING LIANG, and KUAN-JIIN CHEN, National Central University, YU-HUI CHIU, Taipei College of Maritime Technology. — Recent evidence demonstrated that athletes of interceptive sports excel at cognitive tasks requiring processing speed and varied attention, which begs the question how athletes' cognitive functions are modulated by different types of sport experiences. This study aims to compare cognitive profiles among different types of athletes from a cognitive component skills approach. Participants specialized in static sport (swimmers), interceptive sport (fencers), or strategic sport (basketball players) were assessed with a cognitive battery consisting of tasks examining executive control, iconic memory, and varied attention. Between-group comparisons showed that basketball players had superior speed on inhibitory control and iconic memory. Furthermore, principle component analyses on RTs and accuracies of these tasks for each group, respectively, revealed both overlapping and unique cognitive components for each group of athletes. To conclude, intensive training in distinct sports experience could render idiosyncratic cognitive profiles in athletes specialized in sports emphasizing different component-skills.

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Attention Monitoring During Mindfulness Training Reduces Mind-Wandering and Increases Stress Resilience. ALEXA R. ROMBERG, HENK HAARMANN, STEFANIE E. KUCHINSKY, VALERIE P. KARUZIS, and NICHOLAS B. PANDZA, University of Maryland, NICHOLAS S. DAVEY, Washington State University, PATRICK J. CUSHEN, Murray State University. — Mindfulness meditation often involves monitoring one's ongoing thoughts and returning them to the present moment when they wander. Mindfulness meditation training (MMT) has been linked to cognitive benefits, including improved working memory and text comprehension, through increased attention control. The current study provided a stringent test that MMT impacts attention-monitoring processes by comparing two active meditation groups. One received only relaxation meditation training (RMT), and the other also received mindfulness instructions. Sustained attention, text comprehension, and working memory served as outcome measures. Consistent with the attention control account, only the MMT group reported significantly reduced mind-wandering during the sustained attention task. While both groups reported similar reductions in mind-wandering during text comprehension, MMT participants were less influenced by anxiety at post-test than RMT participants. No relations between training and working memory or reading comprehension accuracy were found. Results are discussed with respect to how specific task demands may determine the influence of mindfulness on cognition.

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To Exploit or Explore? Using Pupillometry to Track Norepinephrine Activity in Adults With ADHD Symptoms. REBECCA NICOLE ELISA and BEN PARRIS, Bournemouth University (Sponsored by Brendan Stuart Weekes). — Recent work has suggested that changes in pupil diameter relate directly to changes in locus-coeruleus norepinephrine (LC-NE) system activity (Rajkowsi, Kubiak, & Aston-Jones, 1993). There are two modes of LC-NE firing, each represented by different pupillary responses that promote either task engagement and exploitation (LC phasic mode), or task disengagement in favour of exploration (LC tonic mode). Attention deficit hyperactivity disorder (ADHD) is thought to be related to dysfunctional norepinephrine...
modulation. The present research investigates differences in LC-NE activity between participants with ADHD symptoms, and controls. Pupil diameter is tracked during a task that gives participants the opportunity to behaviourally disengage when the utility of continuing is diminished. It is predicted that participants with ADHD symptoms will show a tendency towards pupillary responses representing LC tonic mode. This favours exploration should be reflected behaviourally by disengagement from trial blocks. Preliminary analysis on initial data indicates support for hypotheses. Email: Rebecca Nicole Elisa, relisa@bournemouth.ac.uk

(1127) Threat of Shock Enhances Response Inhibition While Impairing Visual Discrimination. JONG MOON CHOI and YANG SEOK CHO, Korea University (Sponsored by Gregory Francis). — In current study, we investigated how threat anticipation influences response inhibition by employing a stop-signal task. Twenty-five participants were instructed to discriminate the shape of target stimulus (circle or rectangle) by pressing a button as quickly and accurately as possible while withholding their response when the target shape was filled with red color (stop-signal). The experiment was divided into six blocks. At the beginning of each block, a visual cue was presented to inform participants whether or not they might receive a mild electric-shock randomly. Mean of response time (RT) in go trials was longer during threat blocks compared to safe ones. Mean of stop-signal delay (SSD) was also longer in threat than safe. Importantly, estimated stop-signal response time (mean RT – mean SSD) was shorter in threat than safe. The results suggest that threat anticipation enhances the executive function of stopping responses while it impairs cognitive processing of visual discrimination. Email: Jong Moon Choi, choi.jmoon@gmail.com

(1128) Doodling: More Than a Distraction? AMANDA SZYMANSKI, High Point University, DAVID S. GORFEIN, University of Texas, Dallas, KIMBERLY WEAR, High Point University (Sponsored by David S. Gorfein). — Research has demonstrated links between working memory capacity, mindwandering, topic interest, and reading comprehension (Feng, D’Mello, & Graesser, 2013: McVay & Kane, 2012a and 2012b; Unsworth & McMillan, 2013). Andrade (2010) conducted a study that demonstrated doodling improved memory. The current research expanded this by examining the effect of doodling on mindwandering and reading comprehension. Participants heard fictional stories, psychology articles, or news articles (two; read in different manners across studies). While listening, participants received thought probes. Groups were separated into doodling and non-doodling conditions, with doodlers completed shapes provided. Following each recording, participants completed a multiple choice test for the material, as well as the operation and reading span tasks (Foster, et al., 2014; Unsworth, et al., 2005). Doodling is expected to demonstrate more distractibility from mind-wandering and therefore should benefit more from the doodling. Email: Amanda Szymanski, ltsamanda@yahoo.com

(1129) Does the Style of Mind Wandering Probe Impact Mind Wandering Report? TRISH L. VARAO-SOUZA and ALAN KINGSTONE, University of British Columbia (Sponsored by Alan Kingstone). — Mind wandering is common in many everyday tasks, such as driving, reading and during lectures. However there has been little consistency in how individuals are queried for mind wandering episodes, with probes often presented visually regardless of the way that information is presented. To investigate whether mind wandering varies based on probe type, three experiments were conducted where probe modality (visual or auditory) was either task congruent (e.g., visual probe during a reading task) or task incongruent (e.g., auditory probe during a reading task). Changes and consistency in mind wandering as a function of probe-task compatibility are discussed with regard to amodal and modality-specific attentional processing. These experiments highlight the importance of investigating whether mind wandering probes, which are intended to draw attention by to the task, may in fact be impacting or distracting to the task itself. Email: Trish L. Varao-Sousa, tvarao@bham.ac.uk

(1130) Raising the Value of Task Switching: Task Selection and Performance Under Variable Reward Structures During Voluntary Task Switching. DAVID BRAUN and CATHERINE M. ARRINGTON, Lehigh University (Sponsored by Catherine M. Arrington). — Voluntary task switching is a cognitively demanding environment in which subjects choose between simple tasks, typically with instructions to perform the tasks in a random order. The present research eliminates these instructions and replaces them with reward structures that award points based on diminishing returns for cognitively easier task repetitions. Across experiments, we varied characteristics of the reward structure including probability and magnitude of a change in points, and whether point values were associated with specific tasks or with task transitions. We analyzed task choice and RT data to address two questions: do people utilize reward feedback to drive task selection in a cognitively demanding environment, and does reward feedback utilization result in higher efficiency in this environment? Task choice results show sensitivity to multiple characteristics of reward structure. Individuals who are more sensitive to the reward structure perform the task more efficiently than those who are not. Email: David Braun, dab414@lehigh.edu

(1131) Tunnel Vision Is Produced by Both Auditory and Visual Dual-Task Loads. RYAN RINGER, ZACHARY W. THRONEBURG, TERA WALTON, GREG ERIKSON, ALLISON KOY, and JACOB DEHART, Kansas State University, AARON JOHNSON, Concordia University, ARTHUR KRAMER, Beckman Institute, LESTER LOSCHKY,
Kansas State University (Sponsored by Lester Loschky). — The Useful Field of View (UFOV) is the area of visual space encodable within a single eye fixation. The UFOV is limited by both the design of our eyes—resolution decreases with increased retinal eccentricity—as well as by the attentional bottleneck. No studies have examined how auditory versus foveal loads affect the UFOV independent of low-level visual resolution limits. We did so in two experiments, in which participants viewed scene images while Gabor patches were occasionally presented gaze-contingently at varying retinal eccentricities. Participants discriminated patch orientation, and the patches were thresholded to produced equal discrimination at all eccentricities under single task conditions. This was compared to dual-task performance: Experiment 1, added a foveal rotated L-versus-T task, and Experiment 2 added a concurrent auditory N-back task. Results showed both the foveal and auditory dual-tasks decreased Gabor sensitivity with increasing retinal eccentricity. Thus, tunnel vision does not require a foveal load. Email: Ryan Ringer, rvringer@k-state.edu

(1132) A Rigorous Test of Ego-Depletion in Large-Scale, Fully Confirmatory, Pre-Registered Studies. JOHN H. LURQUIN, LAURA E. MICHAELSON, JANE E. BARKER, DANIEL E. GUSTAVSON, CLAUDIA C. VON BASTIAN, NICHOLAS P. CARRUTH, and AKIRA MIYAKE, University of Colorado Boulder (Sponsored by Tim Curran). — Ego-depletion, a psychological phenomenon in which individuals are less able to engage in self-control after prior exertion of self-control, has become widely popular in the scientific community as well as in the media. However, researchers have recently questioned how robust and reliable the effect is. We examined the robustness of the ego-depletion effect in two large-scale, pre-registered experiments. We maximized our ability to detect the effect by administering widely used depletion tasks and by considering task characteristics and individual differences that potentially moderate the effect. Contrary to the ego-depletion hypothesis, participants in the depletion condition did not perform worse than control participants on the subsequent self-control task in either experiment, even after controlling for moderator variables. Our results serve as an important contribution to theories of self-control, raising questions about the reliability of the basic ego-depletion effect and emphasizing the importance of large sample sizes, moderator variables, and pre-registration. Email: John H. Lurquin, john.lurquin@colorado.edu

(1133) Individual Differences in Working Memory Capacity as a Predictor of Control Exertion in Stroop. KATHERINE MACNAMEE and JASON WATSON, University of Utah (Sponsored by Jason Watson). — The choice of whether to exert or to conserve limited capacity attentional resources is known as the control dilemma. When presented with this dilemma, those with high working memory capacity (WMC) are able to exert control and to perform better than those with low WMC in many traditional lab tasks with high cognitive conflict (Simon). However, when task contexts favor reliance on automatic processing, high WMC individuals may elect to withhold attentional control, resembling those with low WMC. In our study, to assess the generality of the WMC-control dilemma relationship, individuals with varying WMC were presented a high congruency (75%) version of the Stroop color naming task. Task instructions were manipulated where half of the participants were explicitly warned about the rare incongruent trials, which may encourage the exertion of control, and the other half received typical Stroop instructions, which may encourage reliance on automaticity given a high congruency proportion. Email: Katherine MacNamee, Kate.Macnamee@utah.edu

(1134) Graphs Versus Numbers: How Information Format Affects Risky Choices. MICHAEL DAMBACHER, PETER HAFFKE, DANIEL GROSS, and RONALD HUBNER, Universität Konstanz. — Risky choices between lotteries depend on the evaluation of outcome magnitudes and probabilities. Yet, the role of the format in which this information is conveyed remains unclear. Here, we investigate how perceptual format affects risk aversion in choices between lottery pairs with non-negative outcomes. In two presentation modes, either outcomes or probabilities were displayed as pie charts, while the other constituent was presented numerically. Besides an overall preference of the lottery with the higher win probability (i.e., risk aversion), conditional choice functions revealed that the influence of outcome magnitudes increased with response times. Critically, against the intuition that enhanced attention towards graphics augments their impact, risk aversion was stronger when outcomes rather than probabilities were displayed graphically. Our study demonstrates the relevance of information format for risky choices and points to the fast automatic nature of risk aversion. We discuss the results in the light of current decision theories. Email: Michael Dambacher, michael.dambacher@uni-konstanz.de

(1135) Executive Dysfunction in Trait Anxiety: Evaluating and Extending Attentional Control Theory. DANIEL E. GUSTAVSON, JOHN LURQUIN, NICHOLAS CARRUTH, LAURA MICHAELSON, JANE BARKER, CLAUDIA VON BASTIAN, and AKIRA MIYAKE, University of Colorado Boulder (Sponsored by Akira Miyake). — In this large-scale latent-variable study, we evaluated Attentional Control Theory (ACT), an influential theory regarding the relationship between anxiety and executive function (EF). ACT hypothesizes that anxiety is related to worse prepotent response inhibition and set-shifting abilities, but not working memory updating ability. 191 participants completed a battery of EF tasks and trait-level mood questionnaires. The results supported ACT’s hypotheses regarding the inhibition and updating abilities, but not set-shifting ability. Further analyses using the unity/diversity framework (Miyake & Friedman, 2012) revealed that trait anxiety was associated with worse general EF ability (Common EF), but that the abilities unique to shifting and updating are spared (Shifting-specific and Updating-specific abilities). Moreover, the results indicated that the worry
subcomponent of trait anxiety is primarily responsible for those effects. These findings support some of ACT’s claims and help better specify the nature of the EF dysfunction in trait anxiety. Email: Daniel E. Gustavson, daniel.gustavson@colorado.edu

\*ATTENTION: CAPTURE I* 

(1136) Value-Driven Attentional Capture Occurs on the Basis of Relative Value. SEAH CHANG and YANG SEOK CHO, Korea University. — Value has been suggested to modulate involuntary attentional allocation. Adopting visual search tasks, previous studies found that highly valuable but task-irrelevant stimuli capture attention as a consequence of reward learning (e.g., Anderson et al., 2011). The present study was aimed to replicate the previous findings with a spatial cuing task and further examine whether relative value in a given context modulates value-driven attentional capture. In Experiment 1, when three colors were associated with positive, negative, and neutral points during a training phase respectively, the positive and negative color cues captured attention whereas the neutral color cue did not. Importantly, in Experiment 2, when two colors were associated with a positive point and a color with a neutral point, thereby creating a context in which the neutral value was relatively perceived as a cost, both positive and neutral color cues captured attention. These results indicate that relative value is a key determinant for value-driven attentional capture. Email: Yang Seok Cho, vscho_psych@korea.ac.kr

(1137) Contingent Crossmodal Capture. FRANK MAST and CHRISTIAN FRINGS, Trier University, CHARLES SPENCE, University of Oxford. — Numerous studies on visual selective attention have demonstrated that a salient but task-irrelevant distractor can involuntarily capture a participant’s attention. Over the years, there has been a lively debate concerning the impact of contingent top-down control settings on the occurrence of attentional capture effects. The present study investigated whether top-down sets would also affect participants’ performance in a multisensory task setting. We utilized a non-spatial compatibility task. Two different target conditions were: i.e. the targets were either unimodal (only visual) or bimodal (visual and tactile). The similarity between the target and the distractor was manipulated by adding tactile stimulation during the distractor presentation. In the bimodal target condition, larger compatibility effects were documented following bimodal as compared to unimodal distractors. By contrast, in the unimodal target condition, no differences in the size of the compatibility effects were observed for the two distractor types. These results indicate that information from different sensory modalities can be incorporated into contingent top-down control settings, but only if these information are associated with the target. Email: Frank Mast, mastfra@uni-trier.de

(1138) Cue-Target Compatibility as an Indicator of Attentional Capture. HANSOL RHEEM and YANG SEOK CHO, Korea University (Sponsored by Jacqueline Shin). — The present study was aimed to investigate how information processing by spatial attention is moderated by cues’ contingency and validity. In our version of the spatial-cuing paradigm, bars (Experiment 1) or letters (Experiments 2 & 3) were added inside four placeholders of the cue display in which one of the placeholders was cued by color. Participants were to respond to the target which was either compatible or incompatible with the cued stimulus. A significant cuing effect was found only when the target-color cue appeared. Moreover, a significant compatibility effect between the cued stimulus and the target was obtained when the target appeared at the cued location. However, no compatibility effect was obtained when a distractor-color cue did. When the target was presented at an uncued location, no compatibility effect was found regardless of the cue contingency. These results indicate that orienting of spatial attention was contingent upon attentional control setting, even when the processing level obtained in the cued location was taken into consideration. Email: Hansol Rhee, sethr87@gmail.com

(1139) Distraction and Facilitation—Emotional Sounds Affect Performance in a Smiley Oddball Task. JESSICA KORNING LJUNGBERG, Umea University, FABRICE PARMENTIER, University of Balearic Islands. — The aim with this study was to investigate the involuntary capture of attention by to-be ignored emotional sounds. Sixteen participants performed a cross-modal oddball task in which smileys were categorized as happy or sad on a computer screen. Prior to each smiley, a standard sound (a sinewave tone in 80% of the trials) or deviant sounds (happy or sad sounds with rising or falling pitch in 20% of the trials) were presented. The deviant trials were either congruent (e.g., happy sound presented prior to a happy smiley) or incongruent trials (e.g., a happy sound presented prior to sad smiley). Results showed that participants were significantly more distracted in the incongruent trials compared to standard (p<.001) and showed facilitation in the congruent trials compared to standard (p=.027). The results may be interesting from a commercial point of view, but also for the research field of distraction by emotional stimuli. Email: Jessica Kornung Ljungberg, jessica.korningljungberg@psy.umu.se

(1140) Temporal Uncertainty Modulates the Combined Effects of Exogenous Attention and Non-spatial Expectancies. MARK FENSKE, University of Guelph, JENNIFER STOLZ, University of Waterloo, MARIA GIAMMARCO, University of Guelph (Sponsored by Naseem Al-Aidroos). — Research has revealed multiple mechanisms for prioritizing competing visual signals, including those underlying stimulus-driven (exogenous) and goal-driven (endogenous) attention. Exactly how such mechanisms operate together to bias the competition to favor some sources of information over others in guiding thoughts and actions remains unknown.
Here we used pre-cues to examine the combined effects of exogenous spatial attention and endogenous non-spatial stimulus-form expectancies on the speed of target-orientation discriminations. Using a short (150 ms) cue-target onset, the effects of spatial attention and form expectancy were robust yet independent regardless of whether they were manipulated using separate pre-cues (Experiment 1) or a single integrated pre-cue (Experiment 2). However, in Experiment 3 when we disrupted temporal expectancy by varying cue-target onset asynchrony, form expectancy effects were selectively absent on trials with valid spatial cues. This suggests that temporal uncertainty modulates the combined effects of exogenous attention and endogenous stimulus-form expectancies.

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(1141) Emotion and Emotion-Laden Word Types in the Attentional Blink Paradigm. JENNIFER MARTIN and JEANETTE ALTARRIBA, University at Albany, SUNY (Sponsored by Chi-Shing Tse). — Emotions are an indelible part of the human experience and influence our actions and attitudes in profound ways. Knowing how the emotional qualities of words affect attention will also contribute to our understanding of attention itself. Previous work has shown that negative emotion words (e.g., hate) can capture attention more than neutral words using the rapid serial visual presentation (RSVP) technique in the attentional blink paradigm (e.g., Arnell, Killman, & Fijavz, 2007). The present study extended these findings to positive, negative, and neutral words within the same experiment, and investigated whether emotion-laden words (evoking an emotion, but not describing an emotion; e.g., murder) had a similar effect on attention. Results suggest that while negative words capture attention and may interfere with later targets, positive and neutral targets do not impair later attention to the same degree. Results may be consistent with approach-avoidance theories of emotion (e.g., Roth & Cohen, 1986).

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(1142) Monetary Reward Accelerates Conscious Visual Perception. NASEEM AL-AIDROOS and BLAIRE DUBE, University of Guelph. — Visual stimuli associated with monetary reward are prioritized for attention. Specifically, rewarded stimuli are more distracting during visual search, and reflexively capture eye movements. Here we examined how this prioritization occurs: Does reward have early effects on perception, or effects on later processes such as response selection? This question was addressed using a two-phase design. In phase one, participants learned to associate high monetary reward with one spatial location, and low monetary reward with another. In phase two, subjects completed a temporal-order-judgment task to evaluate whether stimuli appearing in a previously highly rewarded location demonstrated visual prior entry; i.e. when objects are presented simultaneously in both locations, do people perceive the object in the highly rewarded location as appearing first? Results indicated a shortened time to awareness for reward related stimuli relative to competing stimuli. Thus, reward influences early aspects of visual processing, affecting processes leading to conscious perception.

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(1143) Negative Arousing Images Impair Working Memory Encoding. KIMBERLY WINGERT, Graduate Student, BRETT HUNTER BALL, CHRIS BLAIS, and GENE A. BREWER, Arizona State University (Sponsored by Chris Blais). — Individual differences in working memory capacity partly arise from variability in attention control, a process influenced by negative emotional content. Thus, individual differences in working memory capacity should be predictive of differences in the ability to regulate attention in emotional contexts. To address this hypothesis, a complex-span working memory task (symmetry span) was modified so that negative arousing images or neutral images subtended the background during the encoding phase. Across 3 experiments, negative arousing images impaired working memory encoding relative to neutral images, resulting in impoverished symmetry span scores. Contrary to our hypothesis, individual differences in working memory capacity derived from two additional complex span tasks failed to moderate the effect of negative arousing images on working memory encoding across two large scale studies. Implications for theories of working memory and attention control in emotional contexts will be discussed.

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(1144) The Role of Contextual Similarity in Inhibition of Return: Evidence From the Target-Target Paradigm. HSUAN-FU CHAO, Chung Yuan Christian University. — Inhibition of return (IOR) refers to slower responses to a target presented at a previously cued location. This study aimed at investigating the role of memory in IOR. The target-target IOR paradigm
was used in the present study, and the contextual similarity between two successive targets was manipulated. Results showed that IOR was greater in the same-context condition than in the different-context condition, suggesting that memory retrieval may play an important role in IOR. Email: Hsuan-Fu Chao, hfchao@cycu.edu.tw

(1146)  
**Attentional Awakening Does Not Represent a Gradual Modulation of Temporal Attention.**  
MOTOHIRO ITO, Chukyo University, JUN-ICHIRO KAWAHARA, Hokkaido University. — The present study examined whether a gradual modulation of temporal attention or attentional capture by the onset of a stimulus stream underlies the attentional awakening phenomenon, which refers to the impaired ability to perceive a uniquely colored target embedded within a rapid sequence of uniformly colored non-target letters when the target appears relatively early in the sequence. We compared this phenomenon in a task in which searching for a target in a letter stream was preceded by a task-irrelevant symbols with that in which no symbols were presented. We found that the preceding symbols shortened the awakening period. Experiment 2 revealed that awakening occurred earlier when the search for a target occurred under conditions involving a high working-memory load than when it did under conditions involving a low working-memory load. Although these results are consistent with the onset hypothesis, they cannot be explained by the gradual modulation of attention. Email: Jun-Ichiro Kawahara, jkawa@let.hokudai.ac.jp

(1147)  
**The Role of Loss Avoidance in Value-Driven Attentional Capture.**  
MICHELLE M. DIBARTOLO, BRIAN A. ANDERSON, and SUSAN M. COURTNEY, Johns Hopkins University. — Value-Driven Attentional Capture (VDAC) is a well-documented phenomenon in which stimuli paired with reward during a training phase subsequently capture attention after they become task irrelevant, despite lack of further reinforcement. Similar attentional biases have also been observed for stimuli previously associated with aversive outcomes. The role of loss avoidance (LA) in shaping attentional biases, however, remains unexplored. In this study, we paired target colors with high and low magnitude loss opportunities that were avoidable through fast and accurate responses in target identification. We hypothesized that LA-paired stimuli would capture attention much like stimuli previously associated with reward, but that the underlying mechanism and corresponding individual differences profile would differ from VDAC. The results support this hypothesis. Attentional capture by stimuli previously associated with LA was positively rather than negatively correlated with depressive symptomology, and was predicted by behavioral inhibition traits rather than behavioral activation and impulsivity. Email: Brian A. Anderson, bander33@jhu.edu

(1148)  
**Anxiety and Accuracy of Ensemble Representations of Emotion in a Crowd.**  
AMRITA PURI, TOBY HALLADAY, KASSANDRA LEE, and JORDAN ROMAGER, Illinois State University, ELLIE CASALMAN, Hendrix College. — Previous studies have shown that observers can rapidly and accurately gauge the average emotion, or expression, of groups of faces. Other work has suggested that fearful faces capture attention, and higher levels of anxiety can correspond to delays in disengaging from fearful faces. We investigated the relationship between participant anxiety levels and estimates of the ensemble emotion of a group. Happy, sad, and fearful faces were morphed together producing a “wheel” of expressions. On each trial, participants viewed a brief display of multiple faces with a randomly determined mean expression, and indicated their estimate of the average expression by selecting a face from the expression wheel. A striking dissociation was observed: accuracy of estimates was correlated with self-reported trait anxiety level, but only for displays with fearful mean expressions. In contrast, social anxiety level was correlated with a bias towards perceiving the crowd as more fearful than it actually was. Email: Amrita Puri, apuri@ilstu.edu

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**• LETTER AND WORD PROCESSING I •**

(1149)  
**Further Explorations of the First Letter Advantage in Two-Alternative Forced Choice Paradigms.**  
ANDREW J. ASCHENBRENNER and DAVID BALOTA, Washington University in St. Louis. — The first letter in a letter string affords preferential processing during the earliest stages of visual word recognition. For example, in a forced choice identification of briefly presented masked words, participants are faster and more accurate to identify stimuli that differ at the first letter (LUNG vs. SUNG) than at any other positions. We have recently extended this observation to vertical presentation. Past studies have blocked vertical or horizontal presentation which may have directed attention to an area of the visual field before stimulus presentation. In the present study, we further examined this pattern by randomly intermixing vertical and horizontal letter strings. Results showed a significant first letter advantage across both orientations. We also explored the locus of the effect by manipulating the characteristics of the first letter (e.g., color) to understand the nature of the extracted code. Discussion focuses on the possibility of a rapid post-stimulus deployment of attention. Email: David Balota, dbalota@artsci.wustl.edu

(1150)  
**Cross-Script L2-L1 Noncognate Translation Priming in Lexical Decision Depends on L2 Proficiency: Evidence From Japanese-English Bilinguals.**  
MARIKO NAKAYAMA and KEISUKE IDA, Waseda University, STEPHEN LUPKER, University of Western Ontario. — For different-script bilinguals, previous masked translation priming experiments have consistently shown that L2
noncognate primes (e.g., roof) do not facilitate L1 target recognition (e.g., 屋根) in a lexical decision task. To explain these null effects, two novel models have been proposed: the Sense Model (Finkbeiner et al., 2004) and the Episodic L2 hypothesis (Jiang & Forster, 2001; Witzel & Forster, 2012). Using Japanese-English bilinguals, the present experiments showed that significant L2-L1 priming in the lexical decision task does arise, however, only for quite proficient bilinguals. Further, an RT distribution analysis indicated that the significant L2-L1 priming effect (for proficient bilinguals) was associated with both a small shift and a skewing of the distribution. These results are most straightforwardly explained by the BIA+ model (Dijkstra & Van Heuven, 2002), although the Episodic L2 hypothesis could also explain the results provided its assumptions are slightly modified. Email: Mariko Nakayama, mariko_nakayama@aoni.waseda.jp

(1151) The Interpretation of Spanish Compound Word by Spanish English Bilinguals. PATRICIA GONZALEZ, ANNA CIESLICKA, and ROBERTO R. HEREDIA, Texas A&M International University. — We investigate how Spanish-English bilinguals interpret compound words in an experiment that involved the interpretation of [N+N] N and [V+N]N patterns. Spanish head-initial compounds are followed by a modifier (hombre rana: "frogman" is a kind of man), while in English the head is final (dog house is a kind of house). Deverbal compounding is scarce in English ("scarecrow") while in Spanish the pattern is very productive (pelagatos: "poor man"). Additionally, transparency/opacity affects interpretation (pelagatos: "poor man"). A group of 245 bilinguals, including late and early sequential, and simultaneous completed a vocabulary test that included 40 isolated compounds. Results show that late sequential bilinguals were more accurate than early sequential and simultaneous bilinguals. [V+N]N compounds were interpreted more accurately than [N+N]N compounds and transparent compounds were interpreted more accurately by all bilingual types. Overall, the results point to compounds as a robust area of linguistic knowledge in all bilingual groups. Email: Anna Cieslicka, anna.cieslicka@tamiu.edu

(1152) A Further Examination of Word Frequency Effects in English Lexical Decision Task Performance. BARBARA JUHASZ, AKILA RAOUUL , and MICAELA KAYE, Wesleyan University. — The current study further examined the ubiquitous word frequency effect in English by exploring the influence of frequency trajectory on lexical decision times (LDTs). Frequency trajectory is measured by how often a word occurs relative to certain grade levels (e.g., Lété & Bonin, 2013; Zevin & Seidenberg, 2004). Words were selected from the Educators’ Word Frequency Guide (Zeno et al., 1995) based on their frequencies in Grade 1 (child frequency) and Grade 13 (adult frequency). Child and adult frequency were varied to create four frequency trajectory conditions: high-to-high (WORLD), high-to-low (UNCLE), low-to-high (BRAIN) and low-to-low (OPERA). LDTs were significantly influenced by child and adult frequency and the factors interacted. Low-to-high words received shorter LDTs compared to low-to-low words while high-to-high and high-to-low words did not significantly differ. These effects persisted with rated age-of-acquisition included as a covariate. Implications for the role of age-limited learning in word recognition will be discussed. Email: Barbara Juhasz, bjuhasz@wesleyan.edu

(1153) Lexical Decision Accentuates Effects on Word Recognition That Narrative Coherence Diminishes. DAN TENG, Grinnell College, SEBASTIAN WALLOT, Aarhus University, DAMIAN G. KELTY-STEPHEN, Grinnell College. — Narrative context change effects of lexical properties, e.g., word frequency and orthographic neighbors (Wallot, Hollis, & van Rooij, 2013). We examined word-recognition times for 20 adjective-noun pairs varying in paired-association strength in both lexical-decision and self-paced-reading contexts. Trials were identical across tasks: letter strings appeared on screen singly. Self-paced reading tasks included three between-groups degrees of narrative coherence: original-sequence story, story with halves switched, and words presented randomly. Models testing only main effects of paired-association, frequency, and orthographic neighbors on recognition time per word show negative frequency effects. Testing interactions with task, trial, task order, and coherence reveals that lexical decision slowed recognition, lexical decision accentuating effects of paired-association and orthographic neighbors, and self-paced reading with original-sequence story diminishing these effects. Single-word lexical features only had effects when lexical decision preceded self-paced reading. Reading times depend on a hierarchical pattern of contextual constraints (e.g., task, task ordering, fatigue/practice, and narrative coherence). Email: Damian G. Kelty-Stephen, keltyssda@grinnell.edu

(1154) Where Do Young Children Look When They Are Being Read To? ANNA BANKS and STEVEN G. LUKE, Brigham Young University (Sponsored by Steven G. Luke). — It is generally agreed that reading to children helps prepare them to read on their own. However, little is known about how reading to children is beneficial; it could increase print awareness and familiarity with orthography, or it could deepen vocabulary and other linguistic knowledge, a prerequisite to skilled reading (Luke, Henderson & Ferreira, 2015). What little research has been done suggests that prereaders seldom look at text (Evans & Saint-Aubin, 2005). In the present study, children's eye movements were tracked as they were being read to. Results showed that children spent most of their time looking at the illustrations, and little time fixating the text. Further, children tended to look at the pictures as they were mentioned, but effectively never looked at the correct word as it was being read. Thus, reading to children can foster vocabulary development but likely does little to facilitate acquisition of orthographic word forms. Email: Anna Banks, byuveyetrackinglab@gmail.com
(1155) Individual Differences in Reading and Spelling Skill Affect Lexical Ambiguity Resolution. ASHLEY ABRAHAM, JOCELYN R. FOLK, and MICHAEL ESKENAZI, Kent State University; ANGELA JONES, John Carroll University. — Previous research has suggested that high-skilled and low-skilled readers use context differentially during reading. Using a memory probe task that employed lexically ambiguous words, Andrews and Bond (2009) found that lexical experts (i.e., good readers and spellers) were less likely to rely on context during single word identification. In a reading task we investigated how reading and spelling skill influenced the use of context during lexical ambiguity resolution. Participants read sentences containing an ambiguous word preceded by varying contextual support for the subordinate meaning. Positive context definitively supported the subordinate meaning of an ambiguous word. Negative context provided support for the subordinate but still remained consistent with the dominant meaning, and there was no biasing context provided before the ambiguous word in the neutral condition. Our results replicate those of Doppink, Morris and Rayner (1992) and extend those findings, suggesting lexical experts use context more efficiently during lexical ambiguity resolution. Email: Angela Jones, acjones@jcu.edu

(1156) Do You Know Where Your Word Has Been? A Right Hemisphere Mechanism for Contextual Diversity. JASON GELLER, Iowa State University; MARY STILL, Old Dominion University; CATHERINE CALDWELL-HARRIS, Boston University. — It has been shown that words appearing in a greater number of contexts are identified more quickly and more accurately than words that appear in fewer contexts. This contextual diversity (CD) effect may be stronger than the word frequency effect. It has been hypothesized that contextually diverse words are more entrenched in memory as a result of diffuse lexico-semantic activation. According to the coarse coding hypothesis (Jung-Beeman, 2005), words eliciting diffuse activation should facilitate identification in the right hemisphere (RH). In turn, we thus predict that the CD effect would be stronger in the RH than the left. Results from a divided visual field task confirmed this hypothesis. We found a CD effect in the RH, but not the left. Based on these findings, we suggest that the locus of the CD effect is in the RH and that it is driven by the summation of diffuse lexico-semantic activation. Email: Mary Still, marystill@gmail.com

(1157) Letter Transposition Effects and Position of the Transposition in Italian Children. LUCIA COLOMBO and FRANCESCA PERESSOTTI, Università di Padova, SIMONE SULPIZIO, Università di Trento. — We investigated the development of transposed letters (TL) effects in lexical decision with Italian second-, third-, and fifth-graders. Stimuli were short (babara, from barba) and long (arrotso, from arrosto) nonwords and matched controls. The position of transposition was manipulated in long nonwords, either at the beginning (ditsanza, from distanza) or at the end (arrosto). We found significant TL effects at each grade level. For long nonwords, the effect increased with age, and was larger for final than initial transpositions. There was also an interaction of TL and TL position effects, and the interaction effect increased with age. These results are discussed with reference to the multiple-route developmental model by Grainger, Létè, Bertrand, Dufau and Ziegler (2012). Email: Lucia Colombo, lucia.colombo@unipd.it

(1158) Does Blocking Words by Difficulty in a Reading Aloud Megastudy Improve the Predictive Power of Standard Variables on Performance Measures? MICHAEL CORTESE, University of Nebraska at Omaha; MAYA M. KHANNA, Creighton University; ROBERT KOPP and JONATHAN B. SANTO, University of Nebraska at Omaha; KAILEY S. PRESTON, Creighton University. — We tested the list homogeneity effect in reading aloud (e.g., Lupker, Brown, & Colombo, 1997) using a megastudy paradigm. In each of two conditions, there were 25 blocks of 100 trials. In the traditional condition, words were ordered randomly, while, in the experimental condition, words were blocked by difficulty (e.g., easy words together, etc.), but the order of the blocks was randomized. We predicted that standard factors (e.g., frequency, length, etc.) would be more predictive of RT in the blocked than random condition because the range of RTs would increase in the blocked condition. Our preliminary results support this prediction. First, the standard deviation for RTs across words was larger in the blocked condition than the traditional condition. Moreover, our predictor variables accounted for approximately 8% more variance in the blocked than the random condition. This outcome has important implications for megastudies of reading aloud and computational models of word recognition. Email: Michael Cortese, mcortese@mail.unomaha.edu

(1159) How Do People Speaking Different Languages Approach Graphemes Differently? Evidence From Eight Language Groups. LI-YUN CHANG, National Taiwan Normal University; CHARLES A. PERFETTI, University of Pittsburgh, HSUEH-CHIH CHEN, National Taiwan Normal University, SCOTT FRAUNDO and XIAOPING FANG, University of Pittsburgh. — This study examined how individuals speaking different languages approach graphemes in different writing systems. We hypothesized that visual perception is tuned by reading experiences in a particular writing system. Data were collected via the Internet (60 individuals from eight language groups, respectively) and in the lab (60 speakers using English, traditional Chinese, and simplified Chinese, respectively). In a same-different judgment task (judging whether pairs of graphemes are the same or different), we found that perception is a function of L1 background and grapheme complexity. Interestingly, in a pattern discrimination task (judging whether two non-grapheme patterns are both symmetrical or both asymmetrical), we discovered higher accuracy in the Chinese group relative to the English group and faster response time in the traditional Chinese group relative to the simplified one. Collectively, findings suggest that individuals' visual skills may be tuned by how visually complex their L1 is, even for individuals speaking the same language. Email: Li-Yun Chang, sklyyun@ntnu.edu.tw
(1160)
Transposition Effect in Korean Eojeol. JEAHONG KIM, SANGYUB KIM, HEE-JO YOU, YEONJI BAIK, and KICHUN NAM, Korea University. — This study examines the principles of the Korean Hangul Eojeol (combination of Korean noun and postposition) recognition process through transposition effect. First, the transposition effect in the Hangul Eojeol has been proved by delayed lexical decision task which presents stimuli for 50ms and 100ms. As Hangul is non-lineal alphabetic script with distinct syllabic boundaries, transpositions of syllables are used for determining the existing of morphological decomposition model. It is shown that the Transposition effect interference (reaction time) decreases in a morphologically-within manipulated condition (eg. 목소리가-mok/so/li/Goa, 목리소가-mok/li/so/ga, where the word mok/so/li is a noun and go is a postposition) and increases in a morphologically-between manipulated condition (eg. 자리부터-za/Li/booo/ktu). This result indicates that the early stage of the Hangul Eojeol orthographic processing might be handled with morphological decomposition model. Email: Kichun Nam, kichun@korea.ac.kr

(1161)
Accounting for the List Composition Effect in Lexical Decision. MELISSA PRINCE, Flinders University, SALLY ANDREWS, University of Sydney, ANNA WOOLLAMS, University of Manchester, ANDREW HEATHCOTE, University of Newcastle. — Asymmetric effects of list composition are typically observed in lexical decision tasks, whereby there is a slow-down in reactions times for easy items (e.g., high-frequency words) and a small speed-up for hard items (e.g., low-frequency words) when presented in mixed compared to pure lists. In this study we manipulated item difficulty simultaneously for words (high vs. low frequency) and nonwords (zero vs. high neighbourhood size) and used the Linear Ballistic Accumulator (LBA) model to tease apart the locus of the list-composition effect. Specifically, if the list-composition effect was driven by differences in processing stimulus-related factors, this effect should be captured by changes in the LBA's drift rate parameter. In contrast, if the effect was due to the strategic changing of decision criterion in the different list environments, it should manifest on parameters relating to the response threshold. Results are consistent with the latter view, with list composition selectively affecting the amount of evidence required for a response. Implications for current models of lexical access will be discussed. Email: Melissa Prince, melissa.prince@flinders.edu.au

(1162)
Contextual Constraint and Word Recognition During Reading. PATRICK PLUMMER, University of California, San Diego (Sponsored by Keith Holyoak). — Frequency controlled target words were embedded in either highly constrained or unconstrained sentence contexts. The invisible boundary paradigm (Rayner, 1975) was used to vary the availability of target word information prior to direct fixation. The preview was either identical to the target word, a phonological preview established using a pseudohomophone, an orthographic control preview, or a baseline, invalid nonword preview. All nonword previews were pronounceable letter strings matched to the target in character length. Target words were read faster when embedded in highly constrained contexts. Preview condition significantly influenced reading measures. Moreover, contextual constraint enhanced both phonological and orthographic preview benefits when compared to the baseline, unrelated preview. Importantly, processing benefits for phonological previews were modulated by orthographic overlap with the target word. Findings suggest that contextual constraint routinely influences the earliest stages of word processing at various levels of sublexical representation during normal reading. Email: Patrick Plummer, pplummer@ucsd.edu

(1163)
Extensions to Letters in Time and Retinotopic Space. JAMES ADELMAN, University of Warwick. — Letters in Time and Retinotopic Space (LTRS; Adelman, 2011) is a model that was designed to evaluate the extent to which thresholded all-or-none perceptual processes could produce confusability and priming phenomena often ascribed to graded lexical matching processes. As such, it accounts of these phenomena made use of simplistic assumptions about lexical processing to avoid ambiguity about the locus of the effects in the model. This leaves open questions as to whether these perceptual processes can be consistent with lexically-based phenomena. Here I consider extensions to LTRS for word and pseudoword superiority effects; sandwich priming; and wordlikeness effects on foil rejection in lexical decision. Email: James Adelman, j.s.adelman@warwick.ac.uk

(1164)
The Lexicalization of Textisms. DANIEL CORTS and ASHLEY WOLFE, Augustana College. — Words like scuba and laser entered the language as acronyms and are now understood almost exclusively as single words. We examined a similar lexicalization process with individual textisms (e.g. BYB for be right back) to determine their status as words or nonwords along with characteristics such as that may influence the degree of lexicalization. Thirty-five 18-22 year olds completed a lexical decision task by categorizing strings of letters as either words or nonwords. The stimuli included textisms, English words, and nonwords; textisms varied in frequency and familiarity as rated by a separate group of participants. A self-reported measure of texting and online chatting measured individual participants’ use each target stimulus. We found typical results for this task in that nonwords took significantly longer to process than English words. On average, textisms were processed at an intermediate speed, significantly different from the other categories. Individuals’ textisms varied so widely that some were indistinguishable from the word or non word conditions. Most of the variability in processing time was explained by familiarity, but not personal usage or instructions on whether textisms were to be considered words. Email: Daniel Corts, danielecorts@augustana.edu
(1165) Using Language Input and Lexical Processing to Predict Vocabulary Size. TRISTAN MAHR and JAN EDWARDS, University of Wisconsin-Madison (Sponsored by Margarita Kaushansky). — Children learn words by listening to caregivers, and the quantity and quality of early language input predict later language development. Recent research suggests that lexical processing efficiency may mediate the relationship between input and vocabulary growth. We asked whether language input and lexical processing at 28-39 months predicted vocabulary size one year later in 140 preschoolers. Input was measured using adult word counts, conversational turn counts, and proportion of meaningful speech and television in the child's environment. Lexical processing was measured using accuracy and rate of change on a four-image looking-while-listening eye-tracking task. Structural equation modeling showed that both input and lexical processing predicted vocabulary size, but most of the effect of input was mediated by lexical processing. Further, amount of television in the environment negatively influenced vocabulary size. These results further support the hypothesis that children must efficiently process ambient language input to capitalize on learning opportunities. Email: Tristan Mahr, tristan.mahr@wisc.edu

(1166) On the Consequences of Bilingualism for Inhibitory Control. GABRIELA TERRAZAS and JUDITH KROLL, Pennsylvania State University (Sponsored by Patricia Roman). — Previous studies have shown bilinguals outperform monolinguals on tasks requiring inhibitory control (e.g., Morales, et al. 2013). Morales and colleagues found that bilinguals were better able to adjust proactive-reactive control than monolinguals on an AX-CPT task. The present study asked whether the ability to adjust components of inhibitory control would affect performance on a retrieved induced forgetting (RIF) task (Anderson, et al.,1994). The RIF task requires retrieval of previously studied items from memory; inhibitory mechanisms are then engaged in the selection of a specific target. Here we compare native speakers, relatively proficient in Spanish as the second language, with functionally monolingual speakers of English, on the AX-CPT, RIF, and verbal fluency tasks. Here we examine the relation between the control tasks for the two groups of speakers, ask how they depend on native language fluency, and consider the pattern of bilingual-monolingual differences. Email: Gabriela Terrazas, gut12@psu.edu

(1167) Investigating Bilingual Non-Selective Lexical Access Within a Reading Comprehension Framework. JUSTIN LAURO and ANA SCHWARTZ, University of Texas at El Paso (Sponsored by Ana Schwartz). — According to the BIA+ model of lexical access, bilinguals have an integrated lexicon, and activation flows automatically across both languages, meaning that the bilingual lexicon is fundamentally non-selective. Research shows that cognates are processed faster relative to non-cognates, even in sentence contexts. However, previous research focuses primarily on processing of single lexical items. The structure building framework of reading comprehension states that readers initially lay a foundation for subsequent information to be mapped onto. This foundation is usually the first noun of the sentence. Using eye-tracking techniques, we demonstrate that cognates facilitate processing throughout an entire sentence when cognates are positioned in the first noun position. Particularly, facilitation was observed across a variety of eye-tracking measures when a pronoun in the sentence refers to the first noun. Interference was observed when the pronoun referred to the second noun and a cognate was the first noun of the sentence. Email: Justin Lauro, jglauro@miners.utep.edu

(1168) How Much Do I Like Myself in a Foreign Language Context? LELA IVAZ and JON ANDONI DUNABEITIA, Basque Center on Cognition, Brain and Language, ALBERT COSTA, Institució Catalana de Recerca i Estudis Avançats, Center for Brain and Cognition, Pompeu Fabra University (Sponsored by Jon Andoni Dunabetta). — Self-related stimuli enhance performance by boosting memory, speed and accuracy as compared to stimuli unrelated to the self. This gives rise to the robust and highly automated self-bias effect demonstrated in several recent studies. We aimed to investigate the extent to which this effect depends on the language context, as recent evidence suggests that foreign language contexts impose a relative emotional and psychological distance in bilinguals. We conducted two experiments with Spanish-English bilinguals performing a perceptual matching task where they associated simple geometric shapes (circles, squares and triangles) with the labels you, friend and other either in their native or foreign language. Results showed a robust asymmetry in the self-bias: larger self-bias effects were found in the native language than in foreign language. Results demonstrate that the foreign language effects are pervasive enough to affect automatic stages of emotional processing. Email: Lela Ivaz, Livaz@bcbl.eu

(1169) Misinformation, Executive Control, and the Revised Hierarchical Model of Bilingual Memory. KENDRA C. SMITH, Washington University in St. Louis, KRISTI MULTHAUP, Davidson College, RIVKA C. IHEJIRIKA, Vanderbilt University (Sponsored by Kristi Multhaup). — This study employed a misinformation paradigm to explore predictions of the revised hierarchical model (RHM) of bilingual memory. To determine if participants are more susceptible to misinformation in their first language (L1) or second language (L2), English-Spanish bilinguals (N = 48) listened to a lecture in L1 or L2, read notes in L1 or L2, and completed a forced-choice recognition test in the lecture language. We predicted a lecture/test language x notes type interaction resulting from lower proportion correct in the L2-L1-L2 (Spanish lecture-English notes-Spanish test) condition than the L1-L2-L1 (English lecture-Spanish
notes-English test) condition and, based on previous data, no significant difference in the same-language conditions. Contrary to expectations, there was a main effect of lecture/test language but no interaction for misinformation items. Additionally, participants completed a modified Stroop task as an executive control measure; however, a correlation between executive control and misinformation was not present. Email: Kendra C. Smith, kendra.c.smith@hotmail.com

(1170)
The Cost of Processing Irregularity and Inconsistency in English for Bilinguals Who Read a Shallow L1 or L2 Orthography Reveals Different Mechanisms of Transfer. MONA ROXANA BOTEZATU, University of Missouri, MAYA MISRA, Previously at the Pennsylvania State University, JUDITH KROLL, Pennsylvania State University. — We evaluated whether proficiency in a language with a shallow orthography (i.e., Spanish) changes the degree of transparency in spelling-sound mappings expected in a deep orthography (i.e., English). English-Spanish (N=26) and Spanish-English (N=24) bilinguals and English monolingual controls (N=19) named regular/consistent (e.g., GATE) and irregular/inconsistent (e.g., PINT) English words. All groups exhibited the standard inhibitory effect of irregularity/inconsistency: slower and less accurate naming of words with irregular/inconsistent than regular/consistent mappings. There was a larger cost in naming irregular/inconsistent than regular/consistent words for English-Spanish bilinguals with higher Spanish proficiency and for Spanish-English bilinguals with lower English proficiency, indicating that proficiency in a language with a shallow orthography increases the expectation of transparent spelling-sound mappings in a deep orthography. We interpret this common pattern in terms of different mechanisms of transfer, distinguishing classic L1-L2 transfer in less proficient Spanish-English bilinguals from L2-L1 transfer and language convergence in more proficient English-Spanish bilinguals. Email: Mona Roxana Botezatu, botezatu@einstein.edu

(1171)
Cognitive Processes Involved in Sentence Comprehension in Spanish/English Code-Switchers: An ERP Study. PATRICIA ROMAN, JAVIER SOLIVÁN, MAYA D. WAIDE, and PAOLA E. DUSSIAS, The Pennsylvania State University. — Psycholinguistic research has shown cognitive costs when bilinguals switch languages (e.g., Meuter & Alport, 1999). However, some bilinguals spontaneously switch languages (code-switching) even within the same utterance, suggesting that under some circumstances, switching does not incur a processing cost. To investigate this, we examined the neurophysiological correlates of code-switching during sentence comprehension in highly proficient Spanish/English code-switchers and compare it with switching highly expected words (lexical switching). Twenty participants read sentences in which the semantic expectancy (high vs. low) and the language context (switch vs. non-switch) of the critical word were manipulated. By crossing both variables we can distinguish the costs related to lexical unexpectancy from those related to code-switching, and how they interact. We compared neural activity in early and late time-windows (i.e., N400 and LPN) to discern the cognitive processes involved in each switch. Based on previous studies we expect a reduced cost to code-switching compared to lexical switching in our sample. Email: Patricia Roman, per3@psu.edu

(1172)
Catching Inhibitory Processes During Speech Planning on the Fly. RHONDA MCCLAIN, ELEONORA ROSSI, and JUDITH KROLL, Pennsylvania State University. — Bilingualism is hypothesized to confer bilinguals with advantages in executive functions (EF). The source of these advantages remains speculative, but one tentative explanation proposes that inhibition during speech planning trains EF. The present study addresses mechanisms of control when second language (L2) learners plan speech. We hypothesized that learners exploit inhibition of the dominant language (L1) to speak the L2. Monolinguals and learners completed a Go/No-go ERP task in which new and repeated pictures were named. Learners named pictures in L1 after L2. Monolinguals named only in L1. We predicted that if learners inhibited the L1 to speak L2, there would be elimination of repetition priming (e.g., increased positivity in P300 component). For learners, repetitions elicited larger P300s relative to new pictures. When monolinguals produced speech, new and repeated pictures did not elicit differences in the P300. We consider the implications for models of inhibitory control during L2 learning. Email: Rhonda McClain, ronaldam1@gmail.com

(1173)
Cross-Linguistic Phonological Rule Access in Bilinguals. MAX R. FREEMAN, Northwestern University, HENRIKE K. BLUMENFELD, San Diego State University, VIORICA MARIAN, Northwestern University. — Auditory input activates a bilingual’s two languages simultaneously. However, it is unclear if bilinguals access phonological rules for combining speech sounds from the other language during target language comprehension. In Spanish, words with s+ consonant onsets cannot exist, and the addition of a vowel is required (spiral/espiral). The present study examined whether Spanish-English bilinguals accessed Spanish phonological rules during English comprehension. In an English lexical decision task, participants heard prime words containing s+ consonant onsets or controls without s+ onsets, followed by a lexical decision on visual targets with the /e/ phonological rule or controls without /e/. If English primes (spiral) activated Spanish phonological rules, then faster responses to /e/ onset non-words (esploded) were predicted. Bilinguals, but not English monolinguals, responded faster to /e/ onset non-words preceded by s+ consonant primes than to controls preceded by s+ consonants. These findings suggest that bilinguals access Spanish phonological rules during English-only comprehension. Email: Henrique K. Blumenfeld, bblumenf@mail.sdsu.edu

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Individual Differences in Executive Control and Second Language Exposure Modulate the Acoustic Realization of Phonological Cues in Highly Proficient Bilingual Speakers. ANNIE GILBERT, IRINA PIVNEVA, and DEBRA TITONE, McGill University. — Many languages share phonemes, however, shared phonemes are often acoustically realized differently. For example, voice onset times (VOTs) for stop consonants (/p/, /t/, /k/) produced in English are significantly longer than those produced in French. An open question is how bilinguals accommodate such differences when they produce first and second language (L1 & L2) speech. Here, we investigate whether executive control capacity and the degree of everyday L2 exposure modulate spontaneously produced VOT durations in highly proficient bilinguals. Speech samples were acquired from 24 highly proficient French-English (French L1) bilinguals in a task where participants named pictures in their L1 (French) or L2 (English). As expected, VOTs were significantly longer during the production of English words compared to French words. Furthermore, French L1 speakers produced even longer, more nativelike, VOT durations as L2 exposure and executive control capacity increased. Thus, both executive control capacity and average L2 exposure modulate the acoustic realization of phonological cues even in highly proficient bilinguals. Email: Annie Gilbert, annie.c.gilbert@mail.mcgill.ca

Bilingualism Across the Lifespan. SARA INCERA and CONOR T. MCLLENAN, Cleveland State University (Sponsored by Conor T. McLennan). — In the present study, we used mouse tracking to examine the effects of bilingualism and age (measured as continuous variables) on cognitive function. Specifically, we measured the impact of bilingualism and age in two measures of executive control: a verbal (Stroop) and a nonverbal (Flanker) cognitive task. Participants responded using a computer mouse. The mouse tracking paradigm allowed us to study the continuous dynamics of the responses over time. A better understanding of the impact of bilingualism and age on cognitive function has the potential to minimize cognitive decline in older age. Bilingualism appears to be one of a number of different ways of enhancing cognitive reserve in order to delay the onset of dementia. Results of the present study provide new information regarding “how old” (age) and “how bilingual” (proficiency and usage) one has to be in order to observe reliable changes in cognitive function. Email: Sara Incera, saraincera@gmail.com

Code-Switching as a Tool to Elucidate the Relationship Between Language Production & Language Comprehension. ANNE L. BEATTY-MARTÍNEZ and PAOLA DUSSIAS, Pennsylvania State University (Sponsored by Paola Dussias). — We use codeswitching—the alternation between languages in bilinguals—to examine the relationship between language production patterns and comprehension difficulty. Because exposure to codeswitching is predicted to impact comprehension, we recruited Spanish-English codeswitchers in the US and non-codeswitchers in Spain. Production is examined using a codeswitched-speech elicitation map task (Anderson et al. 1991); comprehension is examined using event-related potentials. We focus on the production and comprehension of mixed noun phrases: el masc house (the house) is an attested form only in codeswitchers. Preliminary results for production show that codeswitchers (N=10) follow this pattern, while non-codeswitchers (N=24) do not. For comprehension, we expect that for codeswitchers, switches consistent with such distribution are more expected, and hence easier to process. Non-codeswitchers should show integration (LAN) and reanalysis processes (P600/LPC) in switched conditions. Converging evidence from production and comprehension sheds light on the predictive processes in bilinguals differing in experience. Email: Anne L. Beatty-Martinez, anne.beattymartinez@gmail.com

Lexical Conceptual Representations in Bicultural Bilinguals. DEBRA JARED, ANDY XIONG, and XUAN PAN, University of Western Ontario, OLESSIA JOURAVLEV, University of Western Ontario and MIT. — This study examined the conceptual representations associated with translation equivalent words in bicultural bilinguals. Participants were Mandarin-English bilinguals who had lived in China for at least 10 years and in Canada for at least 3 years. They were shown a word and then a picture, and they had to indicate whether the picture depicted the word. ERP and behavioral data were collected. In one session words were in Mandarin and in another they were in English. Critical pictures had either a Chinese or Canadian cultural bias. Decisions for the culturally-congruent word-picture pairs were faster than for culturally-incongruent pairs. As well, ERP analyses of the N250 and N400 components revealed that greater negativities were associated with culturally-incongruent pairs than culturally-congruent pairs. These results provide evidence that conceptual representations depend on the context in which they were acquired, despite their lexical representations being “translation equivalents”. Email: Debra JARED, djared@uwo.ca

Get Up, Stand Up, Stand Up For Your Rights: Heterogeneity in ESL Bilinguals. SUSAN J. RICKARD, LIOW and MARY LAY CHOO LEE, National University of Singapore. — Differences between monolingual English and bilingual English Second Language (ESL) learners are well recognized, but the heterogeneity amongst bilinguals is often overlooked both when the participants’ first languages (L1s) are dissimilar phonologically, and when they contrast with English, e.g., Lipka & Siegel’s (2011) ESLs spoke a total of 33 different languages whilst 85% of Jongejan et al.’s (2007) spoke Chinese, Gujarati, Urdu, or Greek before English. Using a longitudinal design and culturally appropriate tests, we examined vocabulary and literacy development in English for two groups of 4-6 year-old ESL bilinguals: Mandarin L1/English L2 (n=31) and Malay L1/English L2 (n=30) children from the same English-medium classrooms.
Measures of receptive and expressive vocabulary, reading and spelling, and phonological processing (nonword repetition, digit recall, syllable/phoneme awareness) were collated and analyzed. Results showed that the combined data (for n=61) produced predictable group differences in cognitive-linguistic processing that could endure beyond kindergarten. Email: Susan J. Rickard Liow, entarl@nus.edu.sg

(1179)
Foreign Accented Speech and Sentence Comprehension in Bilinguals: An Electrophysiological Study. SARAH GREY, Pennsylvania State University, JANET G. VAN HELL, Pennsylvania State University/Radboud University, Nijmegen. — For non-native listeners, the interlanguage speech intelligibility hypothesis states that comprehension is easier for a foreign accent that is congruent with the listener's accent than when the accent is different. For native listeners, judgments of accent comprehensibility are often driven by social factors and related to perceived difficulty, even when comprehension performance is intact. We examined whether interlanguage speech congruency (a) affects neurorecognition of non-native listeners' sentence comprehension and (b) is related to the listeners' social perceptions of foreign-accentedness. Two groups of bilinguals listened to English-accented and Chinese-English foreign accented sentences during a comprehension task while their brain activity was recorded. One group were Chinese-English bilinguals, for whom the foreign accent was congruent; the second group were Spanish-English bilinguals for whom the foreign accent was incongruent with their own accent. ERP data and measures of social attitudes towards accents clarify the neural and social effects of foreign accent in bilinguals. Email: Sarah Grey, greysae@gmail.com

(1180)
Language Labels in Bilinguals' L2 Impact Semantic Processing in L1. OLESSIA JOURAVLEV, MIT, DEBRA JARED, University of Western Ontario. — In the present research, we extend Lupyan's (2012) label feedback hypothesis to the domain of bilingual language processing. According to this hypothesis, labels shape perceptual and semantic space. We examined whether priming effects in a bilingual's L1 (Russian) are influenced by whether or not the prime and target share a label in their L2 (English). Half of the prime-target pairs were translated by the same English word (common L2-label; e.g., оранжевый (orange, the color) – АПЕЛЬСИН (orange, the fruit)), and half were translated by different English words (no common L2-label; e.g., красный (red) – ЯБЛОКО (apple)). Faster lexical decision latencies and less negative ERPs were observed for “common L2-label” vs. “no common L2-label” prime-target pairs, but only if primes and targets were semantically related (i.e., facilitation for оранжевый (orange, the color) – АПЕЛЬСИН (orange, the fruit), but not for локон (lock of hair) – ЗАМОК (lock, the device to secure doors). Thus, L2 labels influence L1 semantic space; however, this effect is not strong enough to impact concepts with no meaning overlap. Email: Olessia Jouravlev, olessiaj@mit.edu

(1181)
Translating and Understanding Texts With and Without Machine Translation. ERICA B. MICHAEL, PETRA BRADLEY, BROOK HEFRIGHT, LElyn SANER, ALAN MISHLER, and JOSEPH DANKS, University of Maryland. — As Machine Translation (MT) improves and becomes more readily available, technology is playing a larger role in human translation work. Numerous studies have investigated whether there are productivity gains from working with machine-generated output relative to translating from scratch, but important questions remain about the circumstances under which MT is most likely to improve human translators' performance. In the current study, bilingual participants translated Chinese texts into English or answered comprehension questions, with or without access to MT. In addition to comparing speed and accuracy across MT conditions, analyses will examine the processes translators use when their goal is understanding vs. translating a text. Unlike previous studies in which MT access was limited to static output, the current study included a condition involving interaction with the MT system, allowing an examination of how comprehension and translation processes are affected by the ability to analyze the source text in different-sized chunks. Email: Erica B. Michael, emichael@casl.umd.edu

(1182)
Language Mode and Bilingual Lexical Activation Disambiguation. OMAR GARCIA, Texas A&M University-College Station, ROBERTO HEREDIA and ANNA B. CIESLICKA, Texas A&M International University (Sponsored by Roberto Heredia). — After manipulating monolingual and bilingual language modes, is bilingual lexical activation at the single-word level selective or non-selective? Following up on Garcia et al.'s (2012) and Heredia et al.'s (2010) bilingual ambiguity resolution studies, two experiments revisit bilingual lexical activation among English-Spanish/Spanish-English bilinguals. Interlingual homographs (i.e., words across languages exhibiting convergent orthography but divergent semantics such as PAN, bread in Spanish and a cooking utensil in English) were further examined by employing Grosjean's (2001) language mode paradigm and a lexical decision task. After completing auditory and visual exercises (e.g., a mixed English-Spanish story presented before the experimental trials), participants chose whether visually presented letter strings (e.g., homographs, fillers, non-words) were legal words in English (Experiment 1). Experiment 2 required participants to decide whether the presented letter strings were legal words in English after completing English-only auditory and visual exercises. Results are discussed in terms of current ambiguity resolution and bilingual activation models. Email: Omar Garcia, omaromegahotmail.com

(1183)
Availability of Production-based Representations for Non-Native Speech Perception. MISAKI KATO and MELISSA MICHAUD BAES-BERK, University of Oregon (Sponsored by Melissa Michaud Baese-Berk). — Previous studies have suggested that being able to reliably produce non-native sound distinctions does not entail accurate
perceptual categorization of the same sounds. However, the cause for this dissociation is unclear. In this study, we examine whether L2 speakers’ production-based representations can subserve their perception as well. Specifically, we ask if L2 speakers (e.g., L1 English learners of Japanese) who can reliably produce difficult sound distinctions (e.g., Japanese singleton vs. geminate consonants) in naming show the same ability with repetition in two different conditions: repetition of non-words (1) after audio stimuli (2) after visual stimuli. Here, visual stimuli are used as explicit support for the L2 speakers’ production target, and audio stimuli are used as less explicit support. Change in productions from baseline will add insight into the relationship between the underlying representations in speech production and perception.

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• DECISION MAKING I •

(1184)
Stimulus-Response Links and the Backward Crosstalk Effect—A Comparison of Forced- and Free-Choice Tasks. CHRISTOPH NAEFGEN, ANDRÉ CAISSIE, and MARKUS JANCZYK, University of Tübingen (Sponsored by Hartmut Leuthold). — In dual-tasks, (spatial) incompatibility of Task 1 and 2 responses slows down reaction time even in Task 1. This is called the backward crosstalk effect (BCE). To account for the BCE, Hommel (1998) suggested that the appearance of the Task 2 stimulus automatically projects activation onto the corresponding response through (transient or direct) stimulus-response (S-R) links. One way to investigate this claim is to test for a BCE when Task 2 involves no S-R links. One such class of tasks is free-choice tasks. In two experiments, Task 2 was always a forced-choice task, but Task 1 was either forced-choice or free-choice. For forced-choice trials a larger BCE occurred than for free-choice trials. This suggests that S-R links are indeed involved in the BCE, and that they transmit automatic activation from stimuli to corresponding responses. Explanations for the residual BCE in free-choice trials are discussed. Email: Christoph Naefgen, christoph.naefgen@uni-tuebingen.de

(1185)
Real-World Decision Making: Logging Into Secure Versus Insecure Websites. TIMOTHY KELLEY, BENNETT BERTENTHAL, Indiana University. — In a decision making experiment where participants of different levels of domain knowledge were asked to identify secure vs. insecure websites by choosing whether or not to login, we found that there are situations where knowledgeable participants were no different than less knowledgeable participants in terms of accuracy. The process by which participants with different levels of knowledge reached these decisions was qualitatively and quantitatively different as revealed by their mouse tracking. Low-knowledge participants’ mouse trajectories were the same regardless of choice, following a near linear-path. High-knowledge participants demonstrate more uncertainty, particularly in incorrect choices—as shown in varied path trajectories. These varied paths suggest that high-knowledge participants attempt to identify relevant web browser security indicators to inform their decisions. Our results suggest that these indicators are ignored by low-knowledge participants and present inconsistent or insufficient information that increases uncertainty and decreases accuracy for high-knowledge participants. Email: Timothy Kelley, kelleyt@indiana.edu

(1186)
Investigating the Role of Conflicting Information on Severe Weather Warning Decision-Making. MARK A. CASTEEL, Pennsylvania State University-York. — During a severe weather event, the public must be quickly notified so that they can make effective decisions about risk and taking protection action. Severe weather warnings are generated by the National Weather Service (NWS) and then often pushed through a variety of electronic media to the end user, and possibly shared via social media. Given the ubiquitous nature of social media, however, it is surprising that little is known about how message recipients react to official weather warnings if they receive conflicting information. Given the NWS’s Weather Ready Nation initiative designed to improve the entire weather warning enterprise, it is important to understand how message recipients react to potentially conflicting information. The present research, therefore, presented participants with NWS severe weather warnings. Participants assessed a variety of risk attributes about storm and the message itself, as well as their likelihood of taking protection action, sometimes receiving conflicting information from a close friend or family member. Implications of the results will be discussed, especially as they pertain to NWS best practices and the emerging next generation severe weather warning products. Email: Mark A. Casteel, mac13@psu.edu

(1187)
Feeling of Agency Predicts Choice. ZACH BUCKNOFF and JANET METCALFE, Columbia University (Sponsored by Norma Graham). — We conducted a series of experiments using a simple computer-game paradigm – the space pilot task – to investigate how the subjective feeling of agency affects choice. Participants used the mouse to move a cursor to catch Xs and avoid Os as they scrolled down the screen. We manipulated the feeling of agency by introducing interference into the cursor movement (“turbulence”). In these conditions, the cursor did not respond precisely to mouse movements but moved sporadically and was difficult to control. In a replication of prior research, individuals reported feeling less in control in the turbulence condition. A logistic regression analysis showed that while actual performance and subjective judgments of performance predicted choice, judgments of agency had a stronger predictive effect. Individuals were more likely to choose games in which they reported a greater feeling of agency. Email: Zach Bucknoff, zjb2108@columbia.edu
Assessing Prior Beliefs and Memory for Symptom and Illness Relationships. TALIA ROBBINS, PERNILLE HEMMER and KAITLIN LEYBLE, Rutgers University, SARAH ROBBINS, Smith College (Sponsored by Pernille Hemmer). — People’s prior knowledge and beliefs are well calibrated to the statistical regularities of the environment when making judgments and predictions about the duration and extent of everyday events. Such beliefs are known to influence memory and decision making. Here we present work where we experimentally quantify people’s prior beliefs for symptoms, symptom locations, and duration, and measure the influence of these beliefs on memory and decision making. People often try to self-diagnose based on beliefs about symptom-illness relationships. This has become particularly common with the advent of online tools such as “webmd symptom checker.” We assess prior beliefs by asking people about the duration, location, and degree of pain that would cause them to seek care, as well as the illness that this pain might indicate. We also assess the association in reverse: given an illness, (e.g., appendicitis) what symptoms is this illness likely to produce. Lastly, we test memory for symptom-illness pairings. Our analysis focuses on the relationship between recall performance and prior beliefs for symptom-illness relationships. The data will be used to inform a Bayesian cognitive model of memory and decision making.

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High-Value Framing Improves Older Adults’ State-Based Decision-Making. JESSICA COOPER and SHARON M. NOH, University of Texas at Austin, TYSON KERR, University of California, Los Angeles, W. TODD MADDOX, University of Texas (Sponsored by W. Todd Maddox). — Older adults show a performance deficit relative to younger adults in difficult dynamic decision-making, relying increasingly on habitual strategies for decision-making over computationally demanding goal-directed strategies (Worthy et al., 2014). Work in related domains finds that context self-relevance is important in engaging older adults—that older adults depend less on simpliﬁed strategies in contexts with greater self-implications (Hess et al., 2012). Similarly, incorporating high value into memory tasks attenuates older adult memory deﬁcits relative to younger adults (Castel, 2008). Here we examine whether framing decision-making with high value, age-relevant information can engage older adults and attenuate their depﬁcit in dynamic decision-making. Older and younger adults completed tasks under high value (choosing life-saving medications) and low value (selecting health supplements). We ﬁnd that value interacts with age, with older adults performing best under high-value conditions. We also show that this high-value older-adult advantage is unique to tasks that require goal-directed strategies.

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Delay Discounting and Risky Choice: Meta-Analytic Evidence Regarding Single Process Theories. KELLI L. JOHNSON, MICHAEL T. BIXTER, and CHRISTIAN C. LUHMANN, Stony Brook University (Sponsored by Christian C. Luhmann). — In the literature on decision making, preferences about delayed rewards and preferences about uncertainty have implications for cognitive, clinical, and personality psychology as well as ecology and economics. Theoretically, several proposals suggest that such decisions arise from a single process and thus predict strong associations between preferences about delayed and uncertain rewards. However, existing empirical evidence is inconsistent; some studies have reported signiﬁcant associations but many have not. The current study takes a meta-analytic approach surveying 24 studies totaling 31 effect sizes. Results reveal a small to moderate association between choices under uncertainty and choices regarding delayed rewards. This result is inconsistent with existing proposals because the observed relationship is not strong enough to support single-process theories. Moderating variables may provide some explanation of variability across studies. Implications, including the apparent discrepancy between this literature and the conventional construct of impulsivity, will be discussed.

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The Nature of Decisions: The Influence of Natural and Built Environments on Decision Making. EMILY L. JOHNSON and JEFFREY STEVENS, University of Nebraska-Lincoln (Sponsored by Jeffrey Stevens). — Our environment shapes how we think and behave. Exposure to natural environments decreases stress, increases happiness, improves mood, and restores attention. In contrast to this large body of research examining the health and cognitive benefits of viewing scenes of nature, little research investigates how natural environments influence decision making. Here, we tested how exposure to images of nature affects a wide variety of decisions. Participants experienced a delay discounting task, a probability discounting task, a dictator game task, and a commons dilemma task with hypothetical environmental outcomes. Prior to each task, participants viewed images of nature, built environments, or geometric shapes. Compared to other conditions, viewing nature scenes increased self-control in the delay discounting task, risk aversion in the probability discounting task, and prosocial decisions in the dictator game and commons dilemma tasks. Thus, mere exposure to natural environments may improve human decision making across a range of situations.

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Context Effects in Multi-Alternative Decision Making and the N1 Amplitude Elicited by Task-Irrelevant Auditory Probes. TAKASHI TSUZUKI, Rikkyo University, YUJI TAKEDA, National Institute of Advanced Industrial Science and Technology, ITSUKI CHIBA, Rikkyo University. — Attraction and compromise effects result in violations of rational choice during multi-alternative decision making, and the underlying mechanisms warrant further investigations.
We previously reported that the amount of cognitive resources allocated to processing visual information when simultaneously presented with a task-irrelevant auditory probe is reflected in N1 amplitude elicited by the auditory probe; the amplitude decreases with increasing cognitive resource allocation to the visual alternative. Using this paradigm, we examined context effects in multi-alternative decision making. Thirty-one participants were randomly subjected to attraction or compromise conditions. They solved 18 hypothetical purchase problems with three alternatives (target, competitor, and decoy) differing on two attributes. In the attraction condition, analyses of the mean N1 amplitude indicated that participants were likely to choose the competitor if they allocated more cognitive resources to viewing the decoy. This finding supports the theoretical hypothesis that the attraction effect relates to the intuitive process.

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(1193)
Metacognition About Decision-Making, Decision-Making Strategies, and Decision Competence. SHARON LEE ARMSTRONG, LaSalle University. — The present study investigated the relationships among several cognitive variables that are thought to be important for effective decision-making. These included the Metacognitive Awareness Inventory (MAI, Schraw & Dennison, 1994), which measures adults’ metacognitive awareness, and the two major components of metacognition knowledge and regulation of cognition; a measure of decision-making style, the Preference for Intuition and Deliberation scale (PID, C. Betsch, 2004, 2008); and a constructed measure of metacognitive knowledge that is specifically about effective decision-making. The dependent measure of effective decision-making was performance on several decision-making scenarios for which there were pretested preferred solutions. As expected, general metacognitive awareness, specific meta-decision-making knowledge, and decision-making style were significant predictors of effective decision-making. However, the predictions were not uniform across all types of decision scenarios.

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(1194)
Personality-Driven Decision Strategies and Decisiveness in Stopping Evidence Collection. CAMERON BUNKER, MARIO FIFIC, ANDREW ANASARA, and NGUYEN PHAM, Grand Valley State University (Sponsored by Mario Fific). — One of the most important topics in the decision making domain is how individual subjects determine to stop evidence collection and make effective decisions. This is defined as the stopping rule problem. To answer this problem researchers have focused on developing successful models for stopping rules, usually from the point of optimal (or suboptimal) decision performance. In the current study we explored whether personality traits could be used to explain the individual differences in decision making. In particular, whether it is possible to develop personality-driven decision making strategies. We analyzed correlations between personality traits (Big Five personality test), mathematical abilities (Berlin numeracy test), decisiveness (Need for Closure scale), and stopping decision behavior (deferred decision task, measuring decision accuracy, and the number of recommendations opened). The results indicated an intricate role of decisiveness, conscientiousness and to some extent of extraversion in decision making.

Email: Cameron Bunker, bunkerc@mail.gvsu.edu
Integrating Fast-and-Frugal Heuristics With a Model of Memory-Based Cue Generation. ASHLEY LAWRENCE-HUIZENGA, Georgia Institute of Technology, RICK THOMAS, University of Oklahoma, MICHAEL DOUGHERTY, University of Maryland (Sponsored by Rick Thomas). — Although the fast and frugal heuristics have been studied extensively, relatively little attention has been paid to the memory processes underlying cue generation within the heuristics. The goal of this paper is to propose and test a memory-based account of cue generation and use in cue-based inferences. We advance theory by integrating the fast and frugal heuristics with HyGene, a memory based model of how decision makers generate and evaluate hypotheses (Thomas, Dougherty, Sprenger, & Harbison, 2008). Using archival data in which memory retrieval variables were not directly manipulated, we demonstrate that participants' cue selection behavior is consistent with memory-based retrieval. Further, by directly manipulating memory retrieval within a stock-forecasting task, we demonstrate that memory processes underlie cue use. Participants' cue use varied depending on the relationship between cue validity and the frequency with which cues were seen during learning, providing evidence for the critical role of memory in decision-making.

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The Effects of Time Pressure on Evidence Accumulation in a Complex Multi-Stimulus Environment. HECTOR PALADA and ANDREW NEAL, University of Queensland, ANDREW HEATHCOTE, University of Newcastle, RUSSELL MARTIN, Defence Science Technology Organization, RACHEL TAY, University of Queensland (Sponsored by Michael Humphreys). — We examine the mechanisms by which people adapt their decision priorities and strategies in response to time pressure within a complex environment. Participants completed a simulated unmanned aerial vehicle target detection task. We manipulated time pressure by varying decision deadline and the number of simultaneously presented stimuli. We modeled observed choices using the LBA model (Brown & Heathcote, 2008). Initial fits suggest that the rate of evidence accumulation (i.e., drift rate) and non-decision time mediated the effects of deadline. The number of stimuli presented was mediated by response caution (i.e., threshold). Our results provide initial evidence that the factors determining time pressure affect distinct decision-making processes, and offers further support for the application of the LBA to decision-making in complex applied settings.

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Generalization of Dynamic Models of Basic Decision Making to Complex Judgments of Women’s Sexual Interest. JODI R. SMITH, TERESA TREAT, BOB MCMURRAY, and THOMAS A. FARMER, University of Iowa (Sponsored by Teresa Treat). — This work evaluates the generalizability of dynamic competition models to complex judgments of women's sexual interest and whether individual differences in men's endorsement of rape-supportive attitudes moderates online and offline processing of social intentionality. 152 men viewed full-body photographs of women and moved a computer mouse to indicate whether each woman appeared sexually interested or rejecting. The women varied in dating-relevant affect (sexually interested or rejecting), provocativeness of clothing, and attractiveness. Participants' motor trajectories revealed more curvature toward the incorrect response on conceptually incongruent trials (e.g., women were sexually interested yet dressed conservatively) relative to congruent trials, supporting continuous dynamic decisional competition. Offline congruence effects also were present. Rape-supportive attitudes moderated the online congruence effect (i.e., an intermediate state of behavior) but not the offline congruence effect (i.e., endpoint state of behavior). Notably, online measures predicted incremental variability in attitudes, indicating the relevance of dynamic competition models to complex social perception.

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Discounting Delayed Rewards, Probabilistic Rewards, and Rewards That Are Both Delayed and Probabilistic. ARIANA VANDERVELDT, LEONARD GREEN, and JOEL MYERSON, Washington University in St. Louis (Sponsored by Leonard Green). — Vanderveldt et al. (2015) found that a multiplicative hyperboloid model described discounting of rewards that were both delayed and probabilistic. However, the values of the independent variables (amounts, delays, probabilities) used resulted in subjective value being much more affected by probability than delay, raising the question of whether the findings would generalize to situations in which delay and probability are discounted equivalently. The present study used different values of these independent variables, and delay and probability discounting were assessed separately either before or after they were combined so that those who discounted probabilistic rewards more steeply than delayed rewards could be distinguished from those who did not. Regardless of when the separate tasks were administered and whether participants discounted probabilistic rewards more steeply, the multiplicative hyperboloid model described the combined effects of probability and delay on subjective value (R²>2>.95), attesting to the robustness of Vanderveldt et al’s findings.

Email: Ariana Vanderveldt, ariana.vanderveldt@wustl.edu
• ACTION II •

(2001)

Stuck in the Middle: Temporal Averaging and Attentional Orienting in Time. BENJAMIN DE CORTE, CHARLES FOLK, and MATTHEW MATELL, Villanova University (Sponsored by Charles Folk). — Previous research has shown that attention can be allocated to points in time in response to cues associated with short or long ISIs (e.g., Nobre, 2001). Similar paradigms with rats have shown that when two cues are presented simultaneously, rats respond as if timing an average of the two durations. The present studies tested whether humans would show such temporal averaging when orienting attention in time. Cues were briefly presented and followed by a target after one of eight ISIs. Each cue indicated that the target would most likely appear (80% validity) after a unique ISI (300 or 700ms). During test trials, both cues were presented simultaneously, followed by a random ISI. Individual cues yielded the fastest RTs for targets appearing at the expected ISI. However, compound cues produced the fastest RTs at an intermediate ISI, suggesting that humans engage in temporal averaging which can influence attentional orienting in time. Email: Benjamin De Corte, bdcorte@villanova.edu

(2002)

Does Hand Function Bias the Neural Processing of Visual Targets? An ERP Study. CATHERINE REED, Claremont McKenna College, WILL BUSH, University of Iowa, DAIVIK VYAS, Claremont McKenna College, SHAUN VECERA, University of Iowa. — Behavioral studies indicate facilitated target detection near the palm compared to the back of the hand. Electrophysiological research indicates that the receptive fields of bimodal neurons in monkey cortex encompass the space around the hand. Is this difference because performance measures combine early, sensory-based processing (as measured by single-cell recordings) with later, cognitive influences, resulting in what appears to be a grasping-space bias? In a 50/50 go-no-go paradigm, participants held their hand with stimuli appearing either near the palm or back of the hand. Evoked responses showed equivalent N1 amplitudes for palm vs. back hand conditions. However, palm conditions produced larger P3 amplitude target/non-target differences. Our results reconcile the behavioral/physiological discrepancy. No hand-function biases were found in early visual and bimodal neuronal processing given hand conditions were equidistant from the stimuli. Hand position effects occurred later, at more cognitive processing levels, when targets and non-targets needed to be discriminated. Email: Catherine Reed, clreed@cmc.edu

(2003)

Irrelevant Faces? Not When It Is Your Own. PAMELA BAESS, Universität Hildesheim. — Our own faces are hard to ignore. Responses to one’s own face tend to be faster than responses to other faces, even if task identity is irrelevant (own-face advantage). Two experiments explored the functional underpinnings of the own-face advantage. A solo and partner based Go/No-go paradigm was carried out. Participants were asked to respond to the color of a circle superimposed on different faces (one’s own, partner’s, or stranger’s face). The role of face familiarity of the participants was manipulated: Experiment 1 included faces and agents of a weak familiarity. In contrast, Experiment 2 used faces and agents with a deeper level of familiarity. In both experiments, participants’ own faces were processed faster than the two other faces. However, the results differed based on face familiarity. Taken together, the results seem to suggest an important role of face familiarity underlying the own-face advantage in a face/agent interference task. Email: Pamela Baess, baessp@uni-hildesheim.de

(2004)

Event Files Can Contain Conceptual Information. BLAIRE J. WEIDLER and RICHARD A. ABRAMS, Washington University. — The formation of visuo-motor bindings (event files) has been studied almost exclusively with simple perceptual stimuli (e.g., colors and shapes). The present research examined whether event files can also contain conceptual information, and under what situations conceptual bindings may form. In each of several experiments participants were pre-cued to make a left or right hand response to a subsequently presented word (regardless of its meaning). Next, a picture appeared (that on some trials represented the previously seen word) and participants used a left or right hand response to categorize the image or a feature superimposed on the image. Conceptual information bound with action when the image’s identity was task-relevant to the picture task (e.g., categorizing the image as living or non-living) but not when its identity was irrelevant to the task (e.g., identifying a letter superimposed on the image). Thus, under some circumstances event files can contain conceptual information. Email: Richard A. Abrams, rabrams@wustl.edu

(2005)

The Role of Location and Identity in Predicting Action Targets. FRANK PAPENMEIER, University of Tübingen, IVANINA HENRICHs, Euro-FH University of Applied Sciences, BIRGIT ELSNER, University of Potsdam. — The ability to predict the targets of observed goal-directed actions develops early in life. By studying grasping actions, we investigated what those predictions are based on: a target object’s location or a target object’s identity of previously seen actions. Adults, 24-month-old infants, and 14-month-old infants watched video clips showing a hand being placed on a
table and then grasping one of two distinct objects. Following each trial, the objects swapped their locations and across all trials, the hand grasped either at the same location or at the same object identity (between-subjects manipulation). By recording participants’ gaze, we found that while 14-month-old infants based their action predictions on location information only, adults and 24-month-old infants could also predict action targets based on target identity. That suggests a potential priority of location over identity in action prediction that we further investigated with behavioral experiments in adults. Email: Frank Papenmeier, frank.papenmeier@uni-tuebingen.de

(2006)
Grasping the Future: High Level Intentional Attributions Elicit a Predictive Bias in the Perception of Other’s Actions. MATTHEW HUDSON, TOBY NICHOLSON, ROB ELLIS, and PATRIC BACH, Plymouth University. — Perceptual experience is shaped by our expectations. We investigated if prior knowledge of a person’s intentions elicits a predictive bias in the perception of their actions. Participants observed a video of an actor perform an object directed reach, which suddenly disappeared, after which participants indicated the vanishing point by either comparing it to probe stimuli or pointing at the location on a touch screen. Prior to action onset, we manipulated the observer’s knowledge about the actor’s intention, which either correctly predicted the subsequent action or contradicted it. The perceived end-point of the action was displaced further along the observed action trajectory, and this displacement was enhanced when the action confirmed the actor’s intention. Action perception is predictively biased, assimilating both a bottom-up extrapolation of action kinematics and top-down information about the actor’s goal, revealing a hitherto untested influence of high-level abstract information on visual perception. Email: Matthew Hudson, matthew.hudson@plymouth.ac.uk

• SPATIAL COGNITION I •

(2007)
Emotion Unchained: Facial Expression Modulates Gaze Cueing Under Cognitive Load. ANNA PECCHINENDA and MANUEL PETRUCCI, La Sapienza University of Rome. — Evidence shows that gaze cueing effects are not modulated by the emotional expression of a face (Frischen et al., 2007) unless top-down processes are involved (e.g., Pecchinenda, et al., 2008; Bayliss, et al., 2010; Friesen, et al., 2011). In two experiments we investigated whether gaze cueing effects are not modulated by emotional expression because cognitive control is used to comply with task instructions to ignore face distractors. Participants performed a gaze cueing task while counting backward by 7 or counting forward by 2 (Baddeley et al., 2009). Findings showed that facial expressions modulated gaze cueing effects under high cognitive load. In contrast, gaze cueing effects were not affected by facial expression under low cognitive load, replicating the findings typically reported in literature. Results clearly indicate that cognitive control is used to maintain task priority in the gaze cueing task and reduce interference from emotional distractors (e.g., Brosch et al., 2011). Email: Anna Pecchinenda, anna.pecchinenda@uniroma1.it

(2008)
The Impact of Ostracism on Visuospatial Perspective Taking. JAMES CLINTON, JOSEPH MAGLIANO, and JOHN SKOWRONSKI, Northern Illinois University. — We examined whether a perceiver’s social motivation affected the probability of mentally adopting the viewpoint of another person, known as visuospatial perspective taking (VSPT). Our research extended VSPT research by altering a perceiver’s socio-motivational state via social exclusion before completing a VSPT task. Experiment 1 successfully demonstrated that perceivers spontaneously engaged in VSPT when another person was present in a stimulus photo relative to when another person was absent. Experiment 2 replicated this finding and demonstrated that socially included participants and socially excluded participants did not differ in their tendencies to exhibit VSPT. Experiment 3 replicated Experiment 2 and further demonstrated that, regardless of whether perceivers were exposed to a social inclusion manipulation or were exposed to a social exclusion manipulation, those perceivers tended to engage in VSPT at a rate similar to the rate observed in perceivers who were not exposed to a social motivation manipulation (control condition). These results suggest that the VSPT process operates outside of the influence of social motivations. Email: James Clinton, jclinton1@niu.edu

(2009)
Spatial Abilities, Mathematical Self-Efficacy, Anxiety, and Performance. MEREDITH MINEAR, NATHAN CLEMENTS, KENNETH MCCLURE, JESSIE SCHAEFFER, DAVID MECHAM, and MARK RADICH, University of Wisconsin. — Measures of spatial cognition have been shown to be important in a number of different scientific disciplines including biology, physics, chemistry, computer science, geosciences, engineering and mathematics (Hegarty, 2014). We present the results from a correlational study (N=150) designed to investigate the relationship between two measures of spatial cognition, the Purdue Visualization of Rotations Test (Revised) and the Santa Barbara Solids Test, and students’ self-reported mathematics self-efficacy and anxiety. We found significant gender differences with better performance on the spatial measures and greater math self-efficacy for male students and greater math anxiety for females. We also found small positive relationships (rs = .18) between our spatial measures and mathematical self-efficacy and a similar negative relationship with math anxiety. We will also report data on the ability of these measures to predict performance in college level math courses. Email: Meredith Minear, mereditheminear@gmail.com

(2010)
Navigating in an Emergency: The Effects of Stress and Spatial Ability. DEANNE ADAMS, ALEXANDRA R. AMORATI, CHRISTOPHER HARRISON GALEUCIA, and LAURA CARLSON, University of Notre Dame. —
Navigation in buildings can be affected by various factors, including individual differences (Carlson et al., 2010). The present study examined the effects of stress and spatial ability upon navigation in an emergency situation. Participants completed a shopping task in a virtual mall environment. Control participants were then asked to meet a friend at a far exit, whereas participants in the emergency condition were told that a virtual fire had broken out and to escape at the far exit. Emergency condition participants were more likely to have disfluencies in their escape path, including turning into dead ends and heading in the wrong direction, away from the exit. Participants with low spatial ability were significantly more likely to get lost and to erroneously return to the mall entrance. The results illustrate that under stress individuals are more likely to make navigational errors that significantly impair their escape in emergency situations.

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(2011)
Physical Rotation Reveals Mental Rotation Strategies.
AARON L. GARDONY and HOLLY A. TAYLOR, Tufts University (Sponsored by Holly A. Taylor). — Increasing evidence suggests that different cognitive strategies underlie mental rotation (MR). Here, we investigated MR strategies via physical rotation (PR) behavior, exploring how rotation primes influence strategy selection. Participants either manually rotated block figures (endogenous) or observed them autonomously rotate (exogenous). Then they completed a MR task, making parity judgments of the figures. Concurrent with MR, participants manually rotated a rotational sensor, mirroring their MR. Using data mining techniques, we identified three MR strategies from the physical rotation (PR) data: a motoric strategy akin to physical rotation, a distinct analytic strategy, and a non-motoric “don’t move” strategy. Replicating previous work, we found that participants flexibly and optimally traded off between strategies, differentially biasing them based on trial difficulty. The rotation primes appeared to bias motoric strategy selection but the extent of this bias did not differ between conditions. Overall, the present study suggests that mental rotation strategies are optimally integrated.

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(2012)
Knowing When to Fold ‘em: Strategy and Individual Differences in Paper Folding.
HEATHER BURTE and AARON L. GARDONY, Tufts University, ALLYSON HUTTON, Think3d!, HOLLY A. TAYLOR, Tufts University. — The Paper Folding test (Ekstrom, French, & Harman, 1976) assesses spatial visualization, or the ability to mentally manipulate 2- and 3-dimensional figures. It involves viewing a series of images (probes) wherein a square paper is folded and then a hole is punched through it. Participants then identify the correct pattern of punches in the paper once unfolded, from five options. It is currently unclear how properties of the test (e.g., probe and option characteristics) interact with potential cognitive strategies and individual differences, as the 5-item version does not allow probe and option characteristics to be investigated separately. Therefore, the current research examines two versions of the test: the original 5-item version, and a 1-item version (Yes/No the correct pattern of punches is depicted). This research provides recommendations for updating the Paper Folding test to better identify cognitive strategies and to better assess individual differences in spatial visualization.

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(2013)
Spatial Knowledge of a Non-Euclidean Virtual Maze.
CHRISTOPHER J. WIDDOWSON, RANXIAO FRANCES WANG, University of Illinois Urbana-Champaign. — One of the basic properties of space is its curvature, i.e. whether it is Euclidean (flat) or not (curved). The present study examined how people represent non-Euclidean space using four virtual tunnel mazes. One maze formed a square shape (Euclidean space), while the other three contained a shortened or lengthened path segment using a portal so that the overall maze violated the principles of Euclidean geometry. Participants learned the mazes by freely traversing along the paths, and completed a subsequent map-drawing task to assess their spatial knowledge. The straightness of the path segments was generally preserved. In addition, participants showed two dominant cognitive styles: either attempting to preserve orthogonality of the turning angles, but sacrificing relative distance relations, or vice versa. These results revealed how underlying geometric properties of a non-Euclidean maze are incorporated into a coherent spatial representation.

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(2014)
How to Look and Where to Go: Visual Attention During Map Learning.
ALEKSANDRA KASZOWSKA and AARON L. GARDONY, Tufts University, TAD T. BRUNYE, Tufts University & US Army, GEORGE WOLFORD, Dartmouth College, HOLLY A. TAYLOR, Tufts University. — Navigators can learn environment layouts in two ways. Survey encoding centers around landmark locations and spatial distribution. In contrast, route encoding favors learning particular pathways between landmarks. Spatial cognition studies have long focused on survey and route knowledge development and its impact on navigational success and spatial memory (e.g., Naylor, Taylor, & Chechile, 1999; Foo, William, Duchon, & Tarr, 2005). However the precise mechanisms underlying environment learning remain unknown. The current work addresses this gap by analyzing visual attention deployment during survey learning of a map. Participants studied an aerial view of a virtual town for one minute and subsequently completed navigational and spatial memory assessments. We explored visual scanning strategies underlying survey learning and investigated principles guiding visual attention during environment layout learning. The relationship between spatial memory and eye movements is discussed.

Email: George Wolford, wolford@dartmouth.edu
(2015)
Spatial Configuration Task (SCT) Performance: The Impact of Military Occupational Training. ANNIE JALBERT, Department of National Defence. — Spatial ability is an important component of military occupations. The current selection process of the Canadian Armed Forces (CAF) includes a spatial ability measure, but criterion validity analyses of this measure show weak predictability for occupational training performance. To address current deficiencies, a novel spatial ability measure, the Spatial Configuration Task (SCT) was developed (Ford, Slone, & laria, submitted). The SCT implicates the retrosplenial complex region of the posterior cingulate cortex, which is involved with spatial processing (Epstein, 2008). This study is aimed at analyzing the trainability of the SCT and assessing its predictive ability. A sample of trainee and experienced personnel from two Royal Canadian Navy occupations were used. Differences in performance on the SCT were analyzed and predictive validity analyses compared SCT performance to academic and practical measures of training performance. The implication of the results on spatial ability training and selection will be discussed. Email: Annie Jalbert, annie.jalbert@forces.gc.ca

(2016)
On the Origin of the Default Categorical Structure in Spatial Memory. TYLER THRASH, ETH Zurich, DAVID WALLER, Miami University. — Previous research has found that people tend to divide space mentally along orthogonal axes. This orthogonal-axis organization is often attributed to the use of bodily axes and considered a “default” in spatial memory. However, these findings are also consistent with the possibility that this organization results from available environmental information. We investigated whether this organization represents a default in spatial memory and whether environmental structure underlay its use. After learning locations in the absence of environmental structure, participants’ pointing responses did not appear to rely on orthogonal-axis organizations that were aligned with their own bodies. After learning locations in a structured environment, responses were best explained by orthogonal-axis organizations that were aligned with environmental structure, regardless of body orientation. These findings suggest that orthogonal-axis organizations aligned with bodily axes do not necessarily represent a default in memory and may be attributable to the use of environmental structure available during learning. Email: Tyler Thrash, tyler.thrash@gess.ethz.ch

(2017)
The Use of Vertical Height Cues in Spatial Reorientation. YU DU, MARCIA SPETCH, and WEIMIN MOU, University of Alberta (Sponsored by Marcia Spetch). — The Geometric Module account proposes that geometry (distance and directional information) is always dominant in spatial reorientation relative to other cues in large-scale environments. We investigated whether plane geometry (distance / angle) dominates over vertical cues (wall height) when they are in conflict. Participants learned two locations (opposite corners) in either a rectangular room (with distance information) or a rhombus room (with angle information). Both training rooms had two opposite high walls as height cues. On each trial, participants were disoriented and then asked to locate the correct corners. In testing, the rooms were modified to provide: 1) geometric cues only, 2) height cues only and 3) both height and geometric cues in conflict. People located the correct corners successfully with plane geometry (distance / angle) or height cues alone. When distance information conflicted with height cues, people preferred height cues. When angle information conflicted with height cues, people showed no preference for either cue. These results suggest that humans weight vertical cues (height) differently depending on the type of geometric information available, which is inconsistent with Geometric Module account. Email: Yu Du, du5@ualberta.ca

(2018)
Road-Up, not North-Up: Aligning Cognitive Maps of a Familiar Environment. TAD T. BRUNYE, Tufts University & US Army, HEATHER BURTE, University of California, Santa Barbara, LINDSAY HOUCK and HOLLY A. TAYLOR, Tufts University. — Recent research suggests that cognitive maps of familiar environments feature a north-up orientation. Two experiments tested whether evidence for this feature would emerge when a learned environment’s large-scale features (roads, buildings) are oriented oblique to cardinal axes. Experiment 1 asked pedestrians to spontaneously point north in a campus environment oriented oblique to cardinal axes; results showed high variability and error rates, with participants tending to point parallel or perpendicular to adjacent roads. Experiment 2 asked participants to complete a judgment of relative direction task with initial vectors aligned with either magnetic north, true north, road axes, or oblique to any salient axes. Participants were fastest and most accurate while aligned with road orientations. Sense of direction positively predicted accuracy in both experiments. Together, data suggest that cognitive maps of some familiar environments appear to use roads, not cardinal directions, as a primary reference system for organizing spatial memory. Email: Tad T Brunye, tbrunye01@tufts.edu

Do the Stimuli Match Your Cognitive Style? REYYAN BILGE, Istanbul Sehir University, HOLLY A. TAYLOR, Tufts University. — Spatial representation, the way we habitually think about space, was proposed to be a factor to account for performance difference in Mental Rotation (MR) task, along with gender. Students who are more superior in spatial skills were found to select majors in STEM areas. Based on these findings, current research investigated the effects of stimuli characteristics with participants recruited from Worcester Polytechnic Institute (WPI). Both men and women undergraduates were initially categorized as forming more survey- or landmark-centered representations. One hundred and twelve participants went through an MR task with two modifications: 1) 3-D MR figures were presented along with cut versions to promote a different type of strategy in solving these problems, and 2) block figures were either presented within a 3-D frame or none to understand configurations.
Preliminary analyses showed advantage in rotating whole and un-framed figures. There were no main effects for gender or representation, however the interaction between these individual differences begets further discussion. Email: Reyyan Bilge, reyyanbilge@sehir.edu.tr

(2020)
The Effect of Familiarity on Human Adults’ Use of Geometry and Feature in Reorientation. LIN WANG and WEIMIN MOU, University of Alberta (Sponsored by Weimin Mou). — Two experiments investigated how people use features and geometries to reorient relative to a large scale environment. In an immersive virtual environment, participants learned objects’ location in a crossroad consisting of four streets. The targets’ locations can be specified by a building (features), by the street lengths (geometries), or by both. At test, participants replaced objects’ locations with either or both cues. Participants had both testing cues trials with or without the building being displaced during testing. Furthermore, the familiarity with the environment was manipulated by presenting the same building at the same corner of the same crossroad (familiar) or different buildings at different crossroads (unfamiliar) across trials. The results indicated a competition between cues, in the unfamiliar environment but not in the familiar environment. When buildings were displaced, participants in a familiar environment preferred the geometries to the features although the latter was more reliable as a single testing cue whereas participants’ preference of these two cues in unfamiliar environments was determined by the cue reliability. Email: Lin Wang, lwang16@ualberta.ca

(2021)
The Influence of Timeline Orientation and Presentation Modality on Judgment Formation in a Litigation Context. NEIL SCHWARTZ, California State University, Chico, DAVID BRADLEY SARMENTO, University of Illinois, Chicago. — We investigated how timeline axis and presentation modality influence memory and judgment in a legal context. Participants were instructed to assume the role of a juror in a malpractice case. Participants were shown a narrated timeline in one of three axes (horizontal, vertical, diagonal) and one of two presentation modalities (static-sequential, dynamic). No significant differences in memory of events were found between conditions on a free-recall metric at immediate or one-week delay testing. However, two significant results were shown between dynamic & static sequential conditions after a one-week delay on nine-point rating scale questions. First, participants in the dynamic condition judged the defendant as significantly more guilty. Second, participants in the dynamic condition judged specific actions of the defendant as significantly more inappropriate relative to the conditions under which the actions occurred. Thus, multimedia factors, not necessarily factual or narrative recall, may affect judgments of guilt in malpractice litigation contexts. Email: Neil Schwartz, nschwartz@csuchico.edu

• ASSOCIATIVE LEARNING II •

(2022)
Visual Statistical Learning Enhances Memory for Objects From Triplets and Impairs Memory for Letters Inserted Into Triplets. SACHIO OTSUKA, Doshisha University, JUN SAIKI, Kyoto University. — We examined whether learning statistical regularities influences memory using a visual statistical learning paradigm. In the familiarization phase, participants observed a stream of objects. This stream consisted of structured triplets where three objects were always presented in the same order, and random triplets. In the last part of the familiarization phase, Old Turkic letters were inserted into structured triplets and between structured and random triplets (i.e., control letters). In the subsequent memory test, participants were required to decide whether the letters shown were old or new. The results showed that objects from structured triplets were more likely to be remembered than were those from random triplets, and that letters inserted into the structured triplets were less likely to be remembered than were control letters. These results suggest that visual statistical learning enhances memory for each element in a regular set and impairs memory for letters that disrupt the regularity. Email: Sachio Otsuka, otsuka.sachio@nagoya-u.jp

(2023)
The Two Processes Underlying the Test Effect—Evidence From Event-Related Potentials (ERPs). XIAONAN LIU and DEBORAH TAN, Carnegie Mellon University, YA ZHANG, University of Pittsburgh, XIN XIAO and LYNNE REDER, Carnegie Mellon University (Sponsored by John Anderson). — Theoretical explanations of the testing effect have focused on either a retrieval process or a re-encoding process after retrieval. Based on prior neuroimaging evidence, we propose that both processes contribute to the benefits of testing. To test this account, we recorded ERPs while subjects studied, re-studied or took cued-recall tests of word pairs. ERPs were analyzed based on current and subsequent test accuracy, yielding three conditions: both tests correct, both in correct and correct followed by incorrect. The mean amplitudes of waveforms between 400-700 ms during the first test were highest when both tests were correct and lowest when both were incorrect while the mean amplitudes between 700-1000 ms only differed as a function of subsequent memory, higher when the later test was correct. We interpreted the earlier time window as a component reflecting a retrieval process and the later time window as a component reflecting a re-encoding process. Email: Xiaonan Liu, liuxiaonan87@gmail.com

(2024)
Statistical Learning of Regularities Reduces Memory Constraints on Statistical Learning. JOSHUA R. DE LEEUW and ROBERT GOLDSTONE, Indiana University (Sponsored by David Landy). — Statistical learning is constrained by the processes that support it, including perception, attention, and memory. We present results from two experiments that examine one way in which memory constraints and learning
interact with each other. In the first experiment, learners were more likely to acquire a triple-based chunk if the surrounding information was compressible. In the second experiment, learners were also more likely to acquire a chunk when the surrounding information was familiar and compressible, as opposed to just compressible. We show that computational models of statistical learning which involve an interaction between learning and a compressible memory are able to account for the pattern of results. Our results suggest that statistical learning reduces memory constraints on learning by forming more efficient representations (i.e. chunks) of regular patterns, which in turn improves learning due to stronger memories for previously seen instances of common patterns.

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(2025)
Learning of Time Varying Functions Is Based on Association Between Successive Stimuli. LEE-XIENG YANG and TZU-HSI LEE, National Chengchi University. — In function learning, the to-be-learned function always defines the relationships between stimulus and response. If a function defines the stimulus magnitude by time points, we can call this type of function as time-varying function. Learning of time-varying functions would be different from other functions. Specifically, the correlation between successive stimuli should play an important role in learning such functions. In this study, three experiments were conducted with the correlations as positive high, negative high, and positive low. The results show people perform well when the correlation between successive stimuli is high, no matter whether it is positive or negative. Also, people have difficulty learning the time-varying function with a low correlation between successive stimuli. A simple two-layered neural network model is evident to be able to provide good accounts for the data of all experiments. These results suggest that learning time varying function is based on association between successive stimuli.

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(2026)
Aging and Context Dependency in Causal Learning. DANIELLE LOWRY, SHARON MUTTER, MORGAN BROWN, JESSICA ARNOLD, and MEAGAN LUTTRELL, Western Kentucky University. — Past research suggests that aging leads to a decline in the ability to encode and use context in memory. In this experiment, we investigated whether this age-related change affects older adults’ causal learning. Young and older adults received training on a blocking task (A+ and AX+) followed by extinction for the blocking cue (A-) in either the same or a different context. No age or context effects were observed in blocking, but young adults showed greater context dependency than older adults in extinction. Specifically, young adults showed greater extinction when the blocking cue (A) was extinguished in the same context than a different context, whereas older adults showed similar levels of extinction regardless of context. However, older adults did show greater recovery for the blocked cue (X) when the blocking cue (A) was extinguished in the same context, suggesting that they were not entirely insensitive to context during this causal learning task.

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(2027)
Strategic Variations and Sequential Effects in Young and Older Adults Performing a Fitts’ Task. CELINE POLETTI, RITA SLEIMEN-MALKOUN, PATRICK LEMAIRE, and TEMPRADO JEAN-JACQUES, Aix-Marseille University & CNRS (Sponsored by Patrick Lemaire). — We investigated age-related differences in sequential effects in Fitts’ aiming task. Three sequential effects were investigated: trial sequential difficulty effects (TSDE), strategy sequential difficulty effects (SSDE), and strategy repetition effects (SRE). Results showed that participant were slower on current trials after performing harder trials (TSDE) or harder strategy (SSDE) relative to easier trials or easier strategy. These sequential difficulty effects related to both difficulty and strategy were similar in young and older adults. We also observed that across two successive trials, participants tended to repeat the easier strategy most often and the harder strategy least often, with the strategy of intermediate difficulty in between (SRE). Finally, age-related differences in SRE varied with strategies. These findings contribute to better understanding the processes responsible for sequential effects in sensori-motor tasks and for our understanding of processes underlying sensori-motor performance in young and older adults.

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(2028)
Age Differences in Perceptual Learning and Transfer in Orientation Discrimination. XUAN LI, University of Akron, NAOHIDE YAMAMOTO, Queensland University of Technology, PHILIP ALLEN and KEVIN P. KAUT, University of Akron (Sponsored by Philip Allen). — To determine age differences in effectiveness of perceptual learning for improving perceptual abilities and visual working memory (VWM), we included both healthy younger and older adults in a three-day training of an orientation discrimination task, in which performance on discriminating orientations of grating stimuli was measured with a matching-to-sample psychophysical method. Also, transfers of perceptual learning improvements were assessed by performance on four untrained orientations and performance on a VWM task with a longer inter-stimuli interval. Our results show that both younger and older adults improved discrimination thresholds with similar learning rates and exhibited the specificity of improvements for orientation. Also, older adults obtained a training-based improvement in RTs and transferred improvements in thresholds to the VWM performance. We conclude that through perceptual learning in the present study, older adults can eliminate age-related perceptual declines and further overcome the limitation of using VWM capacity to perform a perceptual task.

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(2029) Positivity Effect in Older Adults’ Source Attributions of To-Be-Remembered and To-Be-Forgotten Stimuli: Product of Enhanced Memory Strength or Decision Bias? SARA NICOLE GALLANT and LIXIA YANG, Ryerson University (Sponsored by Lixia Yang). — We previously found that older adults’ source memory for to-be-remembered (TBR) and to-be-forgotten (TBF) words during item-directed forgetting (DF) was differentially affected by emotion. Consistent with age-related positivity biases to remember positive and avoid negative information, older adults’ source memory was greater for TBR-than TBF-positive words and TBF-than TBR-negative words. Here, through use of a decision bias manipulation, we sought to determine the role of response biases in older adults’ emotional source attributions. Two groups of older adults completed an item-DF task for positive, negative, and neutral words. During recognition, participants were induced into either a liberal or conservative response criterion while attributing TBR, TBF, or New sources to each item. Source attributions in the liberal but not conservative condition were affected by emotion. These results suggest that older adults’ positivity effect in source memory for TBR- and TBF-words may be a product of decision bias during recognition. Email: Sara Nicole Gallant, sgallan@psych.ryerson.ca

(2030) When Older Adults Meet Younger Adults: How Do They Change in Their Problem Solving Behavior and Attitudes? ETSUKO HARADA and HIROTO UNTEN, University of Tsukuba. — Previous studies (Akatsu & Harada, 2008) showed that older adults had difficulty to find out their own ways to use new tools and/or artefacts, compared with younger adults, which was attributed to their goal-dependent behavior, and ageism to themselves (negative attitudes to their abilities to do new things). In this study, the same experiment with a simple tool (toy blocks named KAPLA) was executed with three kinds of groups; older adult pairs, younger adult pairs, and older-and-younger adult pairs, eight pairs each. Although main purpose of the experiment was to see effects on older adults behavior, both older and younger adults showed differences in subjective evaluations on their own activities and products, and behavior and utterances in constructive processes, being more positive in the mixed (Heterogeneration) pairs than in the same-age (Homogeneration) pairs. Some social implication and also hypothesis on underlying cognitive mechanism of those results will be discussed. Email: Etsuko Harada, etharada@human.tsukuba.ac.jp

(2031) Busyness Across the Adult Lifespan: The Busier the Better. SARA B. FESTINI, University of Texas at Dallas. IAN M. MCDONOUGH, University of Alabama, DENISE C. PARK, University of Texas at Dallas. — Sustained engagement in mentally challenging activities has been shown to improve memory in older adults (Park et al., 2014). We hypothesized that a busy schedule may be a proxy for an engaged lifestyle and may facilitate cognition. Here, we examined the relationship between self-reported busyness and cognitive and social variables across the adult lifespan (ages 20-89). Participants (N = 463) from the Dallas Lifespan Brain Study completed the Martin and Park Environmental Demands Questionnaire (MPED) and a neuropsychological battery. Results revealed that busyness peaked in the 30s and decreased thereafter. Women reported being busier than men, except during the busiest decades (30s and 40s). Significant independent predictors of busyness included Age, Daily Novel Activities, Gender, Agreeableness, and Need for Cognition. Further, in a sample of 50-70-year-olds, greater busyness was associated with better processing speed, working memory, episodic memory, reasoning, and vocabulary. Hierarchical regressions showed that busyness accounted for significant additional variance in memory and processing speed, after accounting for age and other social/health variables. Thus, living a busy lifestyle may protect against cognitive decline. Email: Sara B. Festini, sara.festini@utdallas.edu

(2032) Does Acting Experience and College Experience Influence Theory of Mind in Emerging Adulthood? ZACHARY PILOT and USHA LAKSHMANAN, Southern Illinois University Carbondale (Sponsored by Lauren Seifert). — Theory of Mind (ToM) is used in a wide range of behaviors that allow social interactions to be seamless and successful. There is growing interest in the influence of special experiences on ToM development beyond childhood. Actors must analyze myriad aspects of the characters they portray and the contexts in which they appear (Stanislavsky, 1950), requiring advanced ToM. We predicted accuracy and response time on two ToM tasks, The Mind in the Eyes (MiE), and an Empathetic Accuracy (EAP) task by demographic predictors, acting experience, and college experience. Sex, college experience, and acting experience significantly contributed to the model predicting MiE task accuracy, explaining 14.4% of the variance. Women, in general, had higher scores as did participants with more acting experience. College experience however, had a negative relationship with MiE. Sex and acting experience were the strongest predictors in a model explaining 9% of the variance in EAP task accuracy. Email: Zachary Pilot, Zach.pilot@siu.edu

(2033) The Unity and Diversity of Executive Functions Across the Lifespan. BENJAMIN KATZ and PRITI SHAH, University of Michigan (Sponsored by Priti Shah). — A classic study by Miyake et al. (2000) finds that although different executive functions (working memory, task switching, and inhibition) are moderately correlated with each other they remain clearly separable. However, it is uncertain whether or not this pattern of relationships holds for different populations (e.g. education, age). We collected data from over 200,000 individuals who completed a set of online games that targeted different executive functions. An examination of the relationship between these tasks across different ages finds that the separable nature of these functions changes significantly across the lifespan, suggesting that the differential rate of development and decline of executive functions may play a key role in the extent to which they are unitary versus separable. (Benjamin Katz was employed as a game designer at Lumosity.com, where the
data used in this study was collected. However, the focus of this research is unrelated to the efficacy of cognitive training.) Email: Benjamin Katz, benkatz@umich.edu

(2034) Age and Spatial Working Memory in Online Samples. CYNTHIA FLORES, LINDSEY LILIENTHAL, DUNG C. BUI, JOEL MYERSON, and SANDRA HALE, Washington University in St Louis. — Two online experiments examined the relation between spatial working memory and age. Experiment 1, conducted to validate our methodology and use of MTurk workers as participants, replicated two basic findings regarding age and working memory: Participants of all ages remembered more spatial locations on a simple span task than on a complex span task, and the rates of decline in the number of locations remembered with age on simple and complex span tasks were equivalent (Hale et al., 2011). Experiment 2 revealed that presenting the array of possible locations during rehearsal opportunities resulted in higher memory spans than when such environmental support was not provided, as in Lilienthal et al. (2014). Presenting a different array during rehearsal opportunities resulted in lower spans, presumably because it disrupted rehearsal. Importantly, older adults were not more affected than younger adults by such disruption, contrary to common views of the mechanisms underlying cognitive aging. Email: Sandra Hale, sshale@wustl.edu

(2035) Global Cognition Before, Surrounding, and After Ischemic Stroke: The Role of Risk and Protective Factors Varies With Time Among Ischemic Stroke Survivors. LESLIE VAUGHAN and CHERYL BUSHNELL, Wake Forest School of Medicine, CHRISTINA L. BELL, University of Hawaii, MARK A. ESPELAND, Wake Forest School of Medicine. — An estimated 65% of individuals with ischemic stroke have global cognitive impairment. Little is known about the role of cognitive risk and protective factors in pre-, peri-, and post-ischemic stroke phases. Longitudinal changes in global cognition after ischemic stroke are not well characterized, especially in older adults >80 years. We examined global cognition trajectories in 3 phases over a mean (SD) of 8.12 (2.30) years in 159 female ischemic stroke survivors aged 65-79 at baseline using linear mixed models with change points. In separate models controlling for demographics we tested an interaction of baseline risk and protective factors with stroke phase on global cognition. Peri-stroke, higher body mass index (BMI), hypertension, lower optimism, and higher physical function were associated with greater mean decreases in global cognition (all p's <.0001), but were not different from the contrasting level (all p's >.05). Post-stroke, higher BMI, hypertension, lower optimism, and higher physical function were instead protective of global cognitive decline (all contrasting p's <.01). Baseline factors may have either a risk or a protective role in global cognition depending on the stroke phase. Email: Leslie Vaughan, alvaugha@wakehealth.edu

(2036) Aging and Affective Feedback Richness in Decisions From Experience. PETE WEGIER and JULIA SPANIOL, Ryerson University (Sponsored by Julia Spaniol). — Feedback-based learning declines with age, but this decline has been shown to be mediated by emotionally-valenced feedback in rule-learning and set-shifting tasks (Gorlick et al., 2013). In decisions from experience, which require learning prior to making a final decision, the role of feedback has received insufficient attention. Here, younger (N=64) and older (N=64) participants completed an experience-based judgment task in which they sampled from two bags of marbles to discover which contained a higher proportion of a target color. The marble distributions varied from trial to trial. Performance feedback after each decision was either affect-rich (pictures of emotional faces) or affect-poor (the words "CORRECT" and "INCORRECT"). In younger adults, affect-rich feedback reduced judgment accuracy. In contrast, feedback type had no effect on accuracy in older adults. This suggests that the effects of emotional feedback on learning and decision making in younger and older adults are task-dependent. Email: Pete Wegier, me@petewegier.com

• HUMAN LEARNING AND INSTRUCTION II •

(2037) Explicit and Implicit Memory Are Better When Input Presentation Is Embodied. JACLYNN V. SULLIVAN and STEPHEN D. CHRISTMAN, University of Toledo. — There is tentative evidence for a “vicarious” embodied cognition effect, in which passive observers watching another person physically produce input items have better memory than when the input items are presented automatically on a screen (Fiorella & Mayer, 2015). In the current study, participants studied a word list under one of three presentation conditions: an experimental one, in which the experimenter wrote down each word on a whiteboard, and two control conditions: one in which words were presented by a computer all at once in a standard font (mimicking typical laboratory procedures), and a second in which words were presented by a computer in a letter-by-letter fashion in a handwritten font (mimicking the presentation mode of the experimental condition). Total item presentation time was 10 seconds across conditions. The vicariously embodied experimental condition led to better explicit (free recall) and implicit (old minus new word fragment completion) memory performance. Email: Stephen D. Christman, stephen.christman@utoledo.edu

(2038) Bedtime Math With Parents Boosts Children’s Math Achievement. MARJORIE SCHAEFFER, TALLA BERKOWITZ, SUSAN LEVINE, and SIAN LEAH BEILOCK, University of Chicago (Sponsored by Sian Leah Beilock). — A large randomized field experiment of 587 1st-graders tested an educational intervention designed to promote interactions between children and parents around math
and increase our understanding of why some students learn less math across the school-year than others. We expected that the home environment contributes to math learning and parents who are anxious about math tend not to engage in math-related activities with children. We tested whether having children and parents engage in "bedtime math"—vs. typical bedtime stories—could improve children’s math achievement. The intervention, brief numerical story problems delivered via iPad-app, significantly increased children’s math learning across the school-year, especially for children with parents habitually anxious about math. Even brief parent-child interactions around math (couple times per week), greatly boosts children’s math achievement.

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(2039)
Investigating the Relationship Between Executive Functions and Effective Digital Learning. GAL BEN-YEHUDAH, The Open University of Israel, LUCHIA KOVALEV, The Open University of Pittsburgh. — Learning in digital environments is taxing, but heightened executive functions (EFs) could support better learning. For instance, the learner first selects relevant links from a search list; often this requires resolution of conflict between the link’s title and its description. We investigated the relationship between EFs, link selection and learning from hypertext. We tested the prediction that bilinguals would be better at link selection in conflict situations. Participants completed pre and post tests on the study topic. During learning they had to select relevant links, of which half contained conflicting information. There was no group difference on study outcomes or on the EF task-switching paradigm. Bilinguals, however, selected more relevant links in the conflict condition and they reported less disorientation during learning. Perceived disorientation during learning was significantly correlated with poor link selection and lower EFs. These findings suggest that the relationship between EFs and digital learning is complex.

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(2040)
Redundancy Causes Spacing Effects. PHILIP PAVLIK JR., JACKLYN K. MAASS, and HENRY HUA, University of Memphis. — An encoding variability theory of spacing effects explains how the difficulty of reconstruction during repetition encoding controls the long-term effect of spaced learning. ERT says that redundancy during repetition (i.e. easier recall due to less forgetting with narrow spacing between repetitions) causes deficient encoding, which leads to weaker long-term learning. We tested this theory using an experiment with 228 participants, which varied both space and response variability using a cloze sentence paradigm with 3 levels of spacing for 18 sentences about basic statistics, repeated 6 times each. One half of the practice items used the same fill-in for all 6 trials, while the other half were randomly assigned to one of the 4 possible fill-ins for each trial. The posttest (3 more trials of each sentence) measured the learning and transfer of these practice conditions, but again using either constant or random fill-in locations. This resulted in a 2x2 practice-post within-subject variability manipulation. A quantitative model of ERT captured all of the main effects and 2 important interactions in this experiment. Importantly, the results appear difficult to explain using an encoding variability theory of spacing effects.

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(2041)
Whole Number Bias Impedes Understanding of Fraction Equivalence. DAVID WILLIAM BRAITHWAITE and ROBERT S. SIEGLER, Carnegie Mellon University. — Learning fractions is a critical step on the pathway to more advanced mathematics. One obstacle to learning fractions is the whole number bias: a tendency to focus on the separate components of fractions, rather than their overall magnitudes. While prior research has reported effects of whole number bias on comparison of unequal fractions, the present study investigated whether whole number bias impedes understanding of fraction equivalence. 4th and 5th grade students’ magnitude representations of equivalent fractions with either small or large components (e.g. 3/4, 15/20) were assessed using number line estimation and magnitude comparison tasks. Results from both tasks indicated that fractions with larger components were represented as having larger magnitudes. Thus, children do not represent equivalent fractions as equal in magnitude, and whole number bias is a key factor contributing to this misconception. The results imply that reducing whole number bias could improve understanding of fraction equivalence, and point to the importance of developing interventions towards this goal.

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(2042)
Why Does Interleaving the Exemplars of To-Be-Learned Categories Enhance Concept Learning? Testing the Discriminative-Contrast Hypothesis. VERONICA X. YAN, University of California, Los Angeles, FARIA SANA and JOSEPH KIM, McMaster University, ROBERT ALLEN BJORK and ELIZABETH LION BJORK, University of California, Los Angeles. — The discriminative-contrast account posits that the interleaving benefit for category induction arises from the juxtaposition of exemplars from different categories, which highlights discriminative features (Kornell & Bjork, 2008). Consistent with this account, when such juxtaposition has been eliminated by, for example, inserting filler items between to-be-studied exemplars, the interleaving benefit has been eliminated (Kang & Pashler, 2012). We tested the discriminative-contrast account further by varying the number of exemplars within different categories (paintings by 2, 6, or 11 artists) that were juxtaposed against exemplars of a critical to-be-learned category. Whether the set of artists were easy or difficult to discriminate, varying the number of juxtapositions did not affect classification performance on a final test. In fact, increasing the number of categories juxtaposed against the critical category impaired performance (although not significantly so), calling into question one of the dominant theoretical accounts of the interleaving benefit.

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(2043)
Learning from Hypertext. PHILIP PAVLIK JR., LUCHIA KOVALEV, and ELIZABIA BJORK, University of Memphis. — Learning from hypertext is taxing, but heightened executive functions (EFs) could support better learning. We investigated the relationship between EFs, link selection and learning from hypertext. We tested the prediction that bilinguals would be better at link selection in conflict situations. Participants completed pre and post tests on the study topic. During learning they had to select relevant links, of which half contained conflicting information. There was no group difference on study outcomes or on the EF task-switching paradigm. Bilinguals, however, selected more relevant links in the conflict condition and they reported less disorientation during learning. Perceived disorientation during learning was significantly correlated with poor link selection and lower EFs. These findings suggest that the relationship between EFs and digital learning is complex.

Email: Gal Ben-Yehudah, galby@openu.ac.il
(2043) Awareness of Other Students Taking the Exam: Contributions to Neuroticism’s Effects on Test Anxiety. SHARON BERTSCH and ALYSSA MALONE, University of Pittsburgh. — Awareness of other students in the testing environment was hypothesized to mediate the relationship between test anxiety and neuroticism. A total sample of 117 students (ages 18-35, Mage=19.99) from two different courses (Introductory Statistics, Introduction to Psychology) were administered a survey following a class exam. The survey included neuroticism items from the NEO-PI-3, items from the Test Anxiety Inventory and Reaction to Tests Scale, and self-created items that measured awareness. PCA yielded two factors, “internalized comparison,” which measured observation of other students and reflected personal judgments of ability and “external monitoring,” observation of other students without these personal implications. The combination of these factors with neuroticism explained between 48 (intro) and 62% (stats) of the variance in test anxiety scores. In both classes controlling for the effect of internalized comparison reduced the relationship between test anxiety and neuroticism, while controlling for external monitoring increased the correlation. Email: Sharon Bertsch, bertsch@pitt.edu

(2044) Training, Retention, and Transfer of Data Entry Perceptual and Motor Processes. VIVIAN SCHNEIDER and ALICE HEALY, University of Colorado, JAMES A. KOLE, University of Northern Colorado, IMMANUEL BARSHI, NASA Ames Research Center. — Subjects were given 2 days of training, with 3 repetitions of 100 trials per day, on a standard data entry task, in which they typed with their right hand 4-digit numbers shown as numerals. Subsequently in each of 2 tests, 20 min and 2 days later, they were given 100 trials of the standard task followed by 100 trials of 1 of 2 task variants: type with the left hand (left-hand) or translate letters into digits and then type digits (code). Each set of 100 trials on the tests included 50 trained numbers (old) and 50 untrained numbers (new). Significant repetition priming (faster response times to old than new numbers) was found overall and separately for the standard, left-hand, and code tasks. Overall repetition priming indicates retention of the trained sequences. Repetition priming on the left-hand and code conditions implies transfer from training in the standard condition to testing in those conditions. For the left-hand condition, there was transfer of perceptual processes despite changes in motor processes, and for the code condition transfer of motor processes despite changes in perceptual processes. There was thus evidence for both specificity and generalizability of training data entry perceptual and motor processes. Email: Vivian Schneider, vickis@psych.colorado.edu

(2045) Mind Wandering Students Know That They Won’t Learn Much: TUTs and JOLs. CHRISTOPHER WAS and R. BEN HOLLIS, Kent State University. — Mind wandering often leads to poor performance on the given activity. Given the propensity for the mind to wander and related performance deficits, investigating individual differences in mind wandering and the impact on performance seems particularly relevant in an educational setting. Although there is clear evidence that mind wandering (or task unrelated thoughts: TUTs) impair academic performance, it is not clear if students are aware of the impact that their mind wandering has on their learning. In the current study, we had undergraduates watch video over power-points online and take quizzes over the content for course credit. During each 15 minute presentation, students were given six mind wandering probes and then asked to make a judgment of learning (JOL) regarding the content proceeding the probe. Results indicate that when students reported TUTs JOLs were lower and more accurate. Email: Christopher Was, cwas@kent.edu

(2046) Effects of Free Viewing and Cued Viewing on Inductive Learning of Perceptual Stimuli. MICHAEL ROBERTS, DePauw University, TERRI BONEBRIGHT, Hendrix College. — When repeated viewings of category stimuli are available, participants’ memory and inductive learning may be influenced by the fixation sequences used during viewing. In this study, participants viewed three repetitions of each painting from a subset of the Kornell and Bjork (2008) stimuli. During training, participants freely viewed the images (condition 1) or followed a cued sequence of fixations (conditions 2 and 3). For the cued sequences, fixation regions were chosen using Itti and Koch’s salience model (2000), and participants followed either a consistent fixation sequence for the three image repetitions (condition 2) or a variable fixation sequence (condition 3). Recognition, artist identification, and inductive learning to classify additional paintings by the respective artists was superior for participants who viewed the training images freely rather than following either a consistent or variable cued sequence during training. We will discuss this and a follow-up study in the context of active learning. Email: Michael Roberts, michaelroberts@depauw.edu

(2047) Cognitive Coupling During Reading. CAITLIN MILLS, University of Notre Dame, EVAN F. RISKO, University of Waterloo, SIDNEY DMELLO, University of Notre Dame, ARTHUR GRAESSER, University of Memphis (Sponsored by Arthur Graesser). — We hypothesized that cognitively engaged readers should dynamically adjust their reading times with respect to task demands by increasing reading times when difficulty increases and vice versa when difficulty decreases. We tested this hypothesis by analyzing four data sets where participants (N = 491) read research methods texts using a self-paced reading paradigm. Participants self-reported mind wandering in response to pseudorandom auditory thought-probes during reading and completed multiple-choice comprehension assessments after reading. Cognitive coupling was computed by regressing each participant’s paragraph-level reading times on the Flesch Kincaid Grade Level (objective measure of difficulty) of that paragraph. Cognitive coupling was found to be a negative predictor of mind wandering and a positive predictor of comprehension. Cognitive coupling also demonstrated incremental predictive
validity by explaining 44% additional variance over reading time alone. Furthermore, both cognitive coupling and reading time mediated the relationship between mind wandering and comprehension, suggesting a possible mechanism for the disruptive influence of mind wandering on comprehension.

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(2048)
Novel Schema Formation: A Test of Necessary Features. HARRISON STOLL and IRENE P. KAN, Villanova University (Sponsored by Michael Brown). — Cognitive schemas are abstract knowledge structures that are stored in long-term memory, and these organizational structures are thought to guide our behaviors and influence subsequent memory encoding and retrieval. Despite the abundance of research on the effects of schemas on cognition, investigations into the inherent features of schemas are less developed. In a recent paper, Ghosh and Gilboa (2014) identified four necessary features of a schema: an associative network structure; formed on the basis of multiple episodes; the content lacks unit detail, and its structure is adaptable. In our study, we evaluated whether a novel schema formed via probabilistic learning would possess these four features. Whereas the first two features were intrinsic to the task structure, the last two features were assessed directly. Although we found strong support for the notion that the content of a schema lacks unit detail, evidence for schema adaptability was ambiguous.

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(2049)
Effects of Provided and Generated Examples on Declarative Concept Learning. AMANDA ZAMARY and KATHERINE A. RAWSON, Kent State University (Sponsored by Katherine A. Rawson). — Prior research on learning of rule-based concepts (e.g., Pythagorean theorem) suggests that alternating worked examples with problem solving best supports learning for novices. Similarly, research on test-enhanced learning shows that practice tests combined with restudy is more effective than either strategy alone. By analogy, learning of abstract declarative concepts (e.g., confirmation bias) may be best when students study provided concrete examples and generate their own concrete examples in combination. However, no research has examined if this pattern holds for declarative concepts. In the current experiments, students studied provided examples, generated their own examples, or both studied provided examples and generated their own examples. In both experiments, students who studied provided examples performed best on a delayed example classification test and spent less time during the practice phase compared to other example conditions.

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(2050)
Category Learning Benefits From Interleaving, Even When Critical Features Are Highlighted. LUKE G. EGLINGTON and SEAN KANG, Dartmouth College (Sponsored by Sean Kang). — Interleaving the presentation of exemplars from different categories (cf. blocking by category) can enhance learning to distinguish between visually similar categories (Kornell & Bjork, 2008; Kang & Pashler, 2012). Prior research showing this advantage mostly used categories that are not precisely defined (e.g., paintings). In 2 earlier experiments we investigated the effect of interleaving on learning educationally relevant chemical categories that had unique defining features. Although our findings supported the use of interleaving, a question remained as to whether this benefit would persist when the critical features of each category are explicitly highlighted during learning. Two new experiments confirmed the benefit of interleaving even when the critical features were highlighted. Our findings suggest that facilitating the notice of discriminative features is not the only way by which interleaving may benefit category learning, and that interleaving can be a beneficial practice even if the critical features are explicitly taught during instruction.

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(2051)
The Benefits of Interleaving Versus Blocking Study: A Meta-Analytic Review. SARAH DELOZIER and MATTHEW RHODES, Colorado State University (Sponsored by Matthew Rhodes). — What do we know about effective schedules of study? Spacing (i.e., studying across multiple study sessions) one’s study results in greater memory performance for that material than blocking (i.e., “cramming” study into one study session). However, how should one study when there are multiple types of information to learn? Alternating one’s study between two or more types of to-be-learned information, or interleaving, is perhaps most comparable to problems faced by students in real life (i.e., students are likely to have more than one type of information to learn at any given time). However, there is not yet a consensus on whether an interleaved schedule of study benefits memory performance. The present study uses meta-analysis to examine the effects of interleaved versus massed schedules of study on memory performance. Results provide evidence for the effectiveness of interleaving as a schedule of study, and the influence of moderators are discussed.

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(2052)
Examining the Contributions of Desirable Difficulty to the Lag Effect in Recognition Testing. GEOFFREY B. MADDOX, Rhodes College, MARY A. PYC, Dart NeuroScience. — Recent evidence suggests that the desirable difficulty account (Bjork, 1994) can account for the lag effect on a more effortful cued recall test (Maddox & Balota, 2015), but no studies have examined this relationship in recognition testing. In the current study, participants studied a list of words presented once or twice separated by one or five items (Lag 1 and Lag 5 conditions, respectively). Participants were asked to report whether items were being presented for the first or second time (i.e., reminding judgment), and the reminding response latency was used as a proxy for the difficulty of the reminding event (i.e., longer response latencies reflected more difficult reminding). Results revealed significant lag effects following short and long retention intervals, but failed to reveal a relationship between reminding response latency and final recognition.
test performance. Discussion emphasizes how reminding difficulty may differentially influence final test performance in familiarity-based versus recollection-based paradigms. Email: Geoffrey B. Maddox, maddoxg@rhodes.edu

(2053)
When Order Matters: The Effects of Combining Blocked Practice and Interleaved Practice. THOMAS C. TOPPINO and RESHMA GOURAVAJHALA, Villanova University. — Learning categories involves learning what cues are shared among category members while also distinguishing between members of different categories. Acquisition is affected by whether category members are blocked (occur successively) or are interleaved (mixed) with members of other categories. Blocking accentuates within-category comparisons which are most informative when within-category similarity is low. Interleaving highlights between-category comparisons which are most informative when between-category similarity is high. The relative effectiveness of blocking and interleaving for learning categories may depend solely on their relative informational value. However, combined schedules may be better if each form of practice contributes something unique. In our experiments, within- and between-category similarity were either both low (Exp. 1) or both high (Exp. 2). Learning was blocked (B), interleaved (I), or half of each (BI and IB). Informational content strongly affected the value of blocking and interleaving as previous studies had indicated, but it was not the whole story. Email: Thomas C. Toppino, thomas.toppino@villanova.edu

(2054)
Learning Categories From Examples: Can the Virtues of Blocking and Interleaving be Combined to Optimize Inductive Learning? MICHAEL GARCIA, ROBERT ALLEN BJORK, and ELIZABETH LIGON BJORK, University of California, Los Angeles (Sponsored by Robert Allen Bjork). — How exemplars of to-be-learned categories are sequenced has been shown to have a large impact on the inductive learning of those categories, as measured by participants' subsequent ability to classify new exemplars of those categories. Of particular interest, interleaving the exemplars of the to-be-learning categories, rather than blocking the exemplars by category, often enhances such inductive learning (e.g., Kang & Pashler, 2012; Kornell & Bjork, 2008; Wahlheim, Dunlosky, Jacoby 2011), a finding that is in marked contrast to participants' beliefs and impressions. In prior work we have shown that manipulating category boundaries within a material set can cause blocking to be more effective than interleaving, and vice versa. Our current study employs mixed schedules of practice—incorporating aspects of blocked and interleaved practice—and shows enhanced category learning performance regardless of category-boundary manipulations. Email: Michael Garcia, gilkeymarcia@gmail.com

(2055) AUTOBIOGRAPHICAL MEMORY
Forgive and Forget: Does Self-Affirmation Affect Responses to Transgression? SASKIA GIEBL, University of Sheffield. — Forgiveness is important for an individual's health and for a well-functioning society. Recently, research has revealed that forgiveness influences the way in which a transgression is remembered. We built upon these findings by examining the role of self-affirmation (SA)—that is, reflecting on important personal values—on forgiveness and the memory of the offence. Participants (120) recalled situations when they were hurt or offended by others, engaged in one of four SA tasks that were either related or unrelated to the transgression, and then completed a forgiveness questionnaire. Finally, participants were asked to recall their memory of the transgression once again. Our hypothesis was that engagement in the SA activity would facilitate forgiveness and would modify participants' subsequent memory of the transgression. Email: Saskia Giebl, saskia.giebl@gmail.com

(2056) Musical Memories: A Special Subtype of Autobiographical Remembering? JENNIFER M. TALARICO, Lafayette College, ANDREA R. HALPERN, Bucknell University, VICTORIA WILLIAMSON, University of Sheffield. — Undergraduates recalled two personally experienced events, one that was particularly vivid and one that was not (i.e., an ordinary event). Half of the participants recalled events that specifically involved music whereas the other half recalled non-musical events. They provided short written descriptions of the memories and rated their phenomenological and metacognitive properties. Ratings of sensory details, reliving the experience, visceral emotional reactions, rehearsal, and personal importance were significantly lower for non-vivid, non-musical memories than for vivid, non-musical memories and the musical memories (both vivid and non-vivid), which were not different from each other. Qualitative analysis was generally consistent with this pattern. Vivid memories (both including music and not) were rated as more surprising and less ordinary than non-vivid memories, but these variables did not differ as a function of whether the events included music. The plurality of all memories were from the teenage years—an atypical pattern in recall for 18-22 year-olds, but one that is consistent with the reminiscence bump. These data suggest that musically related memories may have features similar to flashbulb memories. Email: Jennifer M. Talarico, talaricj@lafayette.edu
Selective Effects of Memory and Imagination Specificity Inductions on Episodic Details: Evidence for Scene Construction. KEVIN P. MADORE and DANIEL L. SCHACTER, Harvard University. — An episodic specificity induction—brief training in recollecting the details of a recent experience—has been found to enhance memory for past events, simulation of future events, means-end problem solving, and divergent creative thinking. Given this evidence, we test the hypothesis that one process the specificity induction targets is scene construction—assembling and maintaining a mental scene or event. Participants received a memory specificity induction, an imagination specificity induction, or a control induction before completing memory, imagination, and picture description tasks (the latter task involved describing but not constructing a scene). Both specificity inductions led to significant and indistinguishable increases in the number of episodic (but not semantic) details generated during subsequent memory and imagination tasks compared with the control induction. By contrast, there was no effect of induction on any type of detail generated on picture description. These results provide novel evidence that the process of scene construction is targeted by both specificity inductions. Email: Daniel L. Schacter, dls@wjh.harvard.edu

Positivity Biases in Remembering the Past and Imagining the Future: Retrieval-Induced Forgetting as an Underlying Mechanism? SASKIA GIEBL, University of California, Los Angeles, BENJAMIN C. STORM, University of California, Santa Cruz, DOROTHY R. BUCHLI, ELIZABETH LIGON BJORK, and ROBERT A. BJORK, University of California, Los Angeles. — People often think of themselves and their experiences in a more positive light than is objectively justified. Inhibitory control processes may promote this positivity bias by modulating the accessibility of negative thoughts and episodes from the past, which then limits their influence in the construction of imagined future events. We tested this hypothesis by investigating the correlation between retrieval-induced forgetting and the extent to which individuals imagine positive and negative episodic future events. First, we measured performance on a task requiring participants to imagine personal episodic events (either positive or negative), and then correlated that measure with retrieval-induced forgetting. As predicted, individuals who exhibited higher levels of retrieval-induced forgetting imagined fewer negative episodic future events than did individuals who exhibited lower levels of retrieval-induced forgetting. This finding provides new insight into the possible role of retrieval-induced forgetting in autobiographical memory. Email: Elizabeth Ligon Bjork, elbjork@psych.ucla.edu

Induction of a Self-Referential Mode of Memory Encoding in Younger and Older Adults. JONATHAN JACKSON, CINDY LUU, and ANGELA GUTCHESS, Brandeis University. — The self-reference effect (SRE) in memory refers to items that are more likely to be remembered when processed in the context of the self relative to other social or semantic contexts. The SRE is usually constrained to the level of the individual stimulus, preventing its extension as a more naturalistic strategy for memory enhancement. The current study investigated the possible extension of the SRE across multiple stimuli, rather than at the level of individual stimuli within a list. Younger and older adults wrote for ten minutes on an autobiographical experience, a current self-description, or to narrate a visual scene. Participants then completed a task that typically demonstrates an SRE. Those in the narrative condition produced the expected SRE in a surprise free recall test, while those in the self-description and autobiographical conditions produced weaker or nonexistent SREs. Older adults recalled fewer words, but performed like younger adults across conditions. We consider the possible induction of a self-referential mode that may enhance memory beyond the item-level SRE. Email: Jonathan Jackson, jonathan.d.jackson@gmail.com

The Role of Episodic Simulation and Self-Referential Processing in Altruistic Intentions. CASPIAN SAWCZAK, MARY PAT MCANDREWS, and MORRIS MOSCOVITCH, University of Toronto (Sponsored by Morris Moscovitch). — A recent study showed that when people simulate (imagine) future episodes in which they help someone cope with a crisis, they subsequently report being more willing to help that person compared to when they think abstractly about ways to help or when they engage in unrelated mental activity (Gaesser & Schacter, 2014). We extended this work by testing whether imagining a third party helping someone in a crisis would yield a similar effect on one's own willingness to help. Forty-two young adults read vignettes in which individuals needed help with various problems. After reading each one, they either imagined themselves helping the individual; imagined an unfamiliar third party helping; or solved math problems. Finally, they rated their willingness to help the person in each scenario. Imagining oneself helping led to greater willingness to help compared to solving math problems, as did imagining a third party helping. The advantage of imagining oneself over imagining a third party approached significance. These results provide additional evidence that episodic simulation per se can boost empathy, as well as tentative evidence for an amplifying role of self-referential processing in this phenomenon. Email: Caspian Sawczak, caspian.sawczak@utoronto.ca

Retrieval of Past and Future Positive and Negative Autobiographical Experiences. ELVIRA GARCÍA-BAJOS, MALEN MIGUELES, and ALAITZ AIZPURUA, University of the Basque Country. — We studied retrieval-induced forgetting for past or future autobiographical experiences. In the study phase participants were given cues to remember autobiographical experiences in their past or to think about experiences that may occur in their future. In both conditions half of the experiences were positive and half were negative. In the retrieval-practice phase, for past and future experiences, participants retrieved either half of the positive or negative experiences using cued recall or capitals of the world (control groups). Retrieval practice produced recall facilitation for the
practised positive and negative past and future experiences. While retrieval practice on positive experiences did not impair the recall of other positive experiences, we found inhibition for negative past and future experiences when participants practised negative experiences. Furthermore, the retrieval practice on positive future experiences inhibited negative future experiences. The findings may have practical implications for treatment of emotional disorders.

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(2062)
Impact of Personal Goals on Future Thinking in Younger and Older Adults. LEANN K. LAPP, STEPHANIE W. YUNG, RYAN S. WILLIAMS, and JULIA SPANIOL, Ryerson University.

— This study investigated how personal goals influence age differences in episodic future thinking. Personal goals change with age and have been shown to modulate the organization of future thought. It was hypothesized that cueing individuals with age-relevant goals should modulate age differences in episodic details, as well as phenomenological characteristics, of imagined scenarios. Younger (N=36) and older (N=36) adults completed an adapted version of the Future Thinking Interview (Addis et al., 2008) with goal-relevant cues. Narratives were scored with an established protocol to obtain objective measures of episodic and semantic details. Consistent with prior reports, older adults produced fewer episodic details than younger adults. This age difference was greatest for cues related to young-adult goals. In addition, certain subjective features (emotionality, personal significance) showed age differences as a function of goal domain, whereas subjective vividness was unaffected. Overall, the results suggest that goal activation modulates age differences in future thinking.

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(2063)
Remembering Important and Emotional Public Events Across the Life Span. ALI I. TEKCAN, AYSECAN BODUROGLU, AYSU MUTLUTÜRK and ASLI AKTAN ERCIYES, Bogazici University.

— Although there is considerable research addressing the distribution, and characteristics of autobiographical memories across the life-span, relatively few studies exist on collective memories. We collected two waves of data from nationally representative Turkish samples over a 6-month interval to investigate the changes in the most important, happiest, saddest, proudest, most promising, most embarrassing, and most fearful public events in Turkey’s collective memory. Results showed that there was no bump for public events corresponding to the youth period; consequentiality of the events rather than participants’ age-at-event determined frequency of mention. There were subtle yet significant shifts in the most frequently mentioned public events across the 6-month period. Finally, while there was considerable agreement on the most important events (the 1980 Military Coup and the 1999 Marmara Earthquake) across a number of demographic variables, there was substantial impact of politcal identity and socioeconomic status on emotionally-laden public events.

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(2064)
Parallel Effects of Revelation When Remembering the Past and Forecasting the Future. DEANNE WESTERMAN, Binghamton University; SUNY, MARIANNE LLOYD, Seton Hall University; JEREMY MILLER, Willamette University.

— The revelation effect is a robust phenomenon in episodic memory whereby stimuli that immediately follow a simple cognitive task are more likely to garner positive responses on a variety of memory tasks, including autobiographical memory judgments. Two experiments compared the effect of revelation when participants were asked to remember past events or forecast future events. Participants rated a series of plausible life events according to whether each event occurred in their personal past or would occur in the future. A revelation effect emerged for both past and future judgments. Life events that followed an anagram task were judged as more likely to have occurred in the past and judged as more likely to occur in the future. The results are consistent with past studies showing strong parallels between remembering the past and judging the future and suggest that similar decision-making biases are at play in both types of judgments.

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(2065)
Forgetting Self-Relevant Memories in the Think/No Think Task. MEGUMI SENDA and JUN KAWAGUCHI, Nagoya University.

— Research with the Think/No Think (TNT) paradigm shows that we can forget memories when we repeatedly tried not to think. Previous studies using TNT paradigm, they have mainly used common words and pictures, but self relevant information was seldom studied. In our daily life, most critical memories that are wanted to be forgotten are self relevant rather than common information. In this study, it is investigated whether self relevant information can be forgotten using TNT paradigm. First, participants were presented with a pair of a word (object name: e.g., dryer) and a picture of scenery (e.g., Eiffel Tower). They were instructed to remember the pair either imaging their own future trip (self-relevant condition), imaging a trip of other person (other-relevant condition), or without imaging instruction (control condition). Second, they were presented a word and asked to remember a paired picture (Think) or not to think a picture (No Think). Finally, they were required to remember all pictures. In the results, participants of self-relevant condition remembered no-think pictures less than baseline pictures, but not participants of other-relevant condition. This suggested that people can forget self relevant memories.

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(2066)
One Year Follow-Up: Event Representation After Photograph Review. ELAINE H. NIVEN, MARIA K. WOLTERS, and ROBERT LOGIE, University of Edinburgh.

— We assessed event-based memory a year after a busy street festival during which participants had taken snapshots every three minutes for an hour. Recall was tested along with photograph review at the end of the hour, then after a spaced delay of a day, a week, or a month. A year later, a
subset of participants from each interview group recalled the event for a third time; effect of spacing of second review on participants' memory for the original event was examined through contribution of episodic detail to recall (Levine et al., 2002) and amount of photograph-related recall content. While emphasis is often placed on rapid loss of episodic detail, previous studies suggest memory for events can be consistent, or increase, over time, following an initial review (Wynn & Logie, 1998; Campbell et al., 2011). Results showed that after a year, spacing of review did not influence content of recall.

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(2067) Bi-Modal Distribution of Field and Observer Perspectives in Autobiographical Memory. CONNIE SVOB and GABRIEL RADVANSKY, University of Notre Dame. — Memory perspective has long been considered fluid and malleable with people reporting the ability to switch between 1st person (field) and 3rd person (observer) perspectives (Robinson & Swanson, 1993). In the present study we tested the degree to which people recall events from observer perspectives. In Study 1, we collected data through Amazon’s Mechanical Turk website. On a 7-point scale, participants (n = 495) responded to how often they recalled events from an observer perspective. Results revealed a bi-modal distribution for observer and field perspectives. In Study 2, we examined potential predictors of the distinction between the two perspectives. Again, a bi-modal distribution was observed in a sample of university students (n = 72). Consistent with previous research, results suggested that people who lack observer perspectives had more fragmented and less emotionally intense event memories. Moreover, the participants had distinct personality characteristics, including inverse scores on Extraversion and Agreeableness.

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(2068) Thinking About the Future Causes Forgetting of the Past. ANNIE STANFIELD DITTA and BENJAMIN STORM, University of California, Santa Cruz (Sponsored by Jean E. Fox Tree). — Episodic future thinking refers to the act of imagining an event taking place in the future that has not yet occurred. Previous work has shown that imagining the future and remembering the past rely on similar cognitive and neural mechanisms. The present work suggests that they also have similar consequences when it comes to affecting the accessibility of other information in memory. Drawing upon work on retrieval-induced forgetting, which has shown that retrieving some items in memory can cause the forgetting of other items in memory, we show that episodic future thinking can cause related autobiographical memories to be forgotten. This finding suggests that episodic future thinking can act as a memory modifier by changing the extent to which memories from our past can be subsequently retrieved.

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(2069) Changes in Episodic Future Thought as a Function of Identity: Results From a 3-year Longitudinal Study. SAMANTHA ANN DEFFLER and DAVID RUBIN, Duke University (Sponsored by David Rubin). — Imagining oneself in the future is shaped by current emotions, motivations, and identity. We followed the trajectories of undergraduates over four years; during this time some underwent a change in identity (leaving the pre-med program). Students narrated and rated their future career and family life within one month of their arrival at college. Later, those that no longer identified as pre-med (N = 32) and controls (N = 49) again narrated and rated their futures. We examined changes in future thoughts as a function of time and identity change. When imagining their future career, transitioning students reported less setting and used more insight words and fewer “I” pronouns than students who did not transition. When describing their future families, transitioned students used more positive emotion words over time. For both narratives, students who remained pre-med decreased in reported third-person perspective over time.

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(2070) Overcoming Limitations in Traditional Factor Analysis and Structural Equation Modeling When Working With Ordinal-Level Data: Validating an Adapted Autobiographical Memory Functions Scale for Adults Using R-Factor and LISREL. JANA RANSON and JOSEPH FITZGERALD, Wayne State University (Sponsored by Joseph Fitzgerald). — Autobiographical memory (AM) functions theorists have long contended a three-function model (Directive, Self, and Social). Over the last decade, researchers have attempted to empirically validate and expand upon the theoretical model with Likert-type self-report instruments. Validation of these instruments support various expanded models. However, there is a tendency of traditional factor analyses to “overextract” the number of factors. This bias is exacerbated when data are ordinal and/or nonnormal, raising uncertainty about the true size and structure of expanded AM functions models. The current study adapted the seven-function, Likert-type Child-Caregiver Reminiscence (CRS) scale (Kulkofsky & Koh, 2009) for use with a diverse adult sample (N = 1841). A provisional EFA using principle axis factoring was conducted using R-Factor for ordinal data (Basto & Pereira, 2012), followed by several CFAs including multigroup invariance and multitrait-multimethod. Results yielded a restructured six-function model that included the new AM function of perspective taking.

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**RECOGNITION I**

(2071)

**Spatial Memory for Layout Configuration.** KATY VARNER and STEPHEN DOPKINS, George Washington University (Sponsored by Stephen Dopkins). — Much recent work has focused on the role of metric information in memory for object layouts. We have been exploring the role of less refined information in memory for object layouts. We report the results of several studies exploring the possibility that humans remember the general configuration of the objects in a layout, independently of any metric information regarding the objects. For example, we found that participants, when asked to remember a layout of three objects that were separated by unequal distances, were more likely to false alarm to a layout in which the smallest of the inter-object distances was increased by a certain amount (so that the distances between the objects were more nearly equivalent) than to a layout in which the smallest distance was decreased by the same amount (so that the inequality of the inter-object distances was accentuated). Email: Katy Varner, kvarner@gwu.edu

(2072)

**Verbatim Processing Enhances Memory for Emotionally Valenced Pictures.** EMILY A. FARRIS, University of Texas of the Permian Basin, TIMOTHY ODEGARD and MICHAEL TOGLIA, University of North Florida. — Emotion leads to memory enhancements, if arousal is not too extreme. Less is known about specific memory processes driving these effects. The present study used conjoint recognition analyses to investigate the memory processes associated with emotional memory enhancements for negative and positive pictures. Participants studied pictures, which had been rated as negative and arousing, positive and arousing, or neutral and non-arousing before completing a recognition memory test 48 hours later. Negative pictures were recognized more frequently than neutral pictures and this effect was due to increased verbatim-based identity judgments as suggested by the distinctiveness heuristic. When false memories did occur for positive pictures they were due to gist-based similarity judgments as predicted by prior process-based estimates of false memory for negative arousing words. Such results have implications for eyewitness memory when witnesses are asked to recognize the perpetrator or other arousing items. Email: Emily A. Farris, emily.a.farris@gmail.com

(2073)

**The Influence of Mood on Memory for Happy and Angry Faces.** MEIKE KRONEISEN, University of Mannheim. — Facial identification is important because it informs us regarding how to react to an approaching person, who might be friend or foe. In social situations, the emotional expressions of faces are important and very salient aspects of nonverbal communication. Previous work has shown that the facial expression (happy or angry) influences the memory of this face in a later recognition test. A multinomial processing tree model is presented to disentangle old-new discrimination and source memory. Furthermore, we manipulated the emotional state of our participants by showing them either a positive, negative or no film clip before presenting them facial photographs with different expressions. When no film clip was shown, results indicate that old-new discrimination but not source memory is affected by whether a face was presented with a happy or an angry expression. However, a different pattern reveals when the emotional state of the participant was manipulated. Email: Meike Kroneisen, kroneisen@psychologie.uni-mannheim.de

(2074)

**Effects of Fear Versus Anger on Recognition Memory.** AYCAN KAPUCU, Yasar University, ELVAN ARIKAN IYILIKCI, SEDA EROGLU, and SONIA AMADO, Ege University. — Two experiments investigated the effect of specific moods on recognition memory and whether these effects were mediated by the motivational properties of emotions. Anger and fear were chosen as target emotions because both are negative and highly arousing, but fear triggers avoidance motivation, whereas anger triggers approach motivation (Carver & Harmon-Jones, 2009). Anger or fear was induced by having participants write about an emotional autobiographical event, either before encoding (Experiment 1) or before retrieval (Experiment 2). For the memory task, participants studied neutral words and then made old/new recognition decisions on a confidence rating scale. When mood was induced before encoding, anger and fear did not differ in terms of their effects on memory sensitivity (da) or response bias (ca). When mood was induced directly before retrieval, however, angry participants had a more liberal bias to recognize neutral words as studied but were not more accurate in doing so, than fearful participants. Email: Aycan Kapucu, aycankapucu@gmail.com

(2075)

**An EEG Investigation of Memory in Depression: The Effect of Cognitive Processing.** KELLEN GANDY and HEEKYEONG PARK, University of Texas-Arlington (Sponsored by Heekyeong Park). — Individuals with depression tend to show impaired working memory accompanied with disorders in the left frontal cortex (LFC). However, it is unclear whether this memory impairment is related to a selective deficit in different levels of processing. In order to investigate whether the memory impairments in depression are associated with levels of processing, individuals with high or low depression studied items either at a shallow or deep level and their memory for studied items was tested. Both behavioral and electroencephalography (EEG) responses were measured during study and test. As expected, individuals with low depression (controls) showed a memorial benefit of deep processing at test; however individuals with high depression did not show such memorial benefit. Only individuals with low depression displayed greater ERP Old/New effects in LFC when engaged in deeper processing of the items. These findings provide supporting evidence of a selective deficit in deep processing among individuals with depression. Email: Kellen Gandy, kellen.gandy@mavs.uta.edu
Reminders Influence Memory for Context. JONATHAN TULLIS, Indiana University. — Reminders, stimulus driven retrievals of past episodes, allow us to thrive in novel situations because they enable us to retrieve prior relevant information and prompt distant events to influence each other. Reminders have been shown to enhance recall of prior studied content. For example, when learners study king and later queen, their recall for king is enhanced. Across 2 experiments, I examined the impact of remindings on memory for context. Learners studied a list of words presented in four distinct colors. Some words (e.g., table) were followed by a related word (e.g., chair) in the same or different color, while other words were unrelated to all other studied words. Memory for the color of earlier words was enhanced by the later presentation of a related word in the same color, but was impaired by the later presentation of a related word in a different color. Memory for the color of the later word in each pair was unchanged by the presence of an earlier related word. Memory for the context of prior episodes can be enhanced or impaired by the later presentation of related information. Email: Jonathan Tullis, jonathantullis@gmail.com

Better Recognition Memory for Faces When Looking for a Long-Term Partner. JOSEFA N. S. PANDEIRADA, University of Aveiro & Purdue University, NATÁLIA LISANDRA FERNANDES, University of Aveiro, JAMES S. NAIRNE, Purdue University, PATRÍCIA I. MARINHO, University of Aveiro, MARCO VASCONCELLOS, University of Minho. — Recent studies have demonstrated that memory performance is sensitive to fitness-relevant dimensions (e.g., Nairne & Pandeirada, 2008). The present study extends this work by showing biases to retain information in a mating context. In a between-subject design, participants rated faces + a descriptor on how desirable they would be in the context of looking for a long-term mating partner or a working partner. Descriptors were equally desirable, undesirable or irrelevant to each of the contexts. After a short distractor task participants received an old / new recognition task for the faces. Given an “old” response, participants were then asked to identify the type of descriptor previously presented with the face (desirable, undesirable or irrelevant; SM task). Results revealed better recognition memory in the mating context as compared to the worker. SM performance was also higher in the mating context when the participants’ initial classification of the sentences was considered. Email: Josefa N. S. Pandeirada, josefa@ua.pt

Examining Underlying Processes of the Other Race Bias With the EZ Diffusion Model. STACY A. WETMORE, University of London, SCOTT GRONLUND, University of Oklahoma. — The Other-Race Bias (ORB) describes the finding that recognition memory of faces of the same race is superior to that of faces of another race. One social-cognitive account is that the ORB is a function of the tendency for humans to think categorically about out-group members (i.e., cross-race) and individuate in-group members (i.e., same-race). To test this account, we investigated the contributions of the processing components (configural and featural) by manipulating emotion (neutral or angry) and orientation (upright or inverted). Accuracy and response times were summarized by the EZ diffusion model. Orientation did not affect the ORB, but the ORB was reduced with the presentation of angry faces. Results from the model are consistent with differences in the quality of memorial information, and not a change in response bias. Furthermore, the results indicate configural or featural processing does not account for the reduction of the ORB when cross-race faces have angry expressions. Email: Stacy A. Wetmore, Stacy.Wetmore@rhul.ac.uk

Directed Forgetting and Source Reliability. KATHLEEN L. HOURIHAN, Memorial University of Newfoundland. — When exposed to an abundance of information, it is important to be able to select which information is relevant and should be remembered and which information is irrelevant and can be forgotten. This process can be studied using item method directed forgetting (DF). When selecting what to remember and what to forget, how do we account for the reliability of the source of information? In the current study, source reliability was manipulated in a DF paradigm. Specifically, the reliable source presented a greater proportion of Remember (R) than Forget (F) cued words, whereas the opposite was true for the unreliable source. A recognition test showed that more words from the reliable source (both R and F) were recognized than from the unreliable source, but that source reliability did not affect the magnitude of the DF effect. Source memory judgments were more accurate for R words than F words, but only for the reliable source, indicating that participants tended to assume that R words were provided from the reliable source and F words were provided from the unreliable source. These results imply that participants may discount information from an unreliable source, even when the information itself is considered to be important. Email: Kathleen L. Hourihan, khourihan@mun.ca

Let Me Give You a Hint: Recognition Cues Don’t Alter Directed Forgetting in an Item-Method Task. TRACY TAYLOR and LAURA CUTMORE, Dalhousie University, LOTTA PRIES, Maastricht University. — In an item-method directed forgetting paradigm, words are presented one at a time, each followed by an instruction to Remember or Forget; on subsequent tests of explicit memory, performance is better for Remember words than Forget words—a directed forgetting effect. The dominant view is that the directed forgetting effect arises during encoding due to selective rehearsal of Remember over Forget items. We attempted to falsify a strong view that the directed forgetting effect is due only to encoding mechanisms. Following a typical item-method study phase, we presented yes-no recognition test items in one of three colors: 1) green to indicate that the test item might have received a Remember instruction at study; 2) red to indicate that the test item might have received a Forget instruction at study; and, 3) black, which provided no cue to study instruction. In Experiment 1, recognition color
Item-Based Directed Forgetting for Sound Effects and Spoken Words. TYLER M. ENSOR, Memorial University of Newfoundland, TYLER D. BANCROFT, JACLIN A. WHALEY, and WILLIAM HOCKLEY, Wilfrid Laurier University (Sponsored by Aimee Surprenant). — The picture superiority effect (PSE) is one of the most robust phenomena in cognitive science. In a free-recall experiment, Crutcher and Beer (2011) reported an analogous phenomenon in audition, with environmental sounds remembered better than spoken words. We attempted to extend this finding to two additional domains: old-new recognition and item-based directed forgetting. Across three experiments, we found equivalent memory for sounds and words. Additionally, although the standard directed-forgetting effect emerged, its magnitude was unaffected by stimulus type. In Experiment 4, we had subjects rate the memorability of sounds and words. Although subjects predicted that sounds would be easier to remember than words, this was not reflected in the results of a surprise recognition test. We argue that dual coding may be responsible for the PSE in free recall, but that it is an insufficient explanation in recognition. Email: Tyler M. Ensor, tyler.ensor@gmail.com

Move it, Move it: The Impact of Motor Movements on Directed Forgetting for Words. MARK A. OAKES, ALAN SEARLEMAN, and COURTNEY A. GOODRIDGE, St. Lawrence University. — The theory of embodied cognition claims that changes to, and actions by, the body can influence people's ways of thinking, including memory. Recently, discriminability for words and pictures in an incidental memory paradigm was improved when paired with a joystick movement towards oneself than when paired with a joystick movement away from oneself, coined Motor-Induced Remembering (MIR). In the present study, we investigated whether MIR impacts an intentional memory paradigm. Participants were instructed to remember some words and to forget others. Those in the congruent condition moved the joystick toward themselves for “remember” words and away for “forget” words. In the incongruent condition, participants did the reverse. As expected, there was a powerful main effect in favor of later recognizing “remember” words over “forget” words. More importantly, in support of MIR, this effect was more pronounced in the congruent compared to the incongruent condition. Email: Mark A. Oakes, moakes@stlawu.edu

Intentional and Incidental Encoding of Item and Associative Information in the Directed Forgetting Procedure. WILLIAM HOCKLEY, FAHAD N. AHMAD, and ROSEMARY NICHOLSON, Wilfrid Laurier University. — The intentional and incidental encoding of individual words and associations between pairs of words was examined using the item-based directed forgetting procedure. Item and associative recognition were both greater for word pairs followed by a remember (R) than a forget (F) cue. Item, but not associative, discrimination increased with longer presentation time prior to the cue indicating that the encoding of item information benefited from maintenance rehearsal (Experiments 1A and 1B) but the encoding of relational information did not. The incidental encoding of associations was, though, greater for pairs of words with pre-experimental associations (e.g., needle point), but these pre-experimental associations did not benefit memory for pairs that participants tried to remember (Experiment 2). Overall, the pattern of results for R and F-cued pairs mimicked the age-related associative deficit observed by Ahmad, Fernandes and Hockley (2014) in comparisons of associative memory between young and older adults. Email: William Hockley, whockley@wlu.ca

Not Just Noise: Individual Differences in Response Bias in Memory and Reasoning. TINA CHEN, CAREN M. ROTELLO, University of Massachusetts (Sponsored by Caren M. Rotello). — Response bias is a component of decision-making that can be defined as the general willingness to respond a certain way, such as a preference to respond that a recognition memory test item has been previously studied or a tendency to respond that a syllogistic conclusion is logically valid. However, not all individuals have the same response bias. Indeed, response bias may be a stable cognitive trait in memory that differs across individuals (Kantner & Lindsay, 2012, 2014). One predictor of this trait may be cognitive ability because it appears to predict response bias in memory (Zhu et al., 2010) and in reasoning (e.g., Handley & Trippas, 2015). While memory and reasoning have similar decision-making components and may be related (e.g., Heit, Rotello, & Hayes, 2012), this experiment will be the first to demonstrate whether cognitive ability predicts response bias in both tasks. Email: Tina Chen, tinac@psych.umass.edu

Testing Format Affects the Reliability but not the Size of Criterion Shifts in Recognition Memory. BRYAN FRANKS and JASON HICKS, Louisiana State University (Sponsored by Jason Hicks). — We explored individual differences in criterion shifts by investigating whether the recognition test format affects the size and the reliability of shifting behavior across study-test cycles. Participants studied words either one (weak) or four (strong) times and we presented test items with color cues indicative of expected memory strength. Additionally, we varied the testing format between-subjects such that items at test were presented randomly or in differing sizes of like-strength blocks (40 or 10 per block). Participants completed two study-test cycles and we used
the difference in false alarm rates (FARs) between weak- and strong-cued items as our measure of criterion shifting. We observed about a 9% difference between weak and strong FARs on each test which did not vary by test cycle or test format. Regarding reliability, test format influenced shifts such that we found reliable shifts in the random (r = .51) and 10-item (r = .28) but not the 40-item conditions (r = .22). Email: Bryan Franks, bfran19@tigers.lsu.edu

### FACE PROCESSING

**Rare Emotive Faces and Gaze Cueing.** GEOFF COLE, University of Essex, ALAN PICKERING and GUSTAV KUHN, Goldsmiths University of London. — According to the behavioural urgency hypothesis, visual events that signal potential danger will receive attentional priority. However, emotional expressions, such as a threatening face, have failed to consistently modulate gaze following. One possible explanation for these null results is that in the typical gaze cueing procedure, participants are repeatedly exposed to the same emotional expression/s. We employed a relatively novel variant of the gaze cueing paradigm in which participants were presented with two unique (or “rare”) trials during an experimental block. Either two fearful face trials appeared within a block of happy faces or two happy face trials appeared within a block of fearful faces. Results showed that when observers were repeatedly exposed to the same emotional expression gaze cueing was independent of face type. However, when the emotional expression was a rare event, significantly larger cueing occurred for fearful than for happy faces. As well as supporting the behavioural urgency hypothesis and the hypothesis that emotional expression does indeed modulate gaze following, these results provide further evidence that habituation to experimental stimuli can impact upon findings. Email: Geoff Cole, gcole@essex.ac.uk

**Detecting Changes in Others’ Emotions: Evidence From Eye Movements, Personality, and Unaware Memory.** SUSAN T. DAVIS and CHRISTINE KERSHAW, University of Dayton, JOSEPH PAUSZEK, University of Notre Dame, MICHAEL WRIGHT, University of Dayton. — Change blindness (CB) is common for both disruptive and gradual changes, including facial expression of emotion. This contradicts evidence that facial expressions provide highly salient information, and are typically recognized very quickly. Characteristics believed to interact with this type of CB, empathy (sensitivity to others’ emotions) and social awareness (cognizance of what is needed by others) were examined using eye fixations, gaze patterns, and self-report of change detection. Experiment 1 found that changes in a videotaped actor’s facial expression of emotion were better detected than gradual changes in non-emotional stimuli, and correlated with stronger empathy, social awareness, and ocular focus on the actor’s face. Experiment 2 also demonstrated that viewed emotional changes primed faster RTs to later-viewed impoverished pictures of similar emotions. Memory for emotional changes may be stored, but under-reported due to conscious inability to retrieve, and more likely for those with stronger empathic and socially awareness abilities. Email: Susan T. Davis, susan.davis@notes.udayton.edu

## 2086

**Effects of Combat Exposure During Military Service on Facial Expression’s Recognition: Electrophysiological Findings.** DAVID ANAKI, Bar-Ilan University, ADI REUVENI, Haifa University. — Combat veterans often cope with death threatening situations, which may influence their future social and emotional behavior, even if they do not culminate in full scale mental disorders (such as PTSD). The goal of the current study was to examine how exposure to threatening life events affects the neural response, measured by ERPs, to different, visually-seen, facial expressions. Findings revealed several differences between combat and non-combat veterans; First, the early posterior P1 amplitude was smaller for combat than non-combat veterans. In addition, amplitude of the N170 was less negative for combat veterans. Finally, the hemispheric asymmetry of greater neural response in the right hemisphere, usually observed in face perception, was not found for combat veterans. Our findings suggest that combat veterans perceive facial expressions differently than non-combat veterans, due, probably, to the existential significance of facial expressions, acquired during their military service. Email: David Anaki, david.anaki@biu.ac.il

## 2087

**Wrongful Convictions and Stereotypical Black Features: When a Face-Type Facilitates Misidentification.** HEATHER KLEIDER-OFFUTT and AMANDA CLEVINGER, Georgia State University. — Eyewitness misidentification is the leading cause of wrongful convictions and Black men are the most affected by this memory error. A sub-group of Black men who retain ‘stereotypical Black’ facial features (i.e., dark skin, wide lips & nose) are associated with the criminal-Black-man-stereotype more than their non-stereotypical counterparts. The link between face-type and criminality leads to misidentification from lineups in laboratory studies. Extending to real-world cases, we tested among Black men exonerated by the Innocence Project (IP) with DNA evidence, whether stereotypical Black features were more prominent for exonerates convicted on eyewitness misidentification (IP eyewitness) than for non-misidentification reasons (IP other). Results showed that IP–eyewitness exoneration were more stereotypical than IP–other exoneration and non-stereotypical Black faces used in published laboratory studies. Furthermore, IP–eyewitness faces were equally as stereotypical as stereotypical Black faces used in laboratory studies. Results suggest face-type may contribute to eyewitness error and wrongful conviction. Email: Heather Kleider-Offutt, hkleider@gsu.edu

## 2088

**Wrongful Convictions and Stereotypical Black Features: When a Face-Type Facilitates Misidentification.** HEATHER KLEIDER-OFFUTT and AMANDA CLEVINGER, Georgia State University. — Eyewitness misidentification is the leading cause of wrongful convictions and Black men are the most affected by this memory error. A sub-group of Black men who retain ‘stereotypical Black’ facial features (i.e., dark skin, wide lips & nose) are associated with the criminal-Black-man-stereotype more than their non-stereotypical counterparts. The link between face-type and criminality leads to misidentification from lineups in laboratory studies. Extending to real-world cases, we tested among Black men exonerated by the Innocence Project (IP) with DNA evidence, whether stereotypical Black features were more prominent for exonerates convicted on eyewitness misidentification (IP eyewitness) than for non-misidentification reasons (IP other). Results showed that IP–eyewitness exoneration were more stereotypical than IP–other exoneration and non-stereotypical Black faces used in published laboratory studies. Furthermore, IP–eyewitness faces were equally as stereotypical as stereotypical Black faces used in laboratory studies. Results suggest face-type may contribute to eyewitness error and wrongful conviction. Email: Heather Kleider-Offutt, hkleider@gsu.edu
 Casting Criminals: Does Fear Generalize From the ‘Criminal Type Face’ to all Other Faces Within a Race?  
ALEISHA BOND and HEATHER KLEIDER-OFFUTT, Georgia State University (Sponsored by Heather Kleider-Offutt). — Research suggests that stereotypically Black facial features (e.g. broad nose, full lips) are associated with criminality and violence more so than atypical Black features. These fears and stereotypical associations influence jury decisions, eyewitness identification, and voter opinions. Research also suggests that fear of objects (e.g. birds) generalizes from prototypical (e.g., crow) to atypical (e.g., penguin) members of a category. It follows that associated fear across category members would hold true for faces and criminality. Here, participants judged the believability of different face types (stereotypical, atypical) as "actors" applying for roles in a movie (Drug Dealer, Teacher, or Artist) and determined degree of dangerousness. Prior to the judgment tasks, participants were primed with a fictional prison population reflecting a majority of Black or White inmates. Preliminary results suggest that, regardless of prime, people are quick to judge all stereotypical faces as dangerous. However, when primed with Black-featured-White faces, people quickly judge atypical Black faces as dangerous as well. Email: Alesha Bond, abond4@student.gsu.edu

 Memory for Important Faces: The Role of Aging and Social Goals. MARY B. HARGIS and ALAN CASTEL, University of California, Los Angeles. — People want to remember names and faces of individuals they may meet again in the future. While older adults often face memory impairments, they can sometimes selectively remember important information. The present study examined the effect of social goals and need probability (the likelihood of needing information in the future) in this context. Younger and older participants rated how important certain occupations were (e.g., exercise teacher, doctor), and studied faces, names, and occupations of people of varying relevance, based on the likelihood of interacting with that person in the future. Following four study-free recall sessions, a final cued recall test (in which participants viewed each photograph and recalled any associated information) showed benefits of social importance on the recall of names and occupations for both age groups. These findings suggest that with task experience, important information is more likely to be remembered. Email: Alan Castel, castel@psych.ucla.edu

 The Ins and Outs of Face Recognition. MARILYN BOLTZ, Haverford College, AMELIA STILLWELL, Stanford University. — In everyday interaction, we not only tend to categorize people into in vs. out-group but also show a positivity bias toward in-group members. The purpose of the present research was to investigate whether this bias extends to face recognition. Experiment 1 relied on a minimal group design in which participants viewed a set of male and female faces that varied in their in vs. out-group membership and facial expression (positive, neutral, negative). Results from a subsequent recognition task revealed that in-group faces were recognized faster and more accurately when displaying a positive vs. negative expression while out-group faces yielded the opposite pattern of results. Experiment 2 converged upon these findings through a 3AFC task and further revealed a systematic pattern of distortions such that in-group (out-group) faces were misremembered as more positive (negative) than what they actually were. The implications of these findings are discussed relative to social categorization theory. Email: Marilyn Boltz, mboltz@haverford.edu

 The Role of Audiovisual Integration in the Perception of Attractiveness. ALEXIS T. MOOK and AARON MITCHEL, Bucknell University. — While vocal and facial cues to attractiveness are well established, few studies have examined how these signals interact; yet, they often co-occur in real-world scenarios. We investigated the integration of vocal and facial attractiveness, adapting a Garner speeded-classification paradigm. Since greater averageness is attractive, we combined 2, 4, 8, 16 or 32 faces and voices into averaged composites. Participants rated the attractiveness of the face and voice stimuli first in unsensory baseline conditions and then in two separate audiovisual conditions: individual voices or faces were rated (attended domain) while the accompanying face or voice in the unattended domain varied in composite number. Varying the composite number of faces in the unattended domain altered ratings of individual voices, though voice composite number did not influence ratings of individual faces. This suggests that faces are integral to the perception of vocal attractiveness, though voices may not be integral to judging facial attractiveness. Email: Aaron Mitchel, adm018@bucknell.edu

 Don’t Blame the Bartender: Image Size Disparity Increases False Face-Matches. ROBIN FAIN and KEITH LYLE, University of Louisville (Sponsored by Linda Henkel). — Face matching is the act of deciding whether two facial images depict the same person or different people. Face matching often involves disparities in image size, as when comparing driver’s licenses to life-size faces. Two experiments examined how image-size disparity affects face-matching accuracy. Subjects were tested on pairs of facial images (half same, half different) from the Glasgow Face Matching Test. Images were life-size, driver’s-license-size, or passport-photo-size, and paired images were either the same size or different. All possible size combinations were tested in Experiment 1, while only combinations including life-size images were tested in Experiment 2. Both experiments showed that subjects had difficulty with the driver’s license/life-size comparison, which specifically increased the incidence of mistaking different people for being the same. Hence, one of the most common size disparities in face-matching contexts appears to increase an especially high-risk type of error. Email: Robin Fain, rlfain02@louisville.edu
(2005)
Will you Remember my Face? Valence and Arousal in Memory for Facial Identity. STEPHANIE A. KAZANAS and JEANETTE ALTARRIBA, University at Albany, SUNY (Sponsored by Jeanette Altarriba). — The current set of experiments investigated the impact of valence and arousal on memory for faces. A large set of male and female faces were selected from the Karolinska Directed Emotional Faces database and rated for valence and arousal. Faces with positive, negative, and neutral expressions were studied, with neutral expressions presented during the recognition and source memory tasks. In Experiment 1, the negative expressions were angry (matched with happy positive faces on arousal); in Experiment 2, the negative expressions were sad (significantly less arousing than happy positive faces). The Beck Depression Inventory, State-Trait Anxiety Inventory, and Diagnostic Analysis of Nonverbal Behavior were administered to assess their respective roles on memory performance. Results from these experiments indicate an interesting relationship between valence and arousal: An advantage for positive faces over negative faces was observed in Experiment 1 only. Results are discussed with regards to approach-avoidance motivation and its effect on memory. Email: Stephanie A. Kazanas, skazanas@albany.edu

(2006)
Dissociating Sources of Confidence and Accuracy in Facial Recognition Memory: An Investigation of Verbal Description and Encoding Time. DAWN RACHELLE WEATHERFORD and CHRISTOPHER R. WILLIAMS, Arkansas State University, CURT CARLSON and LACY E. KRUEGER, Texas A&M University-Commerce. — Reinitz and colleagues’ multi-dimensional model predicts that memory determines accuracy; whereas, memory and certainty jointly determine confidence. Using faces and scenes, they found that featural-based encoding increases confidence, after controlling for accuracy, and familiarity-based encoding increases accuracy, after controlling for confidence. Although they manipulated stimulus-driven encoding factors across multiple study durations, we explored task-driven encoding factors. Participants studied 24 faces for either 2s or 6s and then performed either a featural description (to encourage featural-based encoding), trait description (to encourage familiarity-based encoding), or counting task after each. Subsequently, participants provided yes/no judgments and confidence ratings for 48 faces. Both description tasks increased accuracy compared to counting. However, trait description produced the highest accuracy at 2s, whereas featural description produced the highest accuracy at 6s. Additionally, description quality differentially predicted confidence and accuracy. We discuss implications regarding the role of encoding factors on underlying dimensions that support confidence and accuracy judgments. Email: Dawn Rachelle Weatherford, dweatherford@astate.edu

• ATTENTION: CAPTURE II •

(2007)
The Potency of Auditory Distractors: More Than Just Attention Capture? DANIELLE A. LUTFI-PROCTOR and EMILY MARIE ELLIOTT, Louisiana State University. — Within the duplex mechanism account, there are two mechanisms of auditory distraction: attention capture and interference-by-process (e.g., Hughes, 2014). Attention capture refers to a stimulus recruiting attention away from a focal task, while interference-by-process refers to two or more processes interfering with one another, with no necessary attentional component. Three experiments were used to examine the respective roles of interference-by-process and attention capture in a cross-modal Stroop-like paradigm. We examined auditory and visual distractors and targets over three different stimulus onset asynchronies (SOAs). We found evidence of both interference-by-process and attention capture, suggesting both mechanisms can be activated simultaneously, and their respective weights may vary in response to task demands. Additionally, the auditory modality was more likely to capture attention than the visual modality. Overall, these results suggest that both the mechanisms of attention capture and interference-by-process can play a role in distraction effects. Email: Emilie Marie Elliott, eelliott@lsu.edu

(2009)
Working Memory Capacity and Switching Attentional Sets: Are Low-Capacity Individuals More Susceptible to Capture by Distractors. JAMIE NAYLOR and MEI-CHING LIEN, Oregon State University, ERIC RUTHRUFF, University of New Mexico (Sponsored by Andre Didierjean). — Within the duplex mechanism account, there are two mechanisms of auditory distraction: attention capture and interference-by-process (e.g., Hughes, 2014). Attention capture refers to a stimulus recruiting attention away from a focal task, whereas, memory and certainty jointly determine confidence. Using faces and scenes, they found that featural-based encoding increases confidence, after controlling for accuracy, and familiarity-based encoding increases accuracy, after controlling for confidence. Although they manipulated stimulus-driven encoding factors across multiple study durations, we explored task-driven encoding factors. Participants studied 24 faces for either 2s or 6s and then performed either a featural description (to encourage featural-based encoding), trait description (to encourage familiarity-based encoding), or counting task after each. Subsequently, participants provided yes/no judgments and confidence ratings for 48 faces. Both description tasks increased accuracy compared to counting. However, trait description produced the highest accuracy at 2s, whereas featural description produced the highest accuracy at 6s. Additionally, description quality differentially predicted confidence and accuracy. We discuss implications regarding the role of encoding factors on underlying dimensions that support confidence and accuracy judgments. Email: Stephanie A. Kazanas, skazanas@albany.edu

(2009)
Surprise-Induced Deafness: Investigating a Bottleneck of Stimulus-Driven Auditory Attention. TAKASHI OBANA and STEPHEN WEE HUN LIM, National University of Singapore, CHRISTOPHER L. ASPLUND, Yale-NUS College. — Human behaviors are guided broadly by two attentional mechanisms: “top-down” (i.e., goal-directed)
versus "bottom-up" (i.e., stimulus-driven). The now-classic attentional blink relies on goal-directed attention, whereas Asplund et al. (JEP: HPP, 2010) showed that stimulus-driven attention can also profoundly impact conscious perception: When a novel, unanticipated, and task-irrelevant stimulus appeared in a rapid serial visual presentation, participants failed to detect a target presented within half a second after the "surprise" stimulus (SS). In the current study, we investigated this phenomenon in an auditory context (hereinafter termed as Surprise-induced Deafness or SiD). A spoken letter SS was embedded within a rapid auditory presentation stream comprised of pure tones; participants failed to detect a target tone that appeared within half a second following the SS, though this effect habituated. The data suggest that the auditory modality is also subject to stimulus-driven attentional limitations, akin to those observed in the visual system. Email: Stephen Wee Hun Lim, psylimwh@nus.edu.sg

(2101) Relationship Between Performance and Susceptibility to Distraction by Irrelevant Events. SIMONA BUETTI and ALEJANDRO LLERAS, University of Illinois. — Can we predict the likelihood that observers will look at entirely irrelevant pictures, while mentally focused on a task? This question is central to our understanding of phenomena like "distracted driving," "inattentive blindness," and other forms of distraction. Counter to current theory, we proposed that looks at irrelevant images not always negatively impact performance on the primary task, but rather, they sometimes reflect the availability of cognitive resources. We monitored eye-movements during a simple auditory go/no-go task while irrelevant pictures appeared on the display. In two groups of participants, we showed that the more demanding the main task was to participants (as indexed by longer RTs, lower accuracy and larger efficiency scores), the less likely they were to make reflexive eye-movements to the irrelevant images. Thus, the better performing participants made more reflexive looks to the images. We also found this pattern in an Inattentional Blindness task: the level of engagement in the central task prior to the inattention trial predicted the likelihood of seeing the unexpected stimulus. Email: Simona Buetti, sbuetti@gmail.com

(2102) Age-Related Differences in Attentional Capture by Affective Pictures: An Event-Related Potential Study. ELLIOTT JARDIN, Cleveland State University; MEI-CHING LIEN, Oregon State University; PHILIP A. ALLEN, The University of Akron (Sponsored by Mei-Ching Lien). — We examined whether an affective picture captures attention when it is irrelevant using an electrophysiological measure of spatial attention (N2pc). Both younger and older adults performed a gender identification task on a "fearful" face presented simultaneously with a neutral face. The target display was preceded by two picture cues (either a positive or threatening picture, paired with a neutral picture). The affective picture cues were 50% valid and 50% invalid for the target location. We found that both the positive and threatening valenced cues showed N2pc amplitudes greater than zero and cue validity effects on response time. Similar patterns were observed for both younger and older adults. We concluded that capture by affective pictures occurs for both age groups. Email: Elliott Jardin, e.jardin@vikes.csuohio.edu

(2103) Film-Clips and Images Induce Fear and Amusement, Driving Different Shifts in Attention: Global Versus Local Processing. SEDA TERZyan and PAUL HAERICH, Loma Linda University (Sponsored by Paul Haerich). — Different emotional states have been implicated in bringing about fundamental changes in attention, with positive emotions promoting "bigger picture" processing (global attention) and negative emotions promoting detail oriented processing (local attention). Decades of research have supported these relationships, but does this well-established link apply for all laboratory emotion induction techniques? We compared emotional images and film clips. Our findings ran counter to predictions in that reaction times following emotional images were significantly faster than those following film clips. The predicted pattern of processing was found following the emotional images, but not following the film-clips, suggesting a qualitative difference between these emotion induction techniques. Specifically, the amusing and neutral film-clips promoted local processing while the fearful film-clips promoted global processing. These potential qualitative differences between IAPS images and emotion inducing film-clips may have important implications for the comparability between similar studies. Email: Seda Terzyan, Sterzyan@gmail.com

(2104) Reward Learning and Control Over Subsequent Visual Attention and Memory. JANE RAYMOND and LILY FITZGIBBON, University of Birmingham. — Attention capture by stimuli associated with reward is thought to support impulsive behavior, yet individual variation and life span development in this propensity remains poorly understood. To investigate we conducted a large-scale, app-based study on healthy adults (25 - 65 years). Participants learned to associate arbitrary images with winning or losing points. These images then served as cues (signs) of upcoming outcomes in a “memory game,” or as distractors in a speeded “attention game.” In the memory game, images seen at one location predicted non-instrumental rewards (goals) presented at another location a short time later. During the sign-goal interval, a rapid series of to-be-remembered images was presented at each location simultaneously, forcing visual orienting toward sign or goal. We report how individual differences in sign versus goal picture memory is related to learning performance, personality measures, and tendency to be distracted by valued and emotional images in the attention task. Email: Jane Raymond, jraymond@bham.ac.uk
(2105) Making the Covert Overt: Eye-Movements Reveal the Misdirection of Gaze and Attention. ANTHONY S. BARNHART, Carthage College, FRANCISCO COSTELA, Scheppens Eye Research Institute, Harvard Medical School, MICHAEL B. MCCAMY, Barrow Neurological Institute, SUSANA MARTINEZ-CONDE and STEPHEN L. MACKNIK, SUNY Downstate Medical Center, STEPHEN GOLDINGER, Arizona State University. — The methods of magicians are gaining widespread popularity in cognitive science as a powerful tool for increasing the ecological validity of experiments on attention and perception. In a series of eye-tracking experiments, participants watched videos of a magic trick, wherein a coin placed beneath a napkin disappears, reappearing under a different napkin. Appropriately deployed attention would allow participants to detect the "secret" event that underlies the illusion (a moving coin), as it happens in full view and is visible for approximately 550 ms. Nevertheless, we observed high rates of inattentional blindness. Unlike prior research, eye-movements during the critical event showed different patterns for participants, depending on whether they saw the moving coin. By adding a distractor task to the magical presentation, we were able to use it to study the timecourse of divided attention via the measurement of microsaccades. We observed that both the onset and direction of microsaccades index task complexity and the locus of covert attention. Email: Anthony S. Barnhart, anthony.barnhart@nau.edu

(2106) Evidence of Active Suppression of Covert and Overt Attentional Capture. NICHOLAS GASPELIN, CARLY J. LEONARD, and STEVEN LUCK, University of California, Davis. — Researchers have long debated whether salient stimuli can automatically capture visual attention. Stimulus-driven theories claim that salient stimuli automatically capture attention, whereas goal-driven theories propose that an individual's intentions determine whether attention is captured. In the current study, we test a hybrid model—the signal suppression hypothesis—which posits that feature singletons automatically generate a bottom-up salience signal, but that this signal can be actively suppressed by a top-down mechanism to prevent attentional capture. We provide two converging lines of evidence for active suppression of task-irrelevant singletons: (1) In a new capture-probe paradigm, a probe at the singleton distractor location is less likely to be recalled than probes at other distractor locations. (2) In an eye-tracking task, the singleton distractor location is less likely to be fixated than other distractor locations. These results are incompatible with purely stimulus-driven and goal-driven models, but support the signal suppression hypothesis. Email: Nicholas Gaspelin, ngaspelin@ucdavis.edu

(2107) Eye Tracking Reveals Behaviour and Attentional Differences in High and Low Spatial Ability Individuals. VICTORIA A. ROACH, GRAHAM M. FRASER, JAMES KRYKLYWY, DEREK MITCHELL, and TIMOTHY D. WILSON, Western University. — We explored how eye movement relates to mental rotation ability (MRA) during the completion of a timed electronic mental rotations test (EMRT). The EMRT was based on the line drawings of Shepherd and Metzler. Individuals chose if block pairs were rotations (same), or mirrored (different) images during eye tracking. Based on a higher EMRT score, we hypothesized that the high MRA (HMRA) group would have shorter average fixation durations (AFD) and attend to different salient regions of the EMRT. Further, correct answers would have fewer fixations and faster average response times, regardless of MRA. Our predictions were confirmed, AFD of the HMRA group was shorter than the Low MRA (LMRA) group F(1,8)=7.99, p=0.022, and the groups attended to different salient regions of the EMRT images (Fisher Exact Test: 12.47, p=0.018); attending to the same regions only 39% of the time. Correct answers demonstrated fewer fixations F(1,8)=18.12, p=0.003, and shorter average response times F(1,8)=23.89, p=0.001. The facility to identify salient areas of images differs with spatial ability both in the timing and locale of attention. These indices may be important factors to consider for improving spatial problem solving skills in LMRA individuals. Email: Timothy D. Wilson, tim.wilson@uwoc.ca

(2108) Load-Induced Numbness: The Role of Perceptual Load in Determining Tactile Awareness. SANDRA MURPHY and POLLY DALTON, Royal Holloway-University of London. — The inattention paradigm has been used extensively within the visual domain (and increasingly within audition) to investigate the links between attention and awareness. Here, we present a new paradigm that extends this approach to the tactile domain. Participants were instructed to detect a tactile probe presented at the same time as a tactile or a visual target discrimination task of either high or low perceptual load. Despite little evidence that tactile perceptual load modulates tactile awareness, high (vs. low) visual perceptual load reduced tactile probe detection performance. This decrease in awareness occurred even though the tactile probe was presented on a large proportion of trials (50%) and was clearly detectable when instructed to ignore the visual perceptual load task. As well as providing some of the first investigations of perceptual load theory in the tactile domain, this study establishes the new phenomenon of load-induced numbness. Email: Sandra Murphy, sandra.murphy@rhul.ac.uk

(2109) Just Can’t Look Away: Singletons in Predictable Locations Are More Distracting. GREG HUFFMAN, JASON RAJSIC, and JAY PRATT, University of Toronto (Sponsored by Timothy N. Welsh). — In a visual search, a salient distractor increases response times (RTs) despite being defined by a feature that is irrelevant to the search. Here, we examined whether advance knowledge of the distractor's location makes it possible to ignore the distractor. We compared performance in blocks in which a distractor moved randomly around the display (random condition), moved predictably around the display (predictable condition), and remained in the same location on every trial (static condition) to a block with no distractor (baseline condition). Surprisingly, RTs in the predictable condition were longer than both the baseline and random
conditions while RTs in the static condition were similar to baseline. Slower RTs in the predictable condition than the random condition indicate that participants attempted to inhibit the distractor based on their knowledge, but that they were unable to do so, suggesting a strong limitation on the ability to inhibit salient, bottom-up information. Email: Greg Huffman, greg.huffman@mail.utoronto.ca

**COGNITIVE CONTROL II**

(2110)
**Attention to Threat, Worry, and the Impact of Cognitive Load.** COLETTE HIRSCH and HUW GOODWIN, King’s College London. — Anxiety is characterised by an attentional bias to threat. Furthermore, individuals with “pathological” levels of trait worry have their attention biased to threatening material at SOAs of 500ms. High and low trait worriers completed a dot probe task (with threat and benign words). The task was performed whilst holding a concurrent digit span in mind on half the trials. A significant main effect of group on the threat bias index revealed that high worriers were biased towards threat more than low worriers. This difference was not qualified by the condition of the concurrent task (no load vs cognitive load). These findings point to the role of habitual bottom-up influences on a bias to threat in pathological worriers. Email: Colette Hirsch, colette.hirsch@kcl.ac.uk

(2111)
**Examining the Relationship Between Multitasking and Working Memory.** CHRIS KOCH, George Fox University, MARY KATE KOCH, Gonzaga University. — Ophir, Nass, and Wagner (2009) found that individuals who multitask more do not necessarily multitask well. Minear et al. (2013) examined the relationships between media multitasking, attention, working memory, self-control and fluid intelligence. They found that high multitaskers reported being more impulsive and did not perform as well on fluid intelligence tasks. However, they did not find evidence to support the idea that high media multitaskers make more task switching errors than low media multitaskers. The present study further examined the relationship between working memory and multitasking. Participants completed the Media Multitasking Index (MMI), Working Memory Questionnaire (WMQ), short version of the IPIP big five personality traits, Beck’s Depression Inventory, a perceived control measure, and a questionnaire about recreation. The results show a number of interesting correlations. For instance, working memory errors were negatively correlated with several personality factors but not with multitasking. Although agreeableness was also correlated with media multitasking, WMQ scores were not related to media multitasking. Recreation, however, was indirectly related to both multitasking and working memory. Email: Chris Koch, ckoch@georgefox.edu

(2112)
**The Effect of Sadness and Moderate Depression on Attentional Control.** ADRIAN VON MUHLENEN, University of Warwick, LAUREN BELL AERA, University of Cambridge, NARAYANAN SRINIVASAN and AMRENDRA SINGH, University of Allahabad. — We present a series of experiments looking at how induced sadness (Experiment 1) or moderate depression (Experiment 2) influences the three functions of attention: alerting, orienting, and executive control using the attention network test (ANT). Results showed no effects on alerting or on orienting, but participants who were sad or moderately depressed showed less flanker interference (i.e., increased executive control) compared to participants who were neither sad nor depressed. Four further experiments looked at the effect of sadness on global/local processing in a compound letter discrimination task. Sadness was induced either through sad pictures from the IAPS dataset (Experiment 3) or through sad videos (Experiment 4). Results showed no effect on the global/local processing bias, neither by the sad pictures nor by the sad videos. Results from an equivalent study using an Eastern-Asian sample (Experiment 5 and 6) replicated this result, showing that possible effects of sadness on global/local processing are not modulated by a culturally related processing bias. Overall, these results suggest that sadness can affects attentional control, but more so at the level of executive control than at the level of spatial processing. Email: Adrian Von Muhlenen, a.vonmuhlenen@warwick.ac.uk

(2113)
**Using Temporal Expectancies to Drive Visual Selective Attention.** ASHLEY BANGERT, AYRAM ESPARZA, ROGELIO MONTELLANO, and ASHLEY VERA, University of Texas at El Paso. — Research has shown that rhythmic auditory signals drive peaks in visual attention that improve performance on simple visuospatial tasks (e.g. detecting a gap in a stimulus) when trials appear at moments predicted by the rhythm (Miller et al., 2013). We conducted two experiments with college students to see whether these benefits generalize to complex visual attention tasks, including 1) a verbal Stroop task and 2) a visuospatial Stroop-like task. Each trial began with a series of 7 isochronous tones. The stimulus was then presented at the moment an 8th tone was expected or ± 76 ms. In both experiments incongruent trial performance was least accurate and slowest when presented earlier than expected and best when presented later than expected. Thus, auditory expectancies may foster the allocation of visual attention in a manner that persists beyond the expected moment to improve selective attention and the ability to resolve competing response goals. Email: Ashley Bangert, asbangert2@utep.edu

(2114)
**The Dynamics of Best Laid Action Plans: Tracing Response Scheduling in Skilled Typing.** LAURENCE PAUL BEHMER and MATTHEW CRUMP, Brooklyn College, CUNY. — How people plan and execute skilled actions remains poorly understood. scheduling is often explained by dynamic competitive queuing: the timing and order of actions reflect momentary changes to action state activation levels.
controlled by inhibitory connections or timing signals. We present a new measure to test predicted momentary values of activation states for completed and to-be-completed actions within an action plan. In four experiments, typists copied a paragraph by responding to a moving colored target letter that usually signaled the next letter (n+1), but sometimes signaled a near past or future letter (n-3,-2,-1,0, +2,+3). In Ex. RIs were shortest for expected letter position (n+1), and grew increasingly longer by backward or forward position: consistent with dynamic inhibition for future and past actions. Ex. shows: a) dynamic inhibition requires an action plan, b) contributes generally to scheduling words and nonsense strings, and c) depends on coding of spatial position.

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(2115) Reconfiguration Costs in Task Switching Revealed by a Probe Task. JÉRÔME SACKUR, École Normale Superieure. — Switching from one task to another is a costly operation. While this observation is non contentious, the search for the cognitive roots of task switch costs has proved surprisingly challenging. Intuitively, it would seem that a task switch requires top-down "reprogramming". However, direct behavioral evidence for such pure reconfiguration processes are few. Here, in two experiments, I show how to probe the system during its preparation stages, by means of an exogenous, neutral task: in a classical cued task-switching experiment, I insert a neutral imperative task, the execution of which does not require processing of the cue. Thus, any switch cost on these neutral trials is by construction unrelated to task execution, and must originate from task preparation. I combine this novel method with drift diffusion modeling, which analyzes response times as the sum of non-decision and decision times. Pure reconfiguration processes are revealed in the form of longer non-decision times for the neutral, probe task after switches than after repetitions. This offers a direct evidence for the insertion of reconfiguration processes in task switching, insulated from task execution.

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(2116) How Sequential Changes in Reward Magnitude Modulate Cognitive Flexibility: Evidence From Voluntary Task Switching. GESINE DREISBACH and KERSTIN FRÖBER, University of Regensburg. — There is much evidence that the prospect of reward modulates cognitive control in terms of more stable behavior. Recent evidence, however, suggests that a sequential increase in reward prospect increases flexible behavior as evidenced by reduced switch costs (Shen & Chun, 2011). In a series of five experiments, we therefore investigated how sequential changes in reward magnitude alter the switch rate in voluntary task switching. We found converging evidence that the repetition of high reward prospect increases cognitive stability as evidenced by a lower voluntary switch rate. Conversely, any sequential change in reward prospect (increase or decrease) as well as unchanged low reward increases cognitive flexibility as evidenced by a higher switch rate. These findings are strong evidence for a mechanism that biases the cognitive system either towards stability or flexibility depending on changing reward prospects. Results will be discussed within the framework of the adaptive gain theory.

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(2117) Predicting High Levels of Multitasking Reduces Between-Task Interactions. RICO FISCHER, U-Dresden, GESINE DREISBACH, University of Regensburg. — The simultaneous handling of two tasks requires shielding of the prioritized primary task (T1) from crosstalk-interference caused by the secondary task (T2), especially when both tasks overlap strongly in time. In the present study we investigated whether crosstalk-interference can be reduced when specific items do not predict the level of interference but instead, the degree of temporal proximity between both tasks. We implemented an item-specific proportion manipulation of temporal task overlap (SOA). Selected stimuli of T1 predicted either short or long SOAs with 80% validity. Importantly, the predictive value of T1 stimuli determined the adjustment of T1 shielding: Crosstalk-interference was significantly reduced for items predicting high temporal task overlap compared to items predicting low temporal task overlap. Importantly, task shielding was not initiated by predicting the actual conflict level between tasks but by specific items predicting conditions in which two tasks are likely to interact (i.e., short versus long SOA). These findings offer new insights into the specificity of contextual bottom-up regulations of cognitive control.

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(2118) Mixing Location-Relevant and Irrelevant Tasks With Hand and Foot Responses. AKIO NISHIMURA, Yasuda Women's University, KEI KURATOMI, Aichi Shukutoku University. — Responses are faster and more accurate when stimulus and response are on the same side than when they are on the opposite sides (spatial correspondence effect). Mixing location-relevant and location-irrelevant tasks affects the spatial correspondence effect. The present study investigates the role of response-set overlap between the location-relevant and location-irrelevant tasks. Stimulus was presented on the left or the right side of the screen in green, red, or white. Participants were required to press left/right button according to the white stimulus location in either compatible or incompatible manner (location-relevant task), and to its color while ignoring its location if the stimulus was green or red (location-irrelevant task). Responses were made with left/right foot in one task, and with left/right hand in the other task. The spatial correspondence effect for the location-irrelevant task was affected by concurrent location-relevant task. Spatial response coding in task representation is discussed.

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(2119) The Role of Relative Salience of Target and Distractor During Selective Attention. CHUNYUE TENG and MYEONG-HO SOHN, The George Washington University. — Perceptual load of the target has been proved to determine the locus of attentional selection. Low load allows surplus
attentional resources for distractor processing, resulting in significant distractor interference, whereas high load exhausted all resources and prevents distraction. However, the dilution account contends that the reduced distractor interference in the high perceptual load condition can be explained by the diluted representation of the distractor. In three experiments, we attempt to further explore the influence of relative salience between target and distractor over selective attention by using the flanker paradigm. Relative salience was manipulated by changing the color, size or luminosity of target and distractor letters. Results showed that distractor interference existed in both high and low distractor salience condition, and higher relative salience of distractor led to higher magnitude of distractor interference. This pattern is consistent across all three experiments, which supports the effect of relative salience on selective attention. Email: Myeong-Ho Sohn, mhsohn@gmail.com

(2120)
Post-Conflict Slowing Effects in Monolingual and Bilingual Children. JOHN GEORGE GRUNDY, ARAM KEYVANI, and ELLEN BIALYSTOK, York University. — Bilingual children are better able to resolve conflict than monolinguals, but the control strategies that they employ following conflict remain unexplored. Here, we examined a post-conflict slowing effect known as the bivalency effect amongst monolingual and bilingual children in second grade. The bivalency effect is the reliably slower response found for univalent trials that appear within a block containing occasional bivalent trials than for performance in a block of purely univalent trials. Children switched between three tasks in one of two block contexts: 1) purely univalent trials, 2) mostly univalent trials with occasional bivalent stimuli. A large post-conflict slowing (bivalency) effect was observed for all children, but the effect was longer lasting for monolingual children. Our interpretation is that bilingual children disengage attention from previous conflict more rapidly than their monolingual counterparts. Email: John George Grundy, jgrundy@gmail.com

(2121)
Negative Emotion Valence Impairs Attention Network Test: The Effect of Stimulus Onset Asynchrony. QI WANG and LILY VONG, Sun Yat-Sen University. — Stimulus emotional valence can modulate attention. However, few studies have examined how emotional valence affects attention networks, consisting of alerting, orienting and executive mechanisms (Posner & Petersen, 1990) and what factors might influence this effect. The present study investigates how stimulus onset asynchrony (SOA) influences the interaction between emotional valence and the orienting or executive mechanisms. The Attention Networks Test (ANT) orienting cues involved either spatially valid or invalid neutral or negative pictures (IAPS: Lang, et al., 2001). An orienting effect supposes enhanced performance with spatially valid cue. Participants differentiated a target arrow from consistent or inconsistent flanker arrows, thus engaging the executive network. The results showed an orienting effect of negative pictures with a 100ms SOA, but the effect flipped with a 150ms and 300ms SOA. Although the executive effect was found for both negative and neutral pictures, participants performed worse in the former condition. Our findings suggest that negative valence could impair orienting and executive networks, but within a specific time window. Email: Qi Wang, qwang0921@gmail.com

(2122)
The Effects of Feedback on Working Memory Performance. NANCY TSAI, SONIA PATEL, and SUSANNE JAEGGI, University of California, Irvine (Sponsored by Susanne Jaeggi). — Working memory (WM) varies greatly amongst individuals. Such variance in WM may reflect differences in conditions that tax the system which include anxiety, pressure, stress, and intrusive thoughts. Findings on the effects of feedback on performance are inconclusive and may be due to individual differences that drive WM function. The present study examines the effects of fictitious positive or negative feedback during a visual N-Back task, and tracks changes in affect, stress, motivation, locus of control, theories of cognitive abilities, as well as other mindset differences that may moderate the relationship between feedback and WM. While the results indicate that participants in the positive feedback condition numerically outperformed participants in the negative feedback condition on the N-Back task, the effect sizes were small. The potential individual differences moderating the effects will be discussed. Email: Nancy Tsai, nancetsai@gmail.com

(2123)
Crossmodal Spatial Congruence Effects: Visual Dominance in Conditions of Increased and Reduced Selection Difficulty. LINDA TOMKO and ROBERT PROCTOR, Purdue University (Sponsored by Kim-Phuong Vu). — We investigated crossmodal spatial congruence effects in the cued modality-switching paradigm of Lukas, Philipp, and Koch (2010). Bimodal auditory and visual spatial-location stimuli were presented simultaneously, and participants responded with a left or right keypress to the left or right location of the stimulus in the cued modality. Results replicated the asymmetric spatial congruence effects reported by Lukas et al., with higher performance cost for spatially incongruent stimuli when the relevant modality was auditory than when it was visual. A similar result pattern was found when the stimulus-response mapping was incompatible, consistent with the view that the visual dominance effect depends on correspondence between the auditory and visual stimulus locations. Blocking the relevant modality to remove uncertainty reduced but did not eliminate the visual dominance effect. Our findings provide broad support for crossmodal visual dominance, even when participants know to direct attention to the auditory modality. Email: Linda Tomko, ltomko@purdue.edu
Mindfulness and Divergent Thinking: The Value of Heart Rate Variability as an Objective Manipulation Check. JULIA KELLER, BRENDA BURGARD, TRAVIS DECURTIS, SANDRA SANTISTEVEN-ANDREWS, CORLAN KELLER, and ERIC RUTHRUFF, University of New Mexico (Sponsored by Eric Ruthruft). — Mindfulness (MF) is a form of mental training that has been linked with more creative problem-solving. Most MF studies recruit participants interested in meditation, and thus are biased towards positive effects. Participants in this study (n=57) signed up for mental training, not mindfulness meditation; 20 had no prior meditation experience. This is also the first such experiment to use an objective measure of MF (heart rate variability, HRV, a physiological correlate of MF) as a manipulation check. Participants were randomly assigned to either MF training or a control condition (a memory exercise), then completed a test of divergent thinking (Unusual Uses Task) before and after mental training. HRV was significantly higher before and after MF training or a control condition (a memory exercise), and higher rates of HRV were negatively correlated with fluency. MF training improved originality in the MF group and higher rates of HRV were negatively correlated with fluency. MF training improved originality while decreasing fluency, suggesting that MF causes people to slow down and produce fewer but more thoughtful responses. Email: Julia Keller, jkelle01@unm.edu

• LETTER AND WORD PROCESSING II •

Case Transition Format and Lexical Decision Performance: Is the Initial Uppercase Advantage General? ALBERT F. SMITH, JULIA C. HARVEY, AZZOLINA, ARIELLE B. CENIN, AMY M. PALINSKI, LOIS M. ROTUNO, and APRIL D. WALTONEN, Cleveland State University. — MIXed-case ITEms are harder to read than homogeneous-case (UPPERCASE or lowercase) items; in general, lexical decisions are slower for mixed-case than homogeneous-case words. We investigated the relationship of performance to format: In one lexical decision experiment, we presented six-letter items in eight formats—uppercase; lowercase; initial uppercase; initial lowercase; final uppercase; final lowercase; first-half uppercase; and first-half lowercase (e.g., travel; TRAVEL; Travel; tRAVEL; travel; TRAVEl; TravEL, and trAVEl). Responses to homogeneous-case words were faster than to mixed-case words; however, response times for initial-uppercase words did not differ from those for homogeneous-case words, and were faster than those for other mixed-case words. To investigate whether holistic properties contribute to the initial-uppercase advantage, in a second experiment, we presented four-letter stimulus items in 16 formats formed by crossing eight case-transition patterns (e.g., bird; BIRD; Bird; bIRD; BIRD; bIRD; bIRD; BiRD) with two spacings (packed, e.g., bird, and spaced, e.g., b i r d). Email: Albert F. Smith, a.f.smith@csuohio.edu

Homograph Priming Effects and Environmental Context. KIMBERLY WEAR, High Point University, DAVID GORFEIN, University of Texas, Dallas. — Theories of homograph processing argue that meaning selection is very brief (e.g. Gernsbacher & St. John, 2001; Simpson & Kang, 1994). Gorfein and colleagues have shown long-term effects of such processing from 10 minutes to 1 week (Gorfein, 2012; Gorfein, Brown, & DeBasi, 2007; Gorfein & Walters, 1989). Are these long term effects due to episodic memory? Episodic memory is dependent on contextual retrieval (e.g., Parker, Dagnall, & Coyle, 2007). The present series of studies investigated environmental context in a homograph priming situation (balanced and unbalanced homographs were used between subjects). Participants viewed images related to the secondary meaning of homographs followed by the auditory presentation of the homograph 0.5 seconds later. Environmental context was manipulated across two sets of homographs (via room change in study 1 and theme of presentation in study 2). Effect of context was assessed using both word association and free recall. Email: Kimberly Wear, kwear@highpoint.edu

Locus of Case Mixing in Visual Word Recognition: What Do Priming Effects Tell Us? LOGAN PEDERSEN and MEI-CHING LIEN, Oregon State University, PHILIP A. ALLEN, University of Akron. — Perea, Vergara-Martínez, and Gomez (2015) claimed a late locus of case mixing in visual word recognition. In their masking priming study, participants performed a lexical-decision task on an uppercase target,
which was preceded by an identity or unrelated prime (e.g., plane or music followed by PLANE, respectively) in lowercase or mixed case. They found similar priming effects (unrelated—identity) for lowercase and mixed-case primes, suggesting case mixing does not impede the early lexical access. In Experiment 1, we used uppercase or lowercase targets. While the uppercase target replicated Perea et al., the priming effects for the lowercase target were larger for lowercase than mixed-case primes. Experiment 2 examined whether the priming effect was caused by lexical access by using a non-lexical, font discrimination task. A larger priming effect was still observed for lowercase than for mixed-case primes. These results suggest an earlier locus for priming caused by a pre-lexical process. Email: Mei-Ching Lien, mei.lien@oregonstate.edu

(2129) Influence of Color-Related Radical’s Function on the Stroop Effect. AIPING XIONG and ROBERT PROCTOR, Purdue University (Sponsored by Robert Proctor). — Luo, Proctor, and Weng (2014) reported a Stroop effect for complex Chinese characters containing a color-related radical (白 [white] or 黑 [black]). This Stroop effect as a function of radical meaning was evident for low-frequency characters but not high-frequency ones, implying that the meanings of the radicals were accessed when processing the less familiar characters. Although the color-related radicals served a semantic function for the low-frequency characters in Luo et al.’s study, they can also serve a phonetic function. Thus, radical function rather than word frequency may be critical. In the present study Chinese participants performed a keypress Stroop color-identification task, with the function of the color radical in low frequency characters varied. A Stroop effect was obtained that did not depend on whether the color radical was semantic or phonetic, implying that low character frequency is the main determinant of whether the radical meaning is accessed. Email: Aiping Xiong, xionga@purdue.edu

(2130) The Influence of Parafoveal Processing of Character N+2 on Saccade-Targeting in Chinese Reading. XUEJUN BAI, YONGSHENG WANG, CHUANLI ZANG, and GUOLI YAN, Tianjin Normal University (Sponsored by Xingshan Li). — Research shows that parafoveal processing affects saccade-targeting when reading word-based alphabetic languages like English. However it is unclear whether parafoveal processing also influences saccade-targeting when reading naturally-unspaced, character-based languages, like Chinese. In the present study, participants read sentences containing a two-character string in which the first (n+1) and second (n+2) characters either combined to form a word or formed two single-character words. The preview of n+2 was manipulated using the boundary paradigm (Rayner, 1975). A boundary was located before character n+1. Prior to the reader’s eyes crossing this boundary, the preview was either identical to n+2 or a pseudo-character replacement. When n+1 and n+2 combined to form a word, the eyes landed closer to that word’s center in the identical than pseudo-character preview conditions. However, no such effect was observed when the characters formed two separate words. These findings reveal that parafoveal processing of character n+2 influences saccade target selection. Email: Xuejun Bai, bxuejun@126.com

(2131) The Skipping of the Function Word “De” (的) in Chinese Reading. CHUANLI ZANG, MANMAN ZHANG, XUEJUN BAI, and GUOLI YAN, Tianjin Normal University, BERNHARD ANGELE, Bournemouth University, SIMON LIVERSEDGE, University of Southampton (Sponsored by Simon Livergedge). — How do readers decide whether to skip or fixate a word? Angele and Rayner (2013) showed that English readers base skipping decisions exclusively on the parafoveal information available, but not the sentential context. Chinese readers may be able to process the parafoveal word more deeply and integrate it with the sentence context before making a skipping decision. In a boundary paradigm experiment (Rayner, 1975), participants read sentences containing a single-character verb (取 meaning get) manipulated with three previews: identity (取); a semantically and syntactically anomalous high frequency function word “De” (的), or a pseudocharacter. The results showed that Chinese readers were more likely to skip the target when the preview was “De” (的) than in either of the other conditions. These results suggest that the decision to skip “De” is not made on the basis of its likelihood given sentential context. Email: Chuanli Zang, dedipsy@yahoo.com

(2132) Letters Are Automatically Categorized as Consonants or Vowels: Interference of Letter Category in the Letter-Matching Task. VIRGINIE DRABS, FABIENNE CHETAIL, ALAIN CONTENT, Université Libre de Bruxelles. — Several strands of evidence indicate that consonant and vowel letters play distinct roles in visual word recognition, suggesting that letters are categorized in two classes already at an early perceptual stage. Here we examined whether letter category modulates performance in the letter-matching task. Participants performed same/different decisions on letter pairs, with either physical identity, nominal identity or categorical identity instructions. In the two first conditions, non-matching trials included letter pairs that belonged to the same letter category (AE, Eo, BF, Cn) or not (AF, Ec, BE, Cu). We reasoned that if letter categorization is fast and automatic, it should be more difficult to decide that two letters are different in terms of physical or nominal identity if they belong to the same category. Significant letter-category interference was observed in the nominal identity condition provided categorization was fast enough relative to nominal identity decisions. Email: Alain Content, alain.content@ulb.ac.be

(2133) The Role of Affix Productivity in Morphological Decomposition: Evidence From ERPs. JOANNA MORRIS, Hampshire College, ZUZANNA PRZEWLOKA, Mt. Holyoke College. — Are complex words decomposed during recognition, or are they recognized as whole units retrieved from memory? Dual-mechanism models balance these competing constraints by proposing that
decomposition may be modulated by properties of the words being processed. Affix productivity may be one dimension along which the distinction between decomposition and storage is drawn. In this masked priming study we measured ERP responses to stem targets preceded by complex primes with either productive or unproductive affixes. We found that the magnitude of priming effects, in both the N250 and N400 components, was significantly greater for primes with high productivity affixes than for primes with low productivity affixes, suggesting that morphological decomposition is modulated by affix productivity. Email: Joanna Morris, jmorris@hampshire.edu

(2134)
Position Flexibility Across Letters and Morphemes. LAURA JEANNE BLAZEJ and ARIEL COHEN-GOLDBERG, Tufts University (Sponsored by Ariel Cohen-Goldberg). — Although it is virtually uncontested that multimorphemic words are decomposed during visual word recognition, relatively little is known about this process. We report two studies investigating how letter strings are identified as morphemes. Mixed results have been found for whether masked transposed letter (TL) priming occurs across morpheme boundaries. We show in two experiments that TL priming occurs across vowel-initial but not consonant-initial suffixes. These results resolve the discrepancy in the literature and indicate letter recognition and decompositional processes interact. In the second study we investigated how English suffix position is encoded. Following Crepaldi et al. (2010), we found that nonwords containing real roots and suffixes are rejected more slowly than control nonwords only in word-final position (e.g., forgetment > forgetmant, but formentget = formantget and mentforget = mantforget). This result (replicated in a second experiment) indicates that suffixes are only recognized word-finally and demonstrates that suffix position is categorically coded. Email: Laura Jeanne Blazej, laura.blazej@tufts.edu

(2135)
The Polysemy Advantage in Lexical Access: The Role of Context Availability and Orthographic Neighborhood Variables. CAITLIN ANN RICE, NATASHA TOKOWICZ, SCOTT H. FRAUNDORE, and TELIER LATONZA LIBURD, University of Pittsburgh. — Despite early reports of an ambiguity disadvantage in lexical processing, recent studies report an ambiguity advantage, which may be limited to words that are polysemous in that they have multiple related senses rather than multiple unrelated meanings (see Eddington & Tokowicz, 2015). This polysemy advantage may be qualified by interactions with other factors. Tokowicz and Kroll (2007) reported an interaction between number of meanings and context availability in lexical decision, but did not clearly distinguish multiple meanings from senses. We used a lexical decision task to test the potential interaction between polysemy and context availability. We controlled for various factors including orthographic neighborhood variables using linear mixed effects models. The polysemy advantage emerged only for words low in context availability. Words higher in context availability were responded to more quickly than words lower in context availability especially when they had more higher frequency orthographic neighbors (e.g., Samson & Pillon, 2004). Email: Natasha Tokowicz, tokowicz@pitt.edu

• PSYCHOLINGUISTICS I •

(2136)
A Culturomics Evaluation of The Kent-Rosanoff Word-Association List as Used in 1910, 1952, and 1997. ALIXANDER M. GALINSKY, JAN BERKHOUT, and ANGELA STOKES, University of South Dakota. (Sponsored by X.T. Wang). — The Kent-Rosanoff word list has been used in word-association research for over 100 years. Using Google Culturomics word-frequency values, we examined the stability of this word list across three discrete epochs from 1910 to 1997, years in which word-association studies were conducted using the K-R list and involving about 1,000 respondents in each study. Culturomics usage values (CUVs) were calculated. Usage values for the 100 Kent-Rosanoff component words were compared and it was found that the rank order of the majority of the words in the list remained essentially the same, and none of the words in the 1910 list had become obsolete or incomprehensible by 1997.CUV analysis indicates that the original 1910 K-R list can still be used as each word in an association study is a prime for all the following words and all three studies presented the exact same words in the exact same order. Email: Alienxander M. Galinsky, alix.galinsky@coyotes.usd.edu

(2137)
Derivational Word Production in Advanced English Learners. LISA KEMP and JANET MCDONALD, Louisiana State University (Sponsored by Janet McDonald). — English derivational morphology (e.g., gold-golden; silver-silvery) is complex, and may be at least partially governed by phonological properties of the base word. Alegre & Gordon (1999) showed that native speakers' ratings of derived nonce words were sensitive to these phonological properties. In this study, we had both native speakers and advanced L2 English learners rate novel base words and derived forms for their degree of similarity to English. Novel derived forms that matched the phonological patterns of existing English words in terms of number of syllables, stress and final phoneme class were rated higher than those that violated these properties by both the native speakers and the L2 learners. In the advanced L2 learner group, there was also a correlation between language experience and the acceptability rating of novel words. These results suggest that English L2 learners are able to acquire and use the phonological patterns underlying English derivation morphology. Email: Lisa Kemp, lkemp4@tigers.lsu.edu
(2138) The Influence of Word Frequency and Aging on Visual Word Recognition. EMILY REBECCA COHEN-SHIKORA and DAVID BALOTA, Washington University in St. Louis (Sponsored by David Balota). — The current study examines the word frequency effect in visual word recognition tasks in young and older adult readers. All models of visual word recognition include a strong role for word frequency but assume different underlying mechanisms, which produce differing predictions for age changes. Prior studies have produced inconsistent results, possibly due to procedural differences and task-specific processes. This study explores the influence of task and age on the word frequency effect. Novel aspects of the study included treating age and word frequency as continuous, and exploring the influence of individual difference variables such as vocabulary and vision. The primary finding is that the word frequency effect is relatively stable across young and older adults. This finding is discussed in reference to previous inconsistent findings in the literature and its implications for current models of visual word recognition. Email: Emily Rebecca Cohen-Shikora, emily.cohenshikora@gmail.com

(2139) Is Semantic Priming (Ir)rational? Insights From the Speeded Word Fragment Completion Task. TOM HEYMAN, University of Leuven, KEITH A. HUTCHISON, Montana State University, GERT STORMS, University of Leuven (Sponsored by Gert Storms). — The present study used the speeded word fragment completion task to examine whether semantic priming is controllable. More specifically, we created a situation where using the prime would have a deleterious effect on target processing. In three experiments, participants were asked to quickly complete word fragments that were missing either the letter a or e (e.g., sh_ve) such that only one of the responses would yield an existing word (shave in this example). Critical fragments were preceded by a briefly presented prime word that was either related (e.g., PUSH) or unrelated (e.g., WRITE) to a prohibited completion of the target (e.g., shave). The data showed that participants took longer to complete fragments like sh_ve in the related condition. This finding is not in line with rational explanations of semantic priming, but instead seems to support a non-adaptive, automatic mechanism. Email: Tom Heyman, tom.heyman@ppw.kuleuven.be

(2140) Effects of Contextual Valence, Arousal, and Concreteness on Visual Word Recognition. BRYOR SNEFJELLA and VICTOR KUPERMAN, McMaster University (Sponsored by Victor Kuperman). — The role of the sensorimotor and affective systems in visual word recognition is hotly debated. Also, little is known about whether concreteness and affect of the contexts in which a word occurs have independent effects on word recognition. We use large corpora and norming mega-studies to evaluate average concreteness, valence (positivity) and arousal of contexts for thousands of words. To test the role of context, we use word recognition mega-studies: the English Lexicon Project (Balota et al., 2007), British Lexicon Project (Keuleers et al., 2012), and recognition memory studies of Cortese et al. (2010, 2014). Importantly, contextual factors explained variance above and beyond that explained by semantic word norms, and generally showed effects in the same direction as word norms. Our findings indicate that lexical representations are influenced not only by how diverse the word’s contexts are (Adelman et al., 2006), but also by the embodied experiences they elicit. Email: Bryor Snejella, snefjeb@mcmaster.ca

(2141) Rapid Lexical Processing Revealed by the Timecourse of ERP Responses. EMMA FOLK and JOSEPH C. TOSCANO, Villanova University. — Classic views of language processing argue that higher-level information (e.g., lexical) is not accessed until lower-level information (e.g., phonological) has been processed. This, in turn, suggests late effects for higher-level information. We studied the timecourse of lexical processing in an event-related potential (ERP) experiment with a component-independent design. We controlled for acoustic differences using minimal pairs varying in voicing: For every pair with a voiced word (BADGE/padge) there was a corresponding pair with a voiceless word (baint/PAINT). Word onsets were cross-spliced to cancel out acoustic differences, allowing us to examine lexical effects independently of phonological effects. We measured when differences related to lexical status were first observed and found that ERP waveforms diverged approximately 60 ms after the mean point of disambiguation in nonword stimuli, suggesting that lexical processing occurs extremely rapidly. We discuss how these results and the timecourse of phonological and lexical processing inform models of language comprehension. Email: Joseph C. Toscano, joseph.toscano@villanova.edu

(2142) Sound Symbolism in French and English First Names. DAVID M. SIDHU, University of Calgary, JEAN SAINT-AUBIN, Universite de Moncton, PENNY PEXMAN, University of Calgary, (Sponsored by Penny Pexman). — The Bouba/Kiki effect is the demonstration that certain phonemes tend to be associated with either roundness or sharpness; it contrasts with the notion that language is arbitrary. The Bouba/Kiki effect has traditionally been limited to nonwords. Recently, however, Sidhu and Pexman (2015) demonstrated that English speakers show the effect for real English first names (e.g., Bob/Kirk). If this relationship between phonemes and meaning in existing labels represents a fundamental aspect of language, it should generalize across languages and populations. In Experiment 1, we tested this using French names in a French speaking population, and replicated the findings of Sidhu and Pexman (2015). We also established that orthography plays little role (via auditory presentation in Experiment 2, and by directly manipulating font in Experiment 3), implicating the names’ phonemes in the effect. These results suggest a generalized association between phonemes and meaning, even for existing labels. Email: David M Sidhu, dsidhu@ucalgary.ca
(2143)

I Remember That Thuomp is Large: Sound Symbolism Effects in Associative Memory. MELISSA PREZIOSI and JENNIFER COANE, Colby College (Sponsored by Jennifer Coane). — Arbitrariness is the language universal that posits that meanings and sounds within lexical units are unrelated. According to the principle of sound symbolism, however, individual phonemes can convey meaning, such as size. Back and front vowels and plosives and fricatives typically convey largeness and smallness, respectively. Congruent pairings of sounds and meaning can facilitate learning of novel words and nonword-shape associations. In the present studies, we developed a large set of nonwords containing phonemes associated with large and small size. Separate groups of participants normed the nonwords using a continuous size judgment instead of a binary choice task and provided open-ended definitions. Nonwords containing “small” sounds (e.g., evie) were rated as smaller than “large” nonwords (e.g., thuomp) and the definitions further reflected sound symbolism effects. Furthermore, congruent nonword-definition pairings were remembered better than incongruent ones on a memory test. Sound symbolism effects can facilitate learning and retention of definitions. Email: Melissa Preziosi, melissapreziosi@gmail.com

(2144)

Context Effects and Spoken Word Recognition of Chinese: An Eye-Tracking Study. MICHAEL C. W. YIP and MINNA M. ZHAI, The Hong Kong Institute of Education. — An eye-tracking experiment was conducted to examine the effects of sentence context and other lexical information on spoken word recognition processes in Chinese. Sixty native Mandarin listeners were recruited to participate in the eye-tracking experiment. In this experiment, listeners were asked to listen carefully to a spoken sentence, ended with an ambiguous word (Chinese homophone), and look attentively at different Chinese characters or different pictures presented on the computer screen. Types of sentence context and other lexical information were manipulated in the experiment. Results revealed that (1) sentence context had an early effect on the disambiguation processes; (2) sentence context interacted with frequency of the individual meanings of the ambiguous word during lexical access; and (3) phonological information of the distracters had only a minimal effect on the spoken word recognition processes. Finally, the patterns of eye-tracking results seemed to favor an interactive approach in spoken word recognition. Email: Michael C. W. Yip, mcwyip@ied.edu.hk

(2145)

The Influence of Network Density on Spoken Word Recognition. CYNTHIA S. Q. SIEW (Graduate Travel Award Recipient) and MICHAEL VITEVITCH, University of Kansas (Sponsored by Michael Vitevitch). — Network Science has been used to study the organization of phonological word forms in the mental lexicon (Vitevitch, 2008). This paper investigates the influence of another Network Science measure, network density on spoken language processing. Network density measures the density of connections that exist among a word’s immediate phonological neighbors (i.e., 1-hop neighbors), as well as among the neighbors of the neighbors (i.e., 2-hop neighbors). In both word naming and lexical decision tasks, words with low network density were recognized more quickly than words with high network density. The results showed that spoken word recognition is influenced by the level of connectivity among distant neighbors of the target word; a finding that is not easily accommodated by current models of spoken word recognition. A diffusion of activation mechanism implemented within the network structure of the mental lexicon is proposed to account for the present findings. Email: Cynthia S. Q. Siew, cyntsiewsq@gmail.com

(2146)

The Influence of Phonology on the Morphological Decomposition of Pseudo-Compound Words During Typing Tasks. JUANA PARK, CHRISTINA GAGNE, and THOMAS SPALDING, University of Alberta, (Sponsored by Thomas Spalding). — Previous studies showed that when people type pseudo-compounds (lot-ion), they pause between the pseudo-constituents, suggesting that, even though pseudo-compounds lack morphemic structure, they undergo morphological decomposition. We classified pseudo-compounds according to the phonological consistency of each pseudo-constituent (pump is consistent because it keeps its original pronunciation in pumpkin, whereas ion is inconsistent in lotion). We examined whether phonological consistency affects how people process the pseudo-constituents that become available. The typing time for the last letter of the first pseudo-morpheme (t in lot-ion) showed an interaction between the phonological consistency of the first and the second pseudo-constituent. Participants were slower when the consistencies of the two pseudo-constituents were different (consistent-inconsistent or inconsistent-consistent) than when they remained the same (consistent-consistent or inconsistent-inconsistent). This suggests that when the consistency changes from one pseudo-constituent to another, this creates a conflict that makes it more difficult to recompose the pseudo-compounds that were morphologically decomposed. Email: Juana Park, juana@ualberta.ca

(2147)

Polysemy: Core-Lexical Representations in Production. LEON LI, L. ROBERT SLEVc, University of Maryland (Sponsored by L. Robert Slevc). — A homophone is a word with multiple, unrelated meanings; a polysemic word with multiple, related senses. Many studies using comprehension-based measures suggest that polysemes’ senses are representationally unified, whereas homophones’ meanings are representationally separate. Less is known about the representations of polysemes compared to homophones in language production. In this study, speakers named pictures after reading sentence fragments that primed polysemes and homophones either as semantic competitors to the pictures, or as indirect competitors to the pictures (e.g., a homophone of a semantic competitor to a picture, or a polysemous sense of a semantic competitor to a picture). Homophones elicited more intrusions when primed as semantic competitors than when primed as indirect competitors, but polysemes elicited equal amounts of intrusions whether primed as semantic
competitors or as indirect competitors. These results suggest that polysemes are representationally unified in production. Email: Leon Li, lli@terpmail.umd.edu

(2148)
Does Sound Symbolism Influence Speech Production? EILING YEE, University of Connecticut, MONIKA MOLNAR, Basque Center on Cognition, Brain and Language. — According to the sound symbolism literature, comprehenders tend to associate certain labels with certain types of shapes; for instance, "kiki" with jagged shapes, and "bouba" with rounded ones. At the same time, speech production research shows that when words are more predictable, they are produced with shorter durations than when they are less predictable. Taken together, these two phenomena lead to a novel prediction: When speakers label jagged or rounded objects with “predictable” or “unpredictable” novel labels (i.e., labels that, according to sound symbolism, are associated with either jagged or rounded shapes), predictable labels (“kiki” for jagged) will be produced with shorter durations than unpredictable labels (“kiki” for rounded). This prediction was borne out in a production study in which speakers, who were given three rounded and three jagged objects and six labels, followed a written script to label objects with predictable and unpredictable labels. Our findings suggest that the sound-shape bias can influence speech production. Email: Eiling Yee, eiling.yee@gmail.com

(2149)
Do Bilingualism and Aging Impact False Memory? A Test of the DRM Paradigm. MARGOT D. SULLIVAN, York University, CARI A. BOGULSKI, University of Arkansas, ZEHRA KAMANI and ELLEN BIALYSTOK, York University. — In the DRM paradigm, participants study a list of words associated with an un presented lure, a procedure that commonly elicits false recall and recognition of the lure (Roediger et al., 2001). The explanation is that false memories occur due to problems at encoding (spreading activation/interference) and retrieval (source monitoring). In bilinguals, joint activation of languages requires a control mechanism to focus attention on the target language and avoid intrusions from the competing language (Gollan & Kroll, 2001) that are activated by association, similar to rejecting lures in the DRM. Healthy older and younger adult participants who were monolingual or bilingual performed a DRM task with lists of high and low backwards associative strength to a critical lure. Older adults were more likely to falsely recall lures than younger adults, and monolinguals were more likely to falsely recognize lures than bilinguals. Results are discussed in terms of conflict monitoring in bilinguals. Email: Ellen Bialystok, ellenb@yorku.ca

• BILINGUALISM II •

(2150)
How Does Verbal Fluency Influence Bilingual False Memory. LI-HAO YEH and YI-CHUN ANGELA LU, Chung Yuan Christian University. — The purpose of this research was to utilize DRM paradigm to examine the developmental difference in bilingual language processing. The current findings of bilingual false memory have shown false recall and recognition in both within- and between-language conditions. Additionally, false recall and recognition are lower in L2 than in L1. However, no study has directly examined how bilinguals’ L2 verbal fluency influences false memory and whether false memories between L1-L2 and L2-L1 study-test conditions are asymmetric. We measured false recognition of Chinese – English bilinguals with high and intermediate English verbal fluency. First, we found lower false recognition in the between-language condition than that in the within-language condition. Second, comparing with intermediate bilinguals highly fluent bilinguals showed more false recognition in English. Third, highly fluent bilinguals also showed higher false recognition in the L1-L2 condition than that in the L2-L1 condition. Several theories and the implications were discussed. Email: Li-Hao Yeh, yehlihao@gmail.com

(2151)
Repetition Priming in Picture Naming as a Function of Bilingual Proficiency and Word Frequency. RENEE MICHELLE PENALVER, WENDY S. FRANCIS, and CYNTHIA ROSALES, University of Texas at El Paso (Sponsored by Wendy S. Francis). — A prediction of the frequency lag hypothesis (Gollan et al., 2011) is that word frequency effects will be stronger in bilingual than monolingual production and stronger in L2 than L1 production. We tested whether this pattern would extend to repetition priming of production processes in Spanish-English bilinguals and monolingual English speakers. Encoding phase picture naming RTs followed the same pattern as picture naming RTs in Gollan et al. (2008), in that frequency effects on RTs were stronger in bilinguals than in monolinguals. Repetition priming was stronger for low-frequency words than high-frequency words. Repetition priming was stronger in L2 than in L1 and stronger in bilingual L1 than in monolingual L1. The word frequency effect on repetition priming was stronger in L2 than in L1 and stronger in bilingual L1 than in monolingual L1. The patterns of encoding phase RTs and patterns of repetition priming are consistent with the frequency lag hypothesis. Email: Renee Michelle Penalver, rmpenalver@miners.utep.edu

(2152)
Lexical Tone Activation in Bilingual Spoken Word Recognition: Eyetracking Evidence From Mandarin-English Bilinguals. XIN WANG, University of Oxford, JEFF MALINS, Haskins Labs, JUAN WANG, JiangSu Normal University. — Using the visual world paradigm, we performed two eyetracking experiments to investigate whether supra-segmental information in a tonal L1 (e.g., Mandarin Chinese) is also activated when bilinguals are exclusively processing a non-tonal L2 (e.g., English). In experiment 1, we presented Mandarin-English bilinguals with target stimuli that were inter-lingual homophones between
Mandarin and English (e.g., English bay sounds similar to Mandarin bei4). Critically, competitors directly overlapped with English targets segmentally and supra-segmentally (e.g., bei4) or just segmentally (bei1). In experiment 2, competition was instead mediated via covert translation. For example, for the English target tree, competitors either matched the Mandarin translation equivalent segmentally and supra-segmentally (e.g., shu4) or just segmentally (e.g., shu1). In both experiments, combined segmental and supra-segmental overlap gave rise to differential competitive effects compared to segmental overlap alone. These results suggest lexical tones are activated in bilingual lexical access even when processing a non-tonal language. Email: XIN WANG, xinwang267@gmail.com

**How Switching Direction and Foreign Accented Speech Affect Listening to Code-Switched Sentences: An Electrophysiological Study.** CARLA B. FERNANDEZ, Pennsylvania State University, JANET G. VAN HELL, Pennsylvania State University/Radboud University, Nijmegen. — Code-switching, the interchangeable use of two languages within an utterance, is a hallmark of bilingualism. Although natural code-switching occurs more frequently in spoken than written communication, most studies studying the comprehension of code-switched utterances presented sentences visually. In two Event-Related Potentials (ERP) experiments, we investigated the auditory processing of code-switched sentences. In Experiment 1, Spanish-English bilinguals listened to code-switched sentences (switching from L1 to L2 or from L2 to L1) or non-switched sentences. We observed an LPC effect when switching from L1 to L2, while switching from L2 to L1 yielded a N400 effect. In Experiment 2, the code-switched sentences were spoken by Spanish-English bilingual speakers with an accent in English or Spanish, to examine how foreign accented speech modulates switching costs. These accented speech auditory ERP data are currently recorded and analyzed. The current findings indicate that listening to code-switched sentences entails different cognitive mechanisms depending on switching direction. Email: Janet G. Van Hell, jgv3@psu.edu

**Implicit Translation During L2 Sentence Processing.** PEIYUN ZHOU, University of Illinois, YUN YAO, University of Arkansas, KIEL CHRISTIANSON, University of Illinois (Sponsored by Kiel Christianson). — We investigated whether bilingual speakers activate their L1 simultaneously when processing sentences in their L2 language. Monolingual English speakers (N=30) and bilingual Chinese-English speakers (N=30) joined the study. A Self-paced Reading and Masked Priming (SPaM) paradigm was employed with manipulation of three prime conditions for the target words 1) identical English primes; 2) semantically unrelated English primes in which the 1st character overlapped with the target in their Chinese translations; 3) semantically unrelated English primes without overlapping Chinese characters. The Michigan English Language Institute College Entrance Test measured readers’ L1/L2 English proficiency. Reading times on target words and the spillover region showed bilingual speakers displayed reading patterns similar to native English speakers (identical < overlap & non-overlap), indicating they did not perform implicit translation from L2 to L1 during online sentence processing. As proficiency in the L2 increases, bilinguals appear more likely to directly activate their L2 without L1 mediation. Email: Peiyun Zhou, youneverleave@gmail.com

**Temporal Associations in Bilingual Recall: Effects of Proficiency and Word Frequency.** WENDY S. FRANCIS, MARY K. LIANO, and RANDOLPH S. TAYLOR, University of Texas at El Paso. — The effects of bilingual proficiency and word frequency on the strength of temporal associations formed during intentional encoding were explored in Spanish-English bilinguals and monolingual English speakers. Participants were asked to commit several lists of high frequency or low frequency words to memory, and an immediate recall test was given after each list. Both bilinguals and monolinguals remembered more high-frequency words than low-frequency words, and from the serial position curve it was evident that these differences occurred for the first several items in the list. Bilinguals remembered more words overall in L1 than L2, and this difference also occurred for the first several items in the list. Lag recency functions (Kahana et al., 2002) were steeper for high-frequency words than for low-frequency words and steeper for L1 words than for L2 words. The results indicate that bilinguals have more difficulty forming new temporal associations when memorizing items in L2. Email: Wendy S. Francis, wfrancis@utep.edu
(2157) Semantic Blocking Effects in Object Naming by Bilingual Children in English and Spanish. ZENZI M. GRIFFIN, ELIZABETH PEÑA, LISA BEDORE, J. GREGORY HIXON, and LUIS CHACARTEGUI, University of Texas at Austin. — Thirty-six typically developing children (Kindergarten & 2nd grade) repeatedly named objects grouped into blocks of homogenous (penguin, elephant, snake, dog) or heterogeneous (penguin, donut, orange, shoe) semantic categories. Languages were tested with different items and in separate sessions with order counterbalanced across children. As typically seen in adults, children showed semantic interference in both latencies and accuracy when naming objects in their first language Spanish. However, they primarily showed semantic facilitation when naming in English. Results will be discussed with respect to learning and working memory accounts of semantic blocking effects. Email: Zenzi M. Griffin, zgriffin@utexas.edu

(2158) Embracing Cross-Linguistic Conflict: The Benefits of Desirable Difficulties During L3 Word Learning. JARED LINCK, EWA GOLONKA, ERICA B. MICHAEL, DORNA RICHARDSON, CARRIE BONILLA, and TIMOTHY HOWELL, University of Maryland (Sponsored by Jared Linck). — Multilinguals experience cross-language conflict when learning foreign-language words that are false cognates with an already known language. Such conflicts can serve as “desirable difficulties” that enhance vocabulary learning (e.g., Bjork & Kroll, 2015), suggesting that learners should embrace rather than avoid cross-language lexical conflicts. English (L1) - Russian (L2) bilinguals studying Ukrainian (L3) read authentic L3 texts that included L1 or L2 glosses (translations in margin) for cognates, non-cognates, and false cognates. L1 glosses were expected to enhance conceptual processing, whereas L2 glosses highlighted potential L2-L3 conflict. Vocabulary learning was assessed immediately, three days, and one month after treatment. For cognates and non-cognates, L1 glosses facilitated learning more than L2 glosses on all tests. For false cognates, L2 glosses led to better performance than L1 glosses after one month, suggesting that highlighting the L2-L3 conflict produced greater long-term retention. We discuss the importance of encouraging desirable difficulties in multilingual learning. Email: Ewa Golonka, egolonka@umd.edu

(2159) The Effects of Syntax and Productive Vocabularies on Monolingual and Bilingual Children’s Use of Mutual Exclusivity. SIRADA ROCHANAVIBHATA, Northwestern University; NATSUKE ATAGI, CHRISTINA SCHONBERG, and CATHERINE SANDHOFER, University of California, Los Angeles (Sponsored by Catherine Sandhofer). — Though monolingual children use mutual exclusivity (ME) as consistently as monolinguals do (Byers-Heinlein & Werker, 2009; Frank & Poulin-Dubois, 2002; Byers-Heinlein et al., 2014). This study thus examines monolingual and bilingual two-year-olds’ use of ME. In a ME task, children were given familiar and novel objects and told, “Give me the wug!” (syntactic cues) or “Wug!” (no syntactic cues). Bilingual children’s translation equivalent (TE) knowledge was measured as well. Results showed that monolinguals and bilinguals both used ME more often when syntactic cues were available than when those cues were absent. Furthermore, bilinguals who knew few TEs used ME consistently only when provided with syntactic cues. These results suggest that children’s use of ME is dependent on syntactic cues and children’s vocabulary. ME may thus be more malleable than previously thought. Email: Sirada Rochanavibhata, srochanav@gmail.com

• NEURAL MECHANISMS OF COGNITION I •

(2160) Grammatical Gender Violations Affect Cognate Nouns, but not Noncognates, in Intermediate-Level L2 Learners: An ERP Study. PATRICIA SCHEMPP and CARRIE N. JACKSON, Pennsylvania State University, JANET G. VAN HELL, Pennsylvania State University/Radboud University, Nijmegen (Sponsored by Carrie N. Jackson). — Previous studies show that L1 grammatical gender facilitates the acquisition and processing of L2 grammatical gender (e.g., Sabourin et al., 2006). Recent ERP evidence suggests that with high offline accuracy, English native speakers exhibit native-like ERPs to gender violations (Morgan-Short et al., 2012). The present ERP study investigates the sensitivity of intermediate L1 English L2 German learners (N=20) to gender violations in L2 German (German has grammatical gender but English does not), and whether it is easier to learn L2 noun-gender mappings for cognates versus non-cognates. Analyses revealed that less proficient learners exhibited an increased negativity in the 300-500ms time window in response to gender violations with cognate nouns, whereas more proficient learners showed an increased positivity the 400-6 time window. There were no significant effects for gender violations with non-cognates. This suggests that cognate effects extend beyond the lexical level and affect the acquisition of L2 morphosyntax. Email: Patricia Schempp, pschempp@gmail.com

(2161) Neural Correlates of Planning and Monitoring During Sequence Production. BRIAN MATHIAS and PIERRE GIANNFERRARA, McGill University, WILLIAM J. GEHRING, University of Michigan, CAROLINE PALMER, McGill University. — We investigated neural correlates of performers’ planning processes by presenting future-oriented auditory feedback during music performance. Production of auditory sequences requires incremental planning of sequence events, and monitoring of outcomes via sensory feedback. Altered auditory feedback disrupts production particularly when feedback contents match planned events. We tested interactions between planning and monitoring by altering auditory feedback as pianists performed isochronous melodies while EEG was recorded.
Auditory feedback contained occasional altered tones that matched an immediately upcoming Near Future pitch (next sequence event) or a more distant Far Future pitch (two events ahead of current event) in the sequence. The timing of pianists’ keypresses slowed down after Near–but not Far–Future feedback, and neural potentials associated with auditory sensory processing elicited by the next event changed (increased N1 / decreased P2) for Near Future feedback. Both feedback types elicited a feedback-related negativity (FRN) whose larger amplitude was associated with greater slowing. These findings suggest that feedback monitoring most affects planning of immediately upcoming events.

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(2162)
Evidence Against the Phenomenon of Hemispheric Lateralization in Categorical Perception. KATHERINE P. JONES and STEPHEN GOLDINGER, Arizona State University. — Recent research on the Sapir-Whorf hypothesis has focused on hemispheric lateralization in categorical (object) perception, finding that people process categories differently in the left and right cerebral hemispheres (LH and RH), theoretically because the LH dominates language processing. Studies have shown that RTs to target stimuli are faster when targets come from a different lexical category than distractors (e.g., cats versus dogs), but significantly more so when targets appear in the right visual field, which feeds into the LH. We sought to further examine these lateralized perceptual processes, by both replicating and extending the original studies (by Gilbert et al., 2006; 2008). Across four experiments, we could neither extend nor replicate the original findings, despite conducting direct replications. We address several potential problems with the original research by Gilbert and colleagues, including asymmetries in the stimulus materials and data-trimming procedures that may have created false-positive findings.

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(2163)
Degree of Handedness Is Not Associated With Interhemispheric Interaction Measures. ADAM FELTON and CHRISTINE CHIARELLO, University of California, Riverside. — Research investigating the cognitive correlates of strength of handedness (strong/weak) has found a variety of differences: weak handers have greater creativity, superior episodic recall, greater access to subordinate meaning, etc, hypothesized to be due to increased interhemispheric interaction (Prichard, Propper, & Christman, 2013). Participants were divided into strong and weak preference groups and compared on a divided visual field hemispheric integration task (Weissman & Banich, 2000). Participants decided whether a lowercase-letter target in one visual half-field matched an uppercase target within or across visual half-fields. The size of the across-field advantage indicates the extent of hemispheric integration. Results indicated no difference between handedness groups for this measure, F< 1. We also administered a bilateral gain lexical decision task, and again found no evidence of handedness differences for the bilateral gain measure of hemispheric integration, F< 1. We suggest that alternate theoretical explanations for the behavioral differences should be sought.

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(2164)
Behavioral and Structural Correlates of the Semantic System: A Comparison of Mixed and Consistent Handers. ALESSANDRA MCDOWELL and CHRISTINE CHIARELLO, University of California, Riverside (Sponsored by Christine Chiarello). — Mixed-handers may have a more diffuse semantic network as compared to consistent-handers (Sontam & Christman, 2012). However, it is unclear whether resulting behavioral disparities are associated with differing brain structure. Among 164 participants, we found no handedness group differences for category generation, verb generation, and semantic decision, although performance asymmetries on these tasks correlated more strongly among mixed-handers. A meta-analysis (Binder et al., 2009) identified 7 brain regions constituting the semantic system. Using Freesurfer parcellations, corresponding ROIs were chosen, and morphometric asymmetry measures (surface area, thickness, cortical folding) of each were correlated with a semantic performance composite. Semantic scores for consistent handers were associated with folding (r=.222, p=.045), and surface area (r=-.245, p=.026) asymmetry in the pars triangularis. Mixed-handers’ semantic scores were associated with folding (r=-.271, p=.014) and thickness (r=-.234, p=.035) asymmetry in the pars orbitalis. Semantic processing may be associated with different structural substrates, depending on handedness strength.

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(2165)
Testing a Perceptual Theory of Amnesia With fMRI: Perceptual Interference Disrupts Neural Signatures of Familiarity in Visual Cortex. D. MERIKA WILSON and DAVID A. ROSS, University of Massachusetts Amherst, LOK KIN YEUNG and MORGAN D. BARENSE, University of Toronto, ROSEMARY A. COWELL, University of Massachusetts Amherst. — On the theory of amnesia asumes that (1) in the absence of medial temporal lobe (MTL) structures, familiarity judgements are based upon representations of simple visual features in posterior visual cortex, and (2) these representations are susceptible to perceptual interference. Using an incidental 1-back repetition detection task during fMRI, we presented a series of object photographs to assess whether perceptual interference disrupted neural signatures of novelty. Novelty was indexed by repetition reduction (RR) of the BOLD signal. We expected less RR at the end of the series – after perceptual interference – than at the beginning. In the “high interference” condition, interfering objects presented in the middle of the series were perceptually similar to those at the beginning and end (for which RR was measured). In “low interference,” interfering objects were dissimilar. Consistent with the theory, RR was reduced by interference in a posterior visual region, during high relative to low interference runs.

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Top-Down Control of Brainstem Frequency Following Response Is Modulated by Attentional Demands. SERENA KLOS and HOWARD NUSBAUM, University of Chicago (Sponsored by Howard Nusbaum). — The encoding of sound in the peripheral auditory pathway is often described as an automatic process. Research demonstrating long-term training effects on the Frequency Following Response (FFR) within the auditory brainstem response (ABR), however, has demonstrated that learning to attend to and categorize pitch information enhances the ABR (Wong et al., 2007; Krishnan et al., 2008). Here we report a study investigating whether this top-down control of the ABR by the attention network can be seen in real time rather than as a consequence of long-term training. FFRs to a sine tone were measured while participants engaged in two tapping tasks varying in attentional demand. The fidelity of the FFR to the tone decreased when more attention was required to perform the tapping task, suggesting that top-down cortical attention networks may influence all instances of subcortical processing of sounds. Research demonstrating the involvement of the auditory brainstem response (ABR) within the auditory brainstem response (ABR) has demonstrated that learning to attend to and categorize pitch information enhances the ABR (Wong et al., 2007; Krishnan et al., 2008). Here we report a study investigating whether this top-down control of the ABR by the attention network can be seen in real time rather than as a consequence of long-term training. FFRs to a sine tone were measured while participants engaged in two tapping tasks varying in attentional demand. The fidelity of the FFR to the tone decreased when more attention was required to perform the tapping task, suggesting that top-down cortical attention networks may influence all instances of subcortical transmission of an acoustic signal to varying degrees. Email: Serena Klos, sklos@uchicago.edu

The Role of the Left Dorsolateral Prefrontal Cortex in Prospective Memory: A Direct Current Stimulation Study. ASHLEY SCOLARO and RACHEL SPOONER, Central College. — The gateway hypothesis posits differential roles of the lateral and medial prefrontal cortices in prospective remembering (Burgess et al., 2008). Given that recent studies have demonstrated improved performance on task switching after anodal direct current stimulation of the left dorsolateral prefrontal cortex (Leite et al., 2013; Loftus et al., 2015), we hypothesized that similar stimulation would improve prospective remembering. In the current study, transcranial direct current stimulation was applied to the left dorsolateral prefrontal cortex of healthy participants while they completed two task-switching blocks (one block included an embedded prospective memory component). Analyses of ongoing trials replicated previous findings of a cognitive benefit of anodal stimulation of the left dorsolateral prefrontal cortex. Surprisingly, anodal stimulation of the left dorsolateral prefrontal cortex reduced prospective accuracy relative to sham and cathodal stimulation conditions suggesting a complex role of the dorsolateral prefrontal cortex in task switching and prospective memory paradigms. Email: Ashley Scolaro, scolaroa@central.edu

Dissociating Semantic From Associative Processes in False Recognition by Transcranial Direct Current Stimulation (tDCS) of the Left Anterior Temporal Lobe. EMILIANO DÍEZ, Universidad de Salamanca, INICO, CARLOS GOMEZ-ARIZA, Universidad de Jaén, ANTONIO M. DÍEZ, Universidad de Salamanca, MARÍA A. ALONSO, Universidad de La Laguna, ANGEL FERNANDEZ, Universidad de Salamanca, INICO. — Previous research has shown that tDCS of the anterior temporal lobe (ATL) while participants study word lists in DRM-like procedures reduces false recognition. It has been suggested that the diffuse nature of ATL effects could favor the engagement of additional adjacent-to-stimulated networks, decreasing, by competition, the involvement of the ATL in the error-inflation processes that contribute to false memories. To more precisely identify the specific process being affected, we conducted a DRM experiment in which tDCS (anode/cathode/sham) was applied over the participants’ left ATL during the study of lists of words that were either associatively or semantically related to their non-presented critical words. An interaction between stimulation condition and type of list revealed a reduction in false recognition for associative lists but not for semantic lists. This finding suggests that the left ATL is differentially involved in the production of associatively-induced memory intrusions and less involved in semantically-induced intrusions. Email: Carlos Gomez-Ariza, cgomez@ujaen.es

The Impact of Age and Frontal Lobe Functioning on Susceptibility to Misinformation. MICHELLE PHILLIPS-MEEK, Limestone College. — The current study examined the impact of age and frontal lobe functioning on susceptibility to misinformation. A total of 41 healthy young (19-31) and older (59-77) adults were presented with visual misinformation in a paradigm originally used by Okado and Stark (2005). Participants then completed a recognition memory task while undergoing a functional magnetic resonance imaging (fMRI) scan. Participants also completed a series of cognitive measures used to assess frontal lobe functioning. Results showed that age and frontal lobe functioning were both significant predictors of recognition memory accuracy. Activity in brain regions associated with conflict processing was greater for accurate versus false memory retrieval in both older and young adults. In older adults, activity in the anterior cingulate cortex was positively correlated with accuracy. The results of the current work demonstrate that conflict resolution is a critical part of overcoming the effects of misinformation and individual difference variables predict susceptibility in young adults as well as older adults. Email: Michelle Phillips-Meek, mphillips@limestone.edu

A Fast fMRI Protocol to Identify Neural Networks Underlying Cognitive Functions. SHAYNE S.-H. LIN, National Central University, MONICA Y.-C. LI, University of Connecticut, ANYA YU, National Central University, YIHUI HUNG, Haskins Laboratories, ESTHER Y.-C. LIN, National Yang-Ming University, DENISE WU, National Central University. — A battery of simple cognitive tasks was prepared to identify neural networks underlying visual processing, finger movements, sentence comprehension, and mental calculation as checkerboards and words in Mandarin Chinese in both visual and auditory modalities were presented in a five-minute functional magnetic resonance imaging protocol. Despite the short duration of scanning, the brain activations from 56 native Chinese participants revealed classic visual, motor, language, and arithmetic networks associated with the respective cognitive functions. These results were also generally comparable with those from native alphabetic (i.e., French) speakers/readers who underwent identical tasks in their mother tongue, demonstrating largely...
universal neural mechanisms underpinning these cognitive functions. In contrast with some reports of higher engagement of the right hemisphere in reading Chinese than alphabetic languages, lateralization analysis showed left-hemisphere dominant activations in the sentence reading task. This fast protocol was proven to obtain valid and useful neuroimaging data to address theoretically important questions. Email: Denise Wu, denisewu@cc.ncu.edu.tw

**(2171)** Detection of Errors and Conflict During a Long Sustained Attention Task in Patients With Schizophrenia. MARC HOONAKKER, NADEGE DOIGNON-CAMUS, ELISABETH BACON, and ANNE BONNEFOND, INSERM. — The main objective of this study is to better understand, in a time on task perspective, cognitive control impairments in schizophrenia, manifested in altered neural signatures during a long sustained attention task. Patients with schizophrenia and healthy controls (matched in age, gender and education) participated in the study. We used the sustained attention response task (SART) for 30 minutes. Behavioral and ERP measures were recorded. For the analysis of the results, the task was divided into two 15-minute periods. Our preliminary results obtained with 2 groups of 16 subjects each, reveal that schizophrenia patients are globally slower than their healthy counterparts, but still able to maintain a stable level of performance over the course of the task. More importantly, patients showed error- and conflict-monitoring disturbances, as they exhibit attenuated ERN and N200. These findings may suggest that similar cognitive and neural mechanisms underly the two ERP components. Email: Elisabeth Bacon, elisabeth.bacon@unistra.fr

**(2172)** What’s Emotion Got to do With it? The Effects of Emotion on the Neural Correlates of Cognitive Control. BRANDY TIERNAN, Sewanee: University of the South, BERENICE ANAYA, Western Kentucky University. — Studies of emotion and cognition suggest positive and negative affect selectively influence susceptibility to interference on behavioral measures of cognitive control. We used event-related brain potentials (ERPs) to examine the influence of emotion on the neural mechanisms of cognitive control related to performance monitoring (frontal slow wave) conflict detection (medial frontal negativity) and conflict adaptation (conflict SP). Participants performed a variation of the Stroop task where a positive, negative, or neutral word was presented before the stimulus. Behaviorally, the Stroop effect was eliminated on trials preceded by a positive word. Physiologically, there were differences in conflict detection and conflict monitoring ERPs for the three emotion conditions (Experiment 1). We also varied the proportion of congruent and incongruent trials to explicitly manipulate proactive and reactive cognitive control. Behaviorally, emotion no longer influenced the Stroop effect. Physiologically, emotion had varying effects on conflict-related ERPs based on block congruency (Experiment 2). Email: Brandy Tiernan, brandy.tiernan@wku.edu

**(2173)** Joint Effects of Alcohol and Caffeine on the Conflict Adaptation Effect. KIRA BAILEY, Ohio Wesleyan University; DENIS M. MCCARTHY and BRUCE D. BARTHOLOW, University of Missouri-Columbia. — The current study examined the effects of alcohol and caffeine on conflict adaptation in brain and behavior in order to understand how their consumption affects control of behavior in response to changing environmental demands. Young adult drinkers completed a flanker task after consuming one of five beverages: Alcohol + Caffeine; Alcohol + Placebo caffeine; Placebo alcohol + Caffeine; Placebo alcohol + Placebo caffeine; Alcohol alone. Compared to either alcohol alone or the placebo conditions, the current findings indicate that the co-administration of alcohol and caffeine heightened neural responses and eliminated the typical conflict adaptation effect in RT. Interestingly, this occurred not because the caffeine groups showed reduced control following conflict, but rather because caffeine significantly improved performance in terms of smaller compatibility effects (CEs) on post-compatible trials. This resulted in the post-compatible CE being as small as the post-incompatible CE. Caffeine appears to eliminate the need to adjust control following conflict, possibly because control is already maximally deployed even when conflict has not occurred. Email: Kira Bailey, kmbailey@owu.edu

**• REASONING AND PROBLEM SOLVING I •**

**(2174)** Vive la Différence! Bilingualism Impacts Spontaneous Transfer From Dissimilar Sources. PATRICK JOSEPH CUSHEN, Murray State University, JENNIFER WILEY, University of Illinois at Chicago. — Given the widespread belief that analogical processing is an important mechanism for creative problem solving, but difficulty finding spontaneous transfer in laboratory studies, a critical direction for future research is to address which conditions may allow for spontaneous transfer between superficially dissimilar sources and targets. Other research has suggested that individuals who speak multiple languages from an early age may demonstrate cognitive advantages in certain situations including problems involving novelty or requiring flexibility. Adapting materials from Holyoak and Koh (1987), participants were presented with different versions of a source story about a broken lightbulb suggesting a beneficial "convergence" strategy for solving Duncker’s radiation problem. Results indicated different rates of transfer as a function of both bilingualism and the relative similarity of the source story to the target problem. Explanations for these results and how they relate to bilingual advantages in creativity will be discussed. Email: Patrick Joseph Cusden, pcushen@murraystate.edu
(2175) Stuck in a Rut? How Expertise and Warnings Change the Relationship Between Executive Functioning and Overcoming Fixation. REBECCA KOPPEL and JENNIFER WILEY, University of Illinois, Chicago, BENJAMIN STORM, University of California, Santa Cruz. — Problem solving can be difficult because people experience misleading information from the environment or in context of an experiment, or because they have misleading prior knowledge. The two instances of fixation feel like they’re qualitatively different, but whether there are different types of fixation that may be overcome by different means has received little attention. This research tested whether fixation that is experimentally-induced versus induced by prior knowledge can be shown to be qualitatively different via an individual-differences approach. Music experts and novices attempted to solve word-fragments where the fragments (B_ _ SSO_) were orthographically similar to music-related terms (BASSOON), but impossible to solve with them (Answer: BLOSSOM). The studies varied exposure to misleading solutions, prior music knowledge, and the presence of a warning that no answers would be music-related. Results suggest distinct roles for updating and restraint based on priming condition, expertise, and the warning. Email: Rebecca Koppel, r koppe2@uic.edu

(2176) Fixation, Flexibility, and Forgetting During Alternate-Uses Tasks. TIM GEORGE and JENNIFER WILEY, University of Illinois, Chicago (Sponsored by Jennifer Wiley). — Traditional alternate-uses tasks (AUTs) require generating different uses for a single object (e.g., a brick) with the goal of producing highly creative solutions. Such creative performance may partially depend on overcoming initial ideas, and flexibly shifting to new perspectives. In the present experiments, participants either generated ten uses for one item in a standard AUT (single-item), or one use for ten items (multi-item). The results showed that the multi-item AUT increased both creativity and flexibility in responding. Within the more standard single-item AUT, participants who responded more flexibly were more likely to show forgetting of their first solution attempts, and were more likely to generate highly creative responses. This suggests that shifting to new perspectives may involve inhibiting old ideas in standard AUTs, and that generating uses for multiple objects in an interleaved fashion may circumvent the need to inhibit prior responses, which can result in more innovative thinking. Email: Tim George, tgeorg7@uic.edu

(2177) The Effects of Excitatory Transcranial Direct Current Stimulation Over Occipital Cortex on Flexible Object Use. EVANGELIA G. CHRYSIKOU and HANNAH M. MORROW, University of Kansas. — Functional neuroimaging studies of semantic memory have shown increased activity in occipital cortex during the flexible retrieval of information about everyday objects in goal-oriented tasks. Here, we examined whether increasing activity in this region using transcranial direct current stimulation (tDCS) would facilitate performance on an open-ended task. We showed participants images of everyday objects and asked them to report aloud either the common or an uncommon use for them while receiving anodal tDCS either over right or left occipital cortex or sham stimulation. A negative control task was also used. Although excitatory tDCS did not have an effect on participants’ performance on the control task, stimulation over right occipital cortex tended to facilitate the speed in which participants generated responses and the number of responses produced for both common and uncommon uses for the objects. These results contribute to our understanding of the role of this region in visual object processing and suggest that over-excitation of right occipital cortex may promote access to object knowledge retrieval. Email: Evangelia G. Chrysikou, lilachrysikou@ku.edu

(2178) Manipulating Problem Representations by Cuing. AMORY H. DANEK, Ludwig-Maximilians-Universität München. — A problem is solved with insight if the initial, over-constrained problem representation is overcome. Such a “representational change” is thought to be triggered by relaxing prior constraints. We aimed at providing evidence for this. 42 students watched 36 magic tricks, followed by either a helpful cue (relaxing constraints), unhelpful cue (strengthening constraints) or no cue. Participants’ task was to find out how the trick works. We found the highest solving rate for helpful cues (31.3%), and lower ones in the no cue (19.3%) and unhelpful condition (14.5%). Post-hoc tests after a significant ANOVA showed that the difference between helpful and no cue condition was significant (t(41) = 3.28, p = .00) as well as the difference between helpful and unhelpful condition, t(41) = 5.24, p = .00. The finding that constraints can be relaxed (or strengthened) systematically by cueing, leading to either higher or lower solving rates, supports Ohlsson’s representational change theory of insight. Email: Amory H. Danek, amory.danek@lmu.de

(2179) Multiplicative Reasoning With Fractions and Decimals. MELISSA DEWOLE, UCLA, MIRIAM BASSOK, University of Washington, KEITH HOLYOAK, University of California, Los Angeles (Sponsored by Miriam Bassok). — Recent research has shown that adults can capitalize on the bipartite format of fractions (a/b) when reasoning about set relations in visual displays, performing relational tasks more successfully with fractions than with decimals. Here we tested whether a similar fraction advantage holds in identifying multiplicative relations between numbers. In an equation verification task (Experiment 1), we found that adults solve problems more quickly when whole numbers are multiplied by fractions (4 X 6/8 = 3) than by decimals (4 X .75 = 3). Moreover, fraction multipliers primed answers to subsequent problems with inverse multiplicative relations (4 X 6/8 = 3 followed by 3 X 4/3 = 4). This priming effect was correlated with priming effects on a whole-number multiplication task (Experiment 2). These results indicate that multiplication by fractions, but not by decimals, is facilitated by a multiplicative schema initially learned for whole numbers. Email: Melissa DeWolf, mdewolf@ucla.edu
(2180) Aging and Task Representation Updating. DAVID FRANK and DAYNA TOURON, University of North Carolina, Greensboro (Sponsored by Dayna Touron). — Older adults often choose less efficient strategies relative to younger adults, and subsequently fail to revise their strategic choices with task experience. Strategic choices should become more optimal as understanding of the task improves. We used a concept mapping technique to measure older and younger adults’ task representations before and after performing a novel chemistry task. Contrary to our predictions concept map scores did not improve following task practice. However, performance improved over trials, even for items that had to be learned with task practice, suggesting that task representation updating did occur for both age groups. However, no age deficits in task representations or performance were found. These findings add to a literature of spared mental representation formation and use with age. Individual differences in performance were related to motivational factors for young adults and processing speed and crystallized intelligence for older adults.

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(2181) Strategies and the RAPM: Taking a Constructive Approach. ANDREW F. JAROSZ, Mississippi State University, JENNIFER WILEY, University of Illinois at Chicago. — Despite many studies showing that high WMC individuals perform better on analytic reasoning and problem solving tasks, the cognitive mechanisms underlying these relationships are still poorly understood. The present study examined the impact of biasing individuals towards using a single strategy (constructive matching) on the relationship between WMC and performance on the RAPM. Using a combination of instructional manipulations as well as offering a “none-of-the-above” response, participants were biased towards discovering the correct response before they began looking at the response bank, then completed a subset of RAPM items. While high-WMC individuals benefited from this manipulation, low-WMC individuals’ performance was not impacted. Results suggest that individual differences in strategy use can partially account for the relationship between WMC and performance on the RAPM. Additionally, it seems that high-WMC individuals are not necessarily better at selecting appropriate strategies; rather, they are able to use more effective strategies.

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(2182) Sing, O Muse, Through Google: Internet Use Boosts Creativity When Task Is Known in Advance. ELIZABETH HELDER BABCOCK and KIRSTEN WALCH, Augustana College, MAREIKE B. WIETH, Albion College. — Participants were told that their creativity would be tested following a five minute activity designed to enhance creativity—either using the Internet or completing a word search. A modified version of the Guilford Alternative Uses Task consisting of novel objects was used to measure creativity. Half of the participants were shown the objects being used in the Guilford task before the creativity boosting activity, and half did not view the objects until after completing their activity. The participants who were familiarized with the objects ahead of time produced more creative uses for objects following Internet use than after completing the word search. This difference cannot be attributed to directly searching for alternative uses for the objects online because the participants were unable to name or identify the intended use for the novel objects. The participants who used the Internet before being familiarized with the creativity test did not show a boost in creativity, indicating that Internet use may benefit creativity, but only when the parameters of the task are well known.

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(2183) When Difficulty Cultivates Doubt: The Influence of Metacognitive Affect Upon the Interpretation of Social Situations. JAMES R. ESTABROOK and TRINA C. KERSHAW, University of Massachusetts Dartmouth. — Divergent predictions from the Everyday Problem-Solving (EPS) and Ease-of-Retrieval (EoR) models were explored through a novel hypothetical social vignette. While the EPS model predicts that generating many alternate interpretations of an actor’s behavior in the vignette will produce a more preferable interpretation compared to generating only a few, the EoR model predicts that when generating alternate interpretations is experienced as difficult, individuals will doubt those alternates and prefer their original interpretation. 100 undergraduates generated interpretations about the actor in the vignette and completed individual differences measures. Congruent with the EoR model, participants who found the process of generating alternative interpretations surprisingly easy were more likely to choose an alternative over their original interpretation. Congruent with the EPS model, generating many alternative interpretations relative to few alternates, caused participants to have less confidence in their original interpretation. Implications for these competing models and the influence of individual differences will be discussed.

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(2184) The Role of Feedback in Intuition. KRISTIN GRUNEWALD and MARK BEEMAN, Northwestern University (Sponsored by Mark Beeman). — Intuition is often considered an unconscious phenomenon; however, in order to train or improve intuition, one approach is to use conscious, explicit feedback. In a series of three experiments, we asked participants to judge whether a compound remote associate (CRA) problem had a solution or not. In all three experiments, we found a small but reliable intuition effect — participants were able to distinguish solvable from unsolvable problems at a level greater than chance. In addition, trial by trial performance feedback shifted participants’ bias from a tendency to doubt a problem had a solution to a tendency to endorse a problem as solvable. However, the performance feedback did not significantly improve intuition judgments. Implications for the role of implicit and explicit knowledge and strategies in intuition will be explored.

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ALLISON J. JAEGGER and JENNIFER WILEY, University of Illinois, Chicago. — Previous research on the French Kit Paper Folding task has suggested that items may vary along different dimensions including the number of folds required for solution and the presence of atypical asymmetric, invisible, or obscured folds. Because only a few of the original items contain atypical folds, additional items were developed to test whether these two sets of items (typical and atypical folds) might represent two separate constructs. Although some differences in performance between item types were seen due to working memory capacity, performance on both types of items was predicted well by other spatial tasks. Interestingly, no differences in performance were seen due to gender, although some of the results could be suggestive of differences in solution strategies. Email: Allison J. Jaeger, alli.jaeger@gmail.com

The Sources of Sequential Modulations of Poorer-Strategy Effects: A MEG Study in Arithmetic.

THOMAS HINAULT, Aix-Marseille University & CNRS, JEAN-MICHEL BADIER, INSERM, SYLVAIN BAILLET, McConnell Brain Imaging Center, PATRICK LEMAIRE, Aix-Marseille University & CNRS. — Sequential modulations of poorer-strategy effects refer to reduced poorer-strategy effects (i.e., poorer performance when asked to execute a poorer than a better strategy) after poorer-strategy problems compared to after better-strategy problems. These effects have been assumed to involve cognitive control mechanisms similar to those assumed by theories of cognitive control, thus resulting in higher level of control when a poorer strategy has just been executed than following a better strategy. In this study, we used magnetoencephalography to further our understanding of trial-to-trial modulations of such cognitive control processes. Results in both event-related field and time-frequency analyses revealed two distinct neural mechanisms as a function of whether a poorer-strategy (proactive preparation in left inferior frontal gyrus) or a better-strategy (reactive adjustments in anterior cingulate cortex) was executed on previous problem. Email: Patrick Lemaire, patricklemaire13@gmail.com

Revisiting the Construct of ‘Relational Integration’ and its Role in Accounting for General Intelligence: The Importance of Knowledge Integration.

BRENDA ANN MARIE HANNON, Texas A&M-Kingsville, MEREDYTH DANEMAN, University of Toronto at Mississauga. — Recent research suggests that relational integration is a strong predictor of measures of complex cognitive abilities (e.g., Oberauer, Süß, Wilhem, & Wittmann, 2008). In this study we argue that there are at least two types of relational integration and that forming new relational structures by integrating relevant prior knowledge with new information is the fundamental relational integration process that underlies skill at performing many complex cognitive tasks. We describe a simple way to measure individual differences in this knowledge integration process and we show that our knowledge integration measure accounts for an impressive proportion of the variance on a battery of cognitive tests that assessed general fluid intelligence and specific abilities (verbal, quantitative, spatial). Knowledge integration also had better predictive power than two popular measures of the combined storage and processing capacity of working memory (reading span and operation span), as well as another relational integration measure that did not require accessing and integrating prior knowledge. Email: Brenda Ann Marie Hannon, brenda.a.hannon@gmail.com

The Role of Information Provided in Implicit Goal Versus Trait Inferences from Others’ Behaviors.

IRMAK OLCAYSOY OKTEN and GORDON B. MOSKOWITZ, Lehigh University (Sponsored by Barbara Malt). — Previous research suggested people infer others’ invariant characteristics (traits) during encoding when observing behavior (Todorov & Uleman, 2002). Because such research uses a false recognition paradigm to identify inferences, it remains possible the words falsely recognized are not traits, but represent other semantic content. Characteristics inferred from behaviors sometimes reflect variant (context-dependent) categories—goals. We investigated the conditions that promote implicit goal versus trait inferences by manipulating consistency of the behavior and its distinctiveness (if action was initiated towards a specific entity). Study 1 found that a behavior can be expressed both as a goal (to be honest) or trait (honesty) regardless of its consistency or distinctiveness. But Study 2 revealed that at the implicit level, a goal (not a trait) is inferred when the behavior included low consistency and distinctiveness. While goals and traits can be represented similarly semantically, they diverge in activation, dependent on context, when making inferences. Email: Irmak Olcaysoy Oktcen, iro213@lehigh.edu

Alignability, Salience, and Task Demands in Free Categorization.

JOHN CLAPPER and TIMOTHY MYER, California State University, San Bernardino. — We propose a two-stage model of free categorization in which people first select specific objects to compare, and then decide whether they belong to the same category. Stage one is determined by salience, e.g., distinctive cues that automatically draw attention to certain objects in a visual display. Stage two is determined by alignability, i.e., whether the objects have the same overall structure or body plan. People should automatically compare objects that share a distinctive cue, but only see them as a natural kind if they are alignable overall. In this experiment, objects sharing a distinctive cue were either alignable or non-alignable. The instructions stressed grouping (high demand) or grouping only if valid categories were present (low demand). People grouped both types of objects in the high-demand condition but only alignable objects in the low-demand condition, suggesting that psychologically natural categories (kinds) are preferentially based on overall alignability, rather than individual distinguishing features. Email: John Clapper, jclappe@csusb.edu
(2190) Interspersing Memory Items Increases Memory Without Decreasing Rule-Abstraction. ERIN NICOLE GRAHAM and JERI LITTLE, Hillsdale College (Sponsored by Jeri Little). — In a category learning task with individualized items and a well-defined rule, individuals differ in their learning strategies, with strategy predicting categorization of ambiguous transfer items (i.e., items that appear similar to a trained instance but are rendered a member of the opposing category on the basis of the rule). That is, some learners will memorize instances and classify transfer instances consistently with superficial similarity, and others will abstract an underlying rule and classify transfer instances consistently with the rule. Most learners report orienting more towards one strategy than the other. In the present study, we show that interspersing memory items (i.e., items that necessitate recall of specific features of a trained instance) during category training increases memory for individual instances without influencing self-reported strategy, classification of ambiguous transfer items, or abstraction of the rule. These findings suggest that attention to superficial aspects of instances does not impair rule-abstraction. Email: Erin Nicole Graham, egraham1@hillsdale.edu

(2191) Blocked Study Results in Better Encoding of the Frequent (Non-Diagnostic) Properties of the Categories. PAULO CARVALHO (Graduate Travel Award Recipient) and ROBERT GOLDSTONE, Indiana University (Sponsored by Robert Goldstone). — Previous research on the effects of interleaved and blocked study sequences on category learning has proposed that the sequence of study changes what information is encoded. One proposal is that during blocked study learners encode more strongly the similarities within each category while during interleaved study learners encode more strongly the differences between categories (Carvalho & Goldstone, 2014). Consistent with this prediction, in the present work using a transfer task with different types of items we show that following blocked study learners are sensitive to category properties that were presented frequently in the category (but were not diagnostic of category membership). However, following interleaved study learners do not seem to be sensitive to changes on these non-diagnostic properties. These results are captured by an exemplar model that takes into account the sequence of exemplars during learning by changing the likelihood of attending to and encoding different object properties depending on sequential similarities. Email: Paulo Carvalho, pcarvalh@indiana.edu

(2192) The Effect of Labeling on Learning to Categorize Complex Forms. JOSEPH BOOMER, BARBARA ANN CHURCH, and J. DAVID SMITH, University at Buffalo, SUNY (Sponsored by J. David Smith). — The strong tendency to classify stimuli on the basis of a single dimension has been linked to the use of verbalizable category rules. However, the importance of verbalizability over the selective focus of attention is unclear. It is also unclear if rule-like learning occurs when categorizing visually complex stimuli, in which multiple features change (e.g., family resemblance). After finding rule-like learning for categories in a family resemblance morph continuum, we attempted to directly examine the role of verbalizability in visually complex category learning. In Experiment One, participants learned labeled categories faster and with higher accuracy than unlabeled categories. In Experiment Two, participants gave higher dissimilarity ratings for between-category comparison for categories that had been learned with labels; suggesting that labels may help pull apart the perceptual similarity space. These results have implications for understanding category learning in complex stimulus domains, and the role of labels in human category learning. Email: Joseph Boomer, jboomer@buffalo.edu

(2193) Flexible Attention Weighting in Human Category Learning. NOLAN CONAWAY and KENNETH KURTZ, Binghamton University, SUNY (Sponsored by Kenneth Kurtz). — Selective attention is an integral component of exemplar models. In conjunction with stimulus generalization theory, this design principle allows models to account for a wide variety of empirical phenomena. In exemplar models, selective attention is implemented as a set of weights that are used to differentiate the degree of contribution of each stimulus dimension in the computation of similarity between a target item and stored exemplars. A number of different reports suggest that human learners may not be limited to a single set of attention weights – instead, people appear to be able to apply different attentional sets to different areas of the stimulus space. This phenomenon can be explained using exemplar models if they are augmented with exemplar-specific attention. However, the psychological plausibility of exemplar-specific attention is questionable and has not been independently tested. Using the Divergent Autoencoder (DIVA) model, we propose a dynamic focusing mechanism that affords attentional flexibility without invoking exemplar-specific attention. We find that focusing enables DIVA to explain a wide range of empirical phenomena including the evidence suggesting a need for exemplar-specific attention. Email: Nolan Conaway, nconaway1@binghamton.edu

(2194) Switching Between Taxonomic and Thematic Processing Carries a Cost. JON-FREDERICK LANDRIGAN, Drexel University, DANIEL MIRMAN, Moss Rehabilitation Research Institute (Sponsored by Daniel Mirman). — Converging behavioral and neural evidence suggests that semantic cognition is supported by a “taxonomic” system concerned with feature-based similarity and a “thematic” system concerned with relations based on co-occurrence in events or scenarios. The present study evaluated this hypothesis by testing whether switching between semantic systems incurs a cost. Participants completed a triads semantic matching task in which they had to pick which of two words was related to a probe word. The related word was either taxonomically or thematically related to the probe word, mixed pseudo-randomly over the course of the experiment. The type of semantic relatedness was irrelevant to the participants’ task, but there was a switch cost: taxonomic relatedness judgments
were slower when preceded by thematic trials and thematic relatedness judgements were slower when preceded by taxonomic trials. This processing cost when switching between accessing taxonomic vs. thematic relations is consistent with the complementary semantic systems hypothesis. Email: Jon-Frederick Landrigan, jl3456@drexel.edu

(2195)
The Impact of Category Structure and Training Methodology on the Acquisition and Generalizability of Within-Category Information. LAUREN SZYMULA, STEVE HUTCHINSON, and MIKAEL HEIKKENEN, University of Maine; SEBASTIEN HELIE, Purdue University, SHAWN W. ELL, University of Maine. — Category representations can be broadly classified as containing within-category information (commonalities among category members) or between-category information (differences between category members and non-members). This experiment investigates the impact of category structure and training methodology on the acquisition and generalizability of within-category information. Participants were trained on two categories (A and B) from either rule-based or information-integration structures using A/B training (Is the stimulus an A or a B?), A/not-A training (Is the stimulus an A, Yes or No?), or inference training (infer the missing component of the stimulus from a given category) and then tested on an inference task. At test, only training on the information-integration category structure (regardless of training methodology) consistently resulted in within-category information that could be generalized. In sum, these data suggest that category structure may be a more critical for the learning and generalization of within-category information when the goal is to infer missing information. Email: Shawn W. Ell, shawn.ell@umit.maine.edu

(2196)
Additive or Substitutive? Constructing Features, Their Types, and Values From Observations. JOSEPH AUSTERWEIL and TING QIAN, Brown University. — To generalize and learn concepts in a dynamic world, people construct basic units to represent regularities. While recent feature learning models have made progress towards understanding human feature construction (Austerweil & Griffiths, 2013; Goldstone et al., 2008), the constructed features are additive. If the features representing a category are additive, then a novel object with a combination of those features is a valid category member. But, not all features representing real-world categories are additive; rather some features are substitutive, meaning they can only be one out of a set of discrete values (Garner, 1978). For example, a TV is either plasma or LCD—it cannot be both. Further, not all features are binary-valued (e.g., a TV is either plasma, LCD, or LED). How do people construct a set of features to represent a set of objects, decide which features in the set are additive or substitutive, and infer the values of the features from observations of the objects? We formulate a novel model that constructs feature representations and satisfies all the above criteria. We compare its predictions and the predictions of simpler models (e.g., exemplar model) to human performance in novel behavioral experiments. Email: Joseph Austerweil, joseph_austerweil@brown.edu

(2197)
Inducing Categories From Examples: Does the ‘Sweet Spot’ of Retrieval Difficulty Vary With a Learner’s Working-Memory Capacity? FARIA SANA, McMaster University, VERONICA X. YAN, University of California, Los Angeles, JOSEPH KIM, McMaster University, ELIZABETH LIGON BJORK and ROBERT ALLEN BJORK, University of California, Los Angeles. — Interleaving the exemplars of different to-be-learned categories, rather than blocking the exemplars by category, often enhances the inductive learning of those categories. Successful retrieval of previously studied exemplar-features that define a given category is critical to obtaining the interleaving benefit, which suggests that individual differences in the ability to engage in controlled search to retrieve these relevant features—a quality observed among learners with high working memory capacity (WMC)—may influence who benefits from interleaving. Participants studied word-problems of three statistics concepts that were presented interleaved or blocked and consecutively or spaced apart (via unrelated fillers). On a final classification test of new word-problems, lower WMC learners benefited from conditions when retrieval difficulty was intermediate (interleaved-consecutive or blocked-spaced) compared to when retrieval difficulty was too low (blocked-consecutive) or too high (interleaved-spaced). We interpret these results from a “desirable difficulties” (Bjork, 1994) perspective. Email: Joseph Kim, kimjoe@mcmaster.ca

(2198)
Renewal of Conditioned Taste Aversion in Rats Using Bait-Shyness and Graded Extinction Procedures. SADAHIKO NAKAJIMA, HIROYA NAKAGAWA, and NANAKO ONZA, Kwansei Gakuin University. — In rats, conditioned taste aversion that has been established in an environmental context and then extinguished in another context can be renewed by returning the rats to the original context. The present study employed a generalized bait-shyness technique, where oral ingestion of lithium chloride (LiCl) solution induces sodium chloride (NaCl) solution aversion in rats, to demonstrate renewal of salty taste aversion not only after a conventional extinction treatment (i.e. presenting the NaCl solution) but also after a graded extinction procedure in which the saltiness was increased gradually from a low level to the same level as the original taste (Experiment 1). This was also the case when an interfering sweet taste was added and gradually faded out during the graded extinction phase of salty sate aversion (Experiment 2). Theories on the mechanism underlying the renewal effect as well as the clinical implications for relapse of symptoms after systematic desensitization therapy in humans are also discussed. Email: Sadahiko Nakajima, nakajima@kwansei.ac.jp

• ANIMAL LEARNING AND COGNITION •
Do You See What I See? A Comparative Investigation of the Delboeuf Illusion in Humans and Monkeys. AUDREY E. PARRISH, SARAH F. BROSNAN, and MICHAEL BERAN, Georgia State University (Sponsored by Michael Beran). — Visual illusions reveal clues about how the perceptual system operates by understanding when perception “fails.” We investigated whether rhesus monkeys and capuchin monkeys perceived the Delboeuf illusion similarly to humans. In Experiment 1, we presented monkeys and humans with a relative discrimination task that required subjects to choose the larger of two dots that were sometimes encircled by rings. Only humans demonstrated evidence of the illusion, overestimating dots encircled by small rings and underestimating dots encircled by large rings. In Experiment 2, we presented participants with a classification task that required them to classify a central dot as small or large. We presented a range of rings to determine whether the illusion would occur for particular ring sizes. Here, we found evidence of the Delboeuf illusion using this approach. All species underestimated the central dot size to a progressively greater extent with progressively larger rings, indicating continuity across the primates, but methodology matters. Email: Audrey E. Parrish, audrey.parrish1@gmail.com

Can Rhesus Macaques (Macaca Mulatta) Transfer Category Knowledge When Reinforcement Is Deferred? ALEXANDRIA C. ZAKRZEWSKI, BARBARA ANN CHURCH, JENNIFER M. JOHNSON, and JOSEPH BOOMER, University at Buffalo, SUNY, F. GREGORY ASHBY, University of California, Santa Barbara, J. DAVID SMITH, University at Buffalo, SUNY (Sponsored by Barbara Ann Church). — Neuroscientists distinguish an implicit, associative system of category learning from an explicit, rule-based system. These systems are dissociated by category learning tasks with either a multidimensional, information-integration (II) solution or a unidimensional, rule-based (RB) solution. Research examining transfer of learning to untested regions of stimulus space has found impaired transfer in II but not RB tasks in humans and monkeys (Casale et al., 2012; Smith et al., in press). Research also shows humans learn RB but not II tasks when feedback is deferred and rearranged (Smith et al., 2014); and they transfer RB but not II knowledge with deferred-rearranged feedback (Zakrzewski et al., 2014), suggesting transfer in II but not RB tasks is dependent on associative learning. The present study asks whether a similar transfer pattern is seen in rhesus macaques. Results are discussed in terms of what species discontinuities can tell us about the evolution of category learning processes. Email: Alexandria C. Zakrzewski, azakrzew@buffalo.edu

Small-N-Dividual Differences in Attention Control. DAVID A. WASHBURN, Georgia State University. — Tremendous progress has been made in understanding the relation between cognitive constructs (e.g., working memory capacity and fluid intelligence) using the psychometric approach, in which intertask correlations reflecting individual differences between participants reveal overlap and dissociations between processes. Comparative studies typically have too few animals to employ these paradigms, and yet robust individual differences between animals have been reported that seem likely to be reliable and informative. Fortunately, for many studies in comparative cognition small sample sizes are offset by large sampling rates, so that each animal may produce thousands of trials on each task. In the present study, the relation between executive, orienting, and alerting attention-networks and other attention-control measures from a small-N (four rhesus monkeys), multi-task repeated-measures design were explored using methods (e.g., factor and path analysis) typically reserved for large-N designs. The results highlight both the similarities and the differences across monkeys in attention control. Email: David A. Washburn, dwashburn@gsu.edu
• VISION II •

(3001)

Urban Exposure Increases Global Perception. SERGE CAPAROS, Université de Nîmes, KARINA J. LINNELL, Goldsmiths, University of London, ISABELLE BLANCHETTE, Université du Québec à Trois-Rivières. — For a long time, human perception was believed to be hardwired in the brain, similar across places and cultures. Yet some recent findings have shown that even basic perceptual processes are influenced by experience. For instance, urban exposure has been found to alter the local perceptual bias of the Himba, a remote population of Namibia, Africa. In the present study, we aimed to generalize this effect of urban exposure to a less remote population. We tested 155 participants in Rwanda, Africa, using the same similarity-matching Navon task as was employed in Namibia. We controlled for the mediating effect of a series of factors, namely, literacy, education, short-term memory capacity, sense of community, family size, positivity, and wealth. Urban dwellers showed more global perception than rural dwellers, and this effect was not mediated by any of the control factors. While the mechanisms underlying the impact of urban exposure on perception remain to be isolated, this study confirms the strong plasticity of perceptual processes to experience-related factors.

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(3002)

Variance Discrimination Between Different Visual Properties Using Method of Adjustment. MIDORI TOKITA and AKIRA ISHIGUCHI, Ochanomizu University. — We have an ability to perceive statistical structures of surrounding objects and/or events. It has been suggested that this ability is not limited to within a particular perceptual property but across properties, implying the existence of common representation mechanisms independent of stimuli properties (Ueda, Ishiguchi & Tokita, 2014). In order to further explore the possibility of the common mechanism for variance representation, we tested subjective equal levels of variance across different properties (e.g., orientation, size and so on) using Method of Adjustment. Two stimuli arrays, a reference and a test array, were simultaneously presented on the display. In the experiment, the subjects were asked to adjust the variance of the test array so that its variance would be perceptually identical to that of the reference array. The threshold and the point of subjective equality in the within and the across property conditions were obtained. Findings will be presented and discussed.

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(3003)

Good Gestalt: Orderliness Perception Through Touch. KAYLA SCHRAMSKI, Northern Michigan University, FIONA NEWELL, Trinity College Dublin, MOUNIA ZIAT, Northern Michigan University. — The good form principle is the simplest but also the most ambiguous principle of Gestalt laws. Any stimulus that is simple, symmetrical, ordered, or regular can fall under the good form principle. To our knowledge, the present study is the first empirical attempt to explore this principle within the tactile modality. We asked 27 psychology students to engage in a 2AFC discrimination task by exploring 2D tactile stimuli that consisted of two squared tiles (3 x 3 cm) of 49 raised dots, each perfectly aligned or randomly scattered on a grid. Eight comparison stimuli (4 ordered and 4 disordered) were compared to a standard stimulus of intermediate ordering pattern. The results showed that the discrimination thresholds for all ordered patterns were significantly lower from those of disordered patterns. This suggests that, for the tested size and patterns, the threshold for good Gestalt is higher than its counterpart in vision.

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(3004)

Intermodal Tau Effect. CHRISTINE SUTTER, SABRINA SCHULTE, and MARYVONNE GRANOWSKI, RWTH Aachen University. — This study investigates the temporal-spatial interaction in a temporal order judgment task with visual and tactile stimuli. Participants perceive two visual stimuli (two horizontally arranged green LEDs on a fiberboard), followed by two tactile stimuli (two low mass vibrators attached to the participant’s left and right hand). The spatial intervals between visual stimuli, and between tactile stimuli were always constant. Presentation times of visual stimuli varied (on- or offset of left or right stimulus first), while the temporal intervals of tactile stimuli did not vary (same presentation time). As assumed, we found an intermodal tau effect when we ask about the temporal onset of tactile stimuli (left or right first): When the left visual stimulus was extinguished first, the left tactile stimulus seemed to appear first, although both tactile stimuli appeared simultaneously. And the other way around for the earlier offset of the right visual stimulus.

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(3005)

Perceiving Nested Possibilities for Behavior for Another Person. JEFFREY WAGMAN and DANIEL S. SCHLOESSER, Illinois State University, THOMAS STOFFREGEN, University Of Minnesota. — Available actions (affordances) can be nested within one another. The means of performing a behavior can change the ability to perform that behavior, and two different means can bring about functionally equivalent changes in such ability. Perceivers are sensitive to such nestedness when perceiving affordances for the self. We investigated whether this is also the case when perceiving
affordances for another. Participants perceived maximum vertical reaching heights for another person (the "other") when they expected that person to reach while (1) standing on the floor, (2) standing on a (visible) step stool, and (3) using a (visible) stick. Perceivers reported taller maximum reaching heights (1) for a tall than for a short other and (2) when they expected the other to reach while on the step stool or with the stick than while on the floor. The results suggest that perceivers are sensitive to nested affordances for another person.

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(3006) Effect of Labeling Colors Before Rating the Color Preferences. KAZUHIKO YOKOSAWA and MAHO HARADA, The University of Tokyo, MICHIKO ASANO, Rikkyo University. — Previous studies have shown that color preferences can be explained by affective responses to color-associated objects (Palmer & Schloss, 2010) and symbols/concepts (Yokosawa, Asano, Kanazawa, Schloss, & Palmer. 2014). The present study investigated whether color preferences are influenced by labeling the colors with words immediately before rating the color preferences. Prior to rating color preference, on each trial of a Labeling condition, participants labeled a color using a word representing either (1) an object name, (2) an abstract concept, or (3) a color name. Results showed that relative to a No-Labeling control condition, labeling colors increased subsequent ratings of color preferences, specifically for colors deemed less preferred in the control condition. Further investigation confirmed that the labeling modulated the color preferences in the direction of valence of the objects/concepts that are associated with the colors (as labels). These results provide evidence that color preferences were calculated dynamically depending on context.

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(3007) Holistic Gaze Perception Across Time. TIMOTHY SWEENY and DIANA MIHALACHE, University of Denver. — Face perception is holistic. When facial features are seen simultaneously, they are integrated and perceived as a unified whole rather than as disconnected parts. Facial features, however, are sometimes experienced sequentially due to occlusion or rapid shifts of attention. Is holistic representation flexible enough to operate in situations like these, integrating constituent features not just across space, but also across time? Alternatively, does seeing features across time disrupt or even prevent this integration? Here, we found that the holistic perception of another person's gaze direction, which requires integration of head and pupil rotations, can occur even when these features are seen sequentially. Seeing a rotated head attracted the perceived gaze direction of a pair of subsequently presented pupils. However, the time window of this integration was limited and sensitive; holistic perception decayed with delays between the presentations of the head and pupils, and prolonged perception of head rotation and associated adaptation further reduced integration. These findings suggest that the visual system strikes a balance between integrating associated features and distinguishing unique objects over time.

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(3008) The Visual Aesthetics of Snowflakes. OLIVIA C. ADKINS and J. FARLEY NORMAN, Western Kentucky University. — Research on experimental aesthetics has been conducted since the nineteenth century. Interestingly, however, few studies have examined the perceived beauty of naturally-shaped objects. In the current experiment, 204 participants were presented with a set of ten snowflake silhouettes that varied in complexity (perimeter relative to area); they were similarly presented with ten randomly-shaped, computer-generated, solid objects that also varied in complexity. For each stimulus set, the participants selected the single snowflake or object that was the most beautiful (Fechner's method of choice). The results for the solid objects replicated the findings of earlier research: the most and least complex objects were chosen as the most beautiful. Moderately complex objects were rarely selected. The results for the snowflakes were different. For these visual stimuli, the least complex snowflakes were almost never chosen; only the complex snowflakes were perceived as being most beautiful, with the aesthetic preference increasing with increases in complexity.

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(3009) Inertial Loading of Actual and Imagined Arm Movement. ANDREW SLIFKIN, ABHISHEK DEY, and MICHAEL SUMMERS, Cleveland State University. — Similar information processes are engaged when action is actually executed and when it is imagined. That hypothesis has received support from studies showing that actual and imagined movement durations (MDs) are equivalent. For example, Papaxanthis, Schieppati, Gentili, and Pozzo (2002) demonstrated actual-imagined MD equivalence for arm movements made at each of three levels of inertial load (0.0, 1.0, 1.5 kg). Here, Experiment 1 attempted to replicate the methods and procedure of Papaxanthis et al. Experiment 2 examined the influence of motor-imagery load holding (no hold/hold) and arm position (vertical/horizontal) conditions on comparisons of actual and imagined MDs. In contrast to the expected results, in both experiments imagined MDs were less than actual MDs. In Experiment 2, neither load holding nor arm position during motor imagery influenced the degree of the actual-imagined MD difference. In other words, "knowledge" of load appears to be independent of both load holding and arm position conditions.

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(3010) Tool-Use Induces a Size Illusion. JIHYUN SUH and RICHARD A. ABRAMS, Washington University in St. Louis (Sponsored by Richard A. Abrams). — It is known that tool-use compresses perceived distance: When a tool is used to extend one's reach, objects newly reachable with the tool are perceived to be closer. In the present study, we tested...
whether tool-use also influences perceived size. In a series of experiments, participants were asked to estimate the size of an object which was just beyond reach. We found that participants estimated the size of the object to be smaller when they were holding a reach-extending tool. The result shows that tool-use not only influences perceived distance but also perceived size.

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(3011)

Nested Possibilities for Behavior in a Tool-Use Task. SARAH CAPUTO, Illinois State University, THOMAS STOFFREGEN, University Of Minnesota, JEFFREY WAGMAN, Illinois State University (Sponsored by Thomas Stoffregen). — Available actions can be nested within one another. Choosing one behavior can create or eliminate other possible behaviors. We investigated nestedness in a tool-use task. In Experiments 1 and 2, participants were asked to assemble tools that would be appropriate for performing a specific action on a target object. Participants assembled tools that reflected the nestedness of the task constraints: Tools were longer when targets were farther away, and had larger rotational inertia for striking/power tasks than for poking/precision tasks. In Experiments 3 and 4, participants rated the suitability of pre-assembled tools for performing a goal behavior on a target object. The results showed that preferences were consistent with the tools assembled in Experiments 1 and 2. Overall, participants both assembled and rated tools in ways consistent with a set of nested constraints on their use in specific tasks.

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(3012)

Time Perception and Stimulus Response Compatibility. DONALD ALEXANDER VARAKIN, AMANDA RENFRO, and JASON HAYS, Eastern Kentucky University. — The current experiments tested if stimulus response compatibility (SRC) affects duration judgments. Participants performed a temporal bisection task, judging on each trial whether a visual stimulus’ duration was closer to pre-learned short (400ms) or long (1600ms) standard. The stimulus appeared on the right or left side of the monitor. Participants had left/right button presses to indicate judged duration, and how the key映射 to duration was counterbalanced. A SRC effect would occur if response-key mapping and stimulus location interact to influence duration judgments. In Experiment 1, stimulus location did not interact with response mapping. In Experiment 2, participants were only given 1000ms to provide a duration judgment after stimulus offset, and an SRC effect was observed. Experiment 3 replicated Experiment 2, and further suggests that SRC’s influence on duration judgments last at least 1000ms. These results suggest that SRC affects duration judgments only when participants must respond quickly.

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(3013)

Enhanced Discrimination of Stiffness Through Perceptual Training. SUNG HUN SIM and BING WU, Arizona State University, ROBERTA KLATZKY, Carnegie Mellon University. — People demonstrate limited ability to discriminate between levels of stiffness, as indicated by high difference thresholds (JNDs). We tested whether this ability could be improved via perceptual training. Over three training sessions, subjects discriminated between two virtual springs, generated by a visual-haptic simulator. In each session they performed a series of two-alternative forced-choice classification trials, with feedback. Successive sessions used different baseline values and smaller objective differences in stiffness between the two springs. Measures of JND were taken pre- and post-training and found to decrease between the two time-points. In contrast, no improvement was observed in a control experiment where the JND was measured repeatedly without interspersed training. Our method of training appears to enhance the haptic discrimination of stiffness, making it potentially applicable to tasks like surgery or diagnosis in which accurate judgments of stiffness are important.

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(3014)

Control-Display Alignment Determines the Prevalent Dimension in 2-D Stimulus-Response Tasks. JAMES MILES, SAMUEL LEE, and KIM-PHUONG VU, California State University Long Beach. — In studies using 2-dimensional (2-D) stimuli and responses, stimulus-response compatibility (SRC) effects are generally larger along the horizontal (right-left) than the vertical (top-bottom) dimension, an effect called right-left prevalence. We propose a new account of prevalence effects based on the spatial alignment between elements on the stimulus display and response locations on the control panel—the control-display alignment (CDA). In particular, when responses are aligned above or below a display, 2-D stimulus and response sets share a common vertical midline that emphasizes a right-left distinction. When responses are to the right or left of the display, the shared midline is horizontal, emphasizing the top-bottom distinction and should instead lead to top-bottom prevalence effects. Participants completed two-choice, 2-D SRC tasks with a response panel centered above, below, left, and right of a projected display. Right-left prevalence was elicited using vertical CDA and top-bottom prevalence was elicited using horizontal CDA. The findings demonstrate that CDA largely determines prevalence effects and should be taken into account when using multi-dimensional stimulus and response sets.

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(3015)

Auditory Feedback Perturbations Disrupt Synchrony in Ensemble Music Performance. ALEXANDER DEMOS, MARCELO M. WANDERLEY, and CAROLINE PALMER, McGill University. — Action simulation and motor synergy theories of joint action were evaluated in duet piano performance while auditory feedback was temporarily removed. Pianists (n = 16 pairs) performed a two-part musical piece together, with one performer using the left hand and one using the right hand. Auditory feedback created by the left, right, or both hands was removed unpredictably and temporarily from sound delivered to both performers. Action simulation predicts that feedback removal from one part will not reduce temporal synchrony, as action information from
Estimates of Distance Traveled When Walking With Normal Compared to Degraded Vision. KRISTINA RAND, SARAH CREEM-REGEHR, and WILLIAM THOMPSON, University of Utah. — Low vision research suggests that navigation with severely-degraded vision impairs spatial learning of novel environments, likely due to both reduced visual information and the increased cognitive demands of walking safely (Rand, Creem-Regehr, & Thompson, 2015). Still unknown are the mechanisms underlying this impaired spatial learning with vision loss. The current work investigates whether differences in perceived distance walked when navigating with degraded compared to normal vision could be an explanation for greater errors in spatial memory. Participants walked paths of varying length through hallways of a campus building and made estimates of the path's length from memory. Initial results show that when people are asked to visually match their distance walked, they overestimate more when walking with degraded vision compared to with normal vision. However, additional measures of perceived distance walked across a greater range of distances and contexts are currently underway to more fully understand these effects. Email: Kristina Rand, kristina.rand@utah.edu

Action Representations Evoked by Objects and Object Names. RAGAV KUMAR, MICHAEL E. J. MASSON, and DANIEL N. BUB, University of Victoria (Sponsored by Michael E. J. Masson). — Subjects were cued to vertically or horizontally oriented power grasps with their left or right hand after being primed with the name of a handled object. They were faster when responding with their dominant hand and when the grasp orientation was congruent with the typical orientation of the prime object's handle (e.g., a vertical wrist orientation for a teapot). Critically, there was no interaction between these two dimensions; both dimensions independently contributed to performance. In contrast, when subjects were primed with pictures of handled objects, an “all-or-none” interaction between dimensions was found, such that an orientation congruency effect appeared only when the response hand was aligned with the handle of the object prime. This interaction implies a hierarchical organization of action components. We conclude that object names evoke categorical values on independent dimensions of action, whereas pictures evoke a hierarchically organized action plan. Email: Ragav Kumar, ragavk@uvic.ca

Difficult Spatial Updating Relies on an Environmental Reference Direction. QILIANG HE and TIMOTHY McNAMARA, Vanderbilt University, JONATHAN KELLY, Iowa State University. — The current research investigated the reference frame used in spatial updating. Participants learned a layout of 8 objects from a single perspective in a virtual room; the learning direction was assumed to define the reference direction. Experiment 1 replicated reference direction effects in subsequent judgments of relative direction. In Experiments 2 & 3, participants used the keyboard to navigate to two of the learned objects with or without room walls, and used the joystick to point to a third object. In Experiment 4, participants used the keyboard for navigation but rotated their body to face the third object. In Experiment 5, participants walked to the two objects and turned to face the third object. We observed reference direction effects in all experiments except for 5. These results imply that spatial updating relied on egocentric reference frames when body-based cues were available, but environmental reference frames when body-based cues were limited. Email: Timothy McNamara, tmcnamara@vanderbilt.edu

Indoor and Outdoor Environmental Features That Aid Wayfinding (and Sense of Belongingness) in Older Adults During Liminal Transition. EN FU, BEVERLY ROSKOS, and STEPHANIE SICKLER, University of Alabama (Sponsored by Beverly Roskos). — This study investigated environmental features that make older adults feel comfortable when they move from a house to a retirement community. Older adults (n = 25, average age = 83.91, SD = 6.78) completed a) an interview about the factors that aid or hinder their wayfinding in this new environment and b) a survey about their sense of belongingness and perceived ease of wayfinding within their community and c) a survey about their sense of direction. Participants were more likely to report external factors (e.g. having a map) than internal factors (e.g. knowing the place) as aiding or hindering their wayfinding. Correlational analyses of the survey data showed significant relations between sense of belongingness and perceived ease of wayfinding within their community and between sense of direction and sense of belongingness (r = .51, p < .05). These data indicate a need for further investigation of social and cognitive factors in wayfinding. Email: En Fu, efu@crimson.ua.edu

Choosing Landmarks at Intersections: Navigational Versus Perceptual Salience. CHRISTOPHER GALEUCIA, DEANNE ADAMS, and LAURA CARLSON, University of Notre Dame, JARED MILLER, Lone Star College, THORA TENBRINK, Bangor University. — When learning a route through a novel environment, objects and buildings encountered along the route can be used as landmarks that can shape our memory for the path and how we describe this route to others. Two experiments were conducted to examine
which landmarks are more likely to be encoded at intersections based on two forms of salience: perceptual and navigational. In both experiments participants watched a video that followed a path through a virtual environment. Along the path there were intersections that featured an object (Study 1- pedestals with cube signs, Study 2- stores with signs) on every corner; each intersection featured one perceptually salient object and two navigationally salient objects. Participants gave a written description of the path and completed a map task after watching the video. The results in both experiments suggest that navigational importance and perceptual features are preferred when choosing landmarks for navigational purposes. Email: Laura Carlson, lcarlson@nd.edu

(3021) Cue Integration During Navigation. LORI A. SJOLUND and JONATHAN KELLY, Iowa State University, TIMOTHY MCNAMARA, Vanderbilt University. — Navigation is influenced by body-based self-motion cues that are integrated over time in a process known as path integration, and also by environmental cues such as landmarks and room shape. This project explored whether humans prefer path integration or environmental cues when returning to a previously visited location in conditions of small and large cue conflicts. Participants walked an outbound path in an immersive virtual environment before attempting to return to the path origin. Path integration and an environmental cue were both available during the outbound path, but experimental manipulations created two dual-cue conflict conditions in which the environmental cue was displaced by a small or large amount before walking the return path. Weights assigned to each cue (inferred through responses on dual-cue conflict trials) indicated that the environmental cue was preferred over path integration in the small conflict condition, but this was reversed in the large conflict condition. These results indicate that path integration may function as a backup system for navigation when environmental cues become unreliable. Email: Jonathan Kelly, jonkelly@iastate.edu

(3022) How Working Memory for Spatial Locations Versus Relations Predicts Navigation Ability. KARA BLACKER, Johns Hopkins University, STEVEN M. WEISBERG, University of Pennsylvania, NORA NEWCOMBE, Temple University, SUSAN M. COURTNEY, Johns Hopkins University. — Successful navigation often requires accurate memory for specific locations and for spatial relationships between locations. Whether these are independent abilities or part of a single cognitive system remains unclear. Based on previous work showing that working memory (WM) for spatial locations has distinct neural mechanisms from WM for spatial relations, we hypothesized that the ability to maintain these distinct types of spatial information would differentially predict individual differences in navigation proficiency. Here participants completed a virtual navigation assessment along with several types of spatial WM tasks. We found that WM for spatial relations was a better predictor of route integration than WM for spatial locations. However, map reconstruction performance relied on both location and relation WM abilities. These results suggest that spatial WM in general is an important factor in successful navigation, but location-specific and relational WM make distinct contributions to different facets of spatial navigation. Email: Kara Blacker, kara.blacker@jhu.edu

(3023) Resetting Path Integration Systems: A Displaced Landmark Perceived After Walking Resets Positions but not Headings. WEIMIN MOU and LEI ZHANG, University of Alberta. — During locomotion, individuals can update their position with either idiothetic cues due to movement (path integration system), or a single visual landmark (piloting system). This project investigated how these two systems interact in position estimation. In Experiment 1, participants walked a two-leg path. The landmark reappeared in a different location during or after participants’ walking the second leg. The results showed that participants’ position estimation followed idiothetic cues in the former case but the displaced landmark in the latter case. In Experiment 2, participants saw the displaced landmark at the end of the second leg and then walked a third leg without the view of the landmark. The results showed that if participants were asked to point to one of the objects before they walked the third leg, their estimated position at the end of the third leg was still influenced by the displaced landmark. These results support the theory stipulating that the path integration system works dynamically and the piloting system resets the path integration system interminently. Email: Weimin Mou, wmou@ualberta.ca

(3024) Wayfinding in Urban and Non-Urban Environments. BEVERLY ROSKOS, University of Alabama, WILL WHITHAM, Georgia State University, SARA STEELE, University of Alabama. — Research on the relations among gender, sense of direction, environmental familiarity, survey strategy usage, and wayfinding performance has largely been done in urban settings. This study investigates these relations in urban and rural environments. Participants (n = 135) learned a specific route through an urban or rural virtual environment and then retraced the route on their own (turning errors) and, starting at the route origin, took the “most efficient route” to a specific landmark (efficiency). There were no differences between the environments in turning errors, but participants were less efficient in the rural environment than in the urban environment. However, variables that predicted turning errors in the urban environment (i.e., gender and sense of direction) did not predict turning errors in the rural environment. None of the variables predicted efficiency in either environment. These results indicate that a more careful analysis of wayfinding in different types of environments is needed. Email: Beverly Roskos, brokos@bama.ua.edu

(3025) Route Learning: Effects of Naturalistic and Explicit Structural Cues. JESSE SARGENT and DEVIN KELLIS, Francis Marion University, LAUREN RICHMOND and JEFFREY M. ZACKS, Washington University in St. Louis.
— Memories of environments’ spatial structure can be shaped by natural features, and also by cues from people or navigational aids. We investigated the contribution of these two information sources by asking participants to watch videos shot by a cameraperson walking around two building sized environments. Routes contained natural borders between spatial regions, such as doorways and hall intersections. During cued routes, these borders were cued by a pause and verbal cue. Distances were underestimated for within-region object pairs compared to between-region pairs, suggesting chunking in spatial memory. However, there was no significant effect of cueing on chunking or overall accuracy. Also, individual differences in this measure of chunking were not reliable across routes, suggesting this measure of spatial chunking may be specific to situations rather than individuals. The natural structure of the environment shaped chunking in spatial memory, but drawing explicit attention to this structure did not moderate its effects.

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(3026) Contributions of Nonspatial Cognitive Ability to Route Memory in Young and Older Adults. LAUREN RICHMOND, Washington University in St. Louis; JESSE Q. SARGENT, Francis Marion University; SHANEY FLORES and JEFFREY M. ZACKS, Washington University in St. Louis. — Both spatial and nonspatial factors may contribute to the effectiveness of one’s route memory; do these relationships differ with age? To assess this, young and older adults experienced 3 routes while landmarks were called to their attention. Participants then pointed to unseen landmarks, drew a map, and estimated distances between landmarks. Participants also completed a battery assessing working memory, processing speed and verbal memory. Aging was associated with significantly poorer performance on all non-spatial cognitive measures. Moreover, older adults performed less well than younger adults on spatial memory indices, though not significantly so for map drawing. Verbal memory predicted map drawing and pointing accuracy, working memory predicted map drawing, and processing speed predicted distance estimation. No significant interactions between age and battery performance in predicting spatial indices were observed. In sum, nonspatial cognitive ability is related to spatial memory; this relationship does not differ as a function of age.

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(3027) Selecting Landmarks When Giving Directions to Different Addressers on Campus. LAURA CARLSON, JENNIFER KOLESARI, CHRIS GALECIA, and DEANNE ADAMS, University of Notre Dame (Sponsored by Laura Carlson). — Landmarks can be helpful guides when completing spatial tasks, such as giving directions. Past research has shown that the salience of landmarks can influence their use, with salience based on perceptual features, or on the spatial relation between the landmark and a target location. In two experiments, students were asked to give directions to locations on campus to other students, alumni, or visitors. In Experiment 1, speakers’ ratings of the imaginability and frequency of use for 20 buildings along the directed paths impacted whether they were included in their directions to other students. In Experiment 2, these features did not impact speakers’ directions to alumni or visitors, suggesting a different prioritization of salience. These results suggest that the experience of the speakers and the identity of the receivers play a role in which landmarks speakers choose to include in their directions.

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(3028) Unpacking Boundary-Related Localization: Identification of Optimal Reference Points and Encodings of Relations Among Reference Points. RUOJING ZHOU and WEIMIN MOU, University of Alberta (Sponsored by Alinda Friedman). — Previous work in our lab (Zhou & Mou, submitted) showed that learning individual locations relative to a single landmark, compared with a boundary, led to a better cognitive map of these locations. In the current project, we manipulated the number of reference points (one piece of ten-degree arc, four pieces of ten-degree arcs, or four pieces of arcs with increased degrees taken from a circular boundary, or the complete circular boundary) available when learning individual locations. The results showed that cognitive mapping was less accurate in the order of one piece, four pieces, and the whole boundary. However, expanding each of the four pieces did not affect the accuracy of cognitive mapping. These findings suggest that for encoding individual location, participants might choose the closest arc (about 10 degree) from a homogenous boundary as the reference point and the relations among the four reference arcs might not be accurately encoded.

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(3029) Distance and Direction Information in Spatial Environments. DARIN HOYER (Graduate Travel Award Recipient) and STEPHEN DOPKINS, George Washington University (Sponsored by George L. Malcolm). — The layout of a spatial environment can be coded using direction and/or distance information. We hypothesize that one type of information may be relied on more than another, and that the subject’s viewpoint may lead to one type of information being favored over the other. In a chain of experiments we investigate these questions by having subjects remember the layout of objects in a cylindrical chamber. Subjects remembered the target objects as being closer to the locations at which the objects would have been remembered if only direction information had been recorded than the locations at which the objects would have been remembered if only distance information had been recorded. These results justify the focus of current research on direction information, and they suggest that an environmental representation may be more accurate at preserving the configuration of a layout than its scale. We then manipulated viewpoint by having subjects view objects from two viewpoints that show the objects in optimal positions for judging the distance between them or their relative directions. Our results suggest that subjects opportunistically encoded the information that was most effectively perceived at any given viewpoint.

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• RECALL I •

(3030)
The Costs and Benefits of Interleaved Retrieval Enhancing List Segregation. KRISTIN DIVIS, AARON BENJAMIN, University of Illinois, Urbana-Champaign (Sponsored by Brian Ross). — What one does between studying new information is important for memory. Previously, we showed that interleaved semantic retrieval within a multitask learning paradigm leads to enhanced memory for future material and reduced memory for prior material (Divis & Benjamin, 2014). These results suggest that interleaved retrieval segregates memories for the individual lists, making them more distinct from one another. In the current study, we tested predictions following from the view that interleaved retrieval can support both a beneficial reduction in interlist interference and also a detrimental reduction in the ability to relate information across lists. Lists that are more distinct from one another should be less likely to be confused; however, it should also be more difficult to make connections between items across the lists. Our results support both of these predictions: learners were more apt to confuse item membership across lists that were not separated by retrieval, and they were less likely to exhibit reminding across related items when those lists were separated by retrieval. These results help shape our understanding of relevant costs and benefits if using interleaved retrieval to promote learning in the classroom.

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(3031)
Enactment Protects Studied Words From Long-Term Dual-Task Interference. JEFFREY D. WAMMES and MYRA FERNANDES, University of Waterloo. — Past studies showed deleterious effects of divided attention (DA) during retrieval (Test 1) on a future memory test (Test 2). We investigated whether enactment could provide protection against such detrimental effects. Participants enacted or read words under full attention (FA) during study, then completed Test 1 under FA or DA with a concurrent word-based task. Participants then performed Test 2 under FA. In Experiment 1, Test 2 asked participants to recall any additional words not output in Test 1; output following DA contained a greater proportion of enacted words than following FA. In Experiment 2, Test 2 asked participants to recall all words from study, and again output following DA contained proportionally more enacted words. Experiment 3 showed that when Test 2 was delayed by 8 minutes, the advantage for enacted words, following DA, was even larger. Findings support the hypothesis that enacted words are more resilient to dual-task interference. Email: Myra Fernandes, mfernan@uwaterloo.ca

(3032)
Memory Reconsolidation: Strength of Reactivation Modulates the Impact of New Learning on Reactivated Memories. ALMUT HUPBACH and IIONA SCULLY, Lehigh University. — Reactivated memories are susceptible to retroactive interference. Recent studies suggest that the strength of reactivation modulates memory change, with weak and strong reactivations preventing, and moderate levels of reactivation promoting alterations. The current study examined this proposed inverted U-shape function in a reconsolidation paradigm. Two days after learning A-B word pairs, memory for these pairs was either not reactivated, moderately reactivated (presentation of A-cues in an unrelated task), or strongly reactivated (restudy or retrieval of A-B pairs). Immediately afterwards, participants either learned A-C word pairs or solved puzzles. Cued recall of B targets was tested two days later. As predicted, intrusions from C into A-B recall occurred more often after moderate reactivation than after strong and no reactivations. In contrast, learning of A-C impaired B recall independent of the reactivation condition, supporting the view that this type of retroactive interference reflects competition that unfolds during the retrieval. Email: Almut Hupbach, hupbach@lehigh.edu

(3033)
Output Interference in Cued Recall. JACK WILSON and AMY H. CRISS, Syracuse University (Sponsored by Amy H. Criss). — Output interference, studied first in terms of recall processes and more recently in terms of recognition processes, is the observation that memory performance declines with additional testing. Release from output interference is the observation that this interference can be ameliorated if the category of the tested material changes partway through a test phase. In cued recall the cues and the to-be-retrieved targets can be manipulated independently, allowing one to investigate the relative contributions of similarity among cues and targets. We implemented a release from output interference experiment in cued recall where one member of each pair was drawn from a set of two categories and later served either as cue or target (post cued). The results suggest that changes in performance at test may be driven by similarity among cues rather than targets. Implications for models of memory, in particular the Retrieving Effectively from Memory model, will be discussed.

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(3034)
Selective Directed Forgetting and Event Models. KYLE PETTIJOHN and GABRIEL RADVANSKY, University of Notre Dame (Sponsored by Gabriel Radvansky). — Directed forgetting occurs when a person shows poorer recall for information associated with a forget instruction than information associated with a remember instruction. In a recent extension of the directed forgetting task, called selective directed forgetting, the instruction is to forget only a subset of what is presented. Research on selective directed forgetting has yielded mixed results. The aim of the current experiments is to clarify this literature by examining if selective directed forgetting can be found for information contained in event models. An event model is a mental representation that contains elements of an episode. In the current experiments, people were presented sentences that could be integrated into an event model or not and recall was tested. The results suggest that when sentences can be integrated into event models, selective directed forgetting is possible.

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(3035) Different Methods, Different Processes? A Multinomial Modeling Approach to the Investigation of Directed-Forgetting Processes. JAN RUMMEL and IVAN MAREVIC, Heidelberg University, BEATRICE G. KUHLMANN, University of Mannheim, Germany. — Cognitive underpinnings of directed-forgetting are assumed to depend on the presentation method, that is, whether to-be-forgotten (TBF) and to-be-remembered (TBR) items are presented list-wise or vary item-by-item (Basden, Basden, & Gargano, 1993). To test this assumption, we realized two “remember” groups that had to study several item-pairs and two “forget” groups that had to study the same items but were prompted to forget half of them. Forget prompts were applied either list-wise or item-wise and free and cued recall was assessed for all items. Using a multinomial storage-retrieval model (Rouder & Batchelder, 1998), we found that list-method forgetting of TBF-items was due to reduced retrieval. Item-method forgetting, however, was not only due to reduced storage but also due to reduced retrieval. Improved memory for TBR-items was due to better storage (but not better retrieval) with both methods. These findings have implications for current directed-forgetting theories. Email: Jan Rummel, jan.rummel@psychologie.uni-heidelberg.de

(3036) Cognitive Mechanisms Underlying Selective Directed Forgetting. CARMEN AGUIRRE, Universidad de Granada, CARLOS J GÓMEZ-ARIZA, Universidad de Jaen, M. TERESA BAJO, Universidad de Granada. — In an adapted list-method directed-forgetting paradigm, Delaney et al. (2009) showed that cueing participants to selectively forget one set of previously studied items impaired the recall of these items compared to those in the same list that were cued to remember. This selective directed forgetting (SDF) effect has been replicated in several studies, but also some failures to replicate it have been published. In addition, there is some discussion regarding the nature of the mechanism underlying the effect. The purpose of this study is to explore the reasons for the discrepancy in finding SDF and to identify the nature of the cognitive mechanisms producing this effect. Our results suggest that the failures to replicate the effect might be due to the reliability of the instructions (given by the experimenter vs. the computer screen). In addition, by using dual task procedures, we also provide evidence that SDF is mediated by a controlled mechanism that might be inhibitory in nature. Email: Carmen Aguirre, aguirrec@ugr.es

(3037) Forgetting Old Arguments by Generating New Arguments. JULIA SOARES, BENJAMIN STORM, University of California, Santa Cruz (Sponsored by Benjamin Storm). — Retrieval-induced forgetting is observed when the retrieval (or generation) of target information causes the forgetting of non-target information. Across several experiments, we investigated whether similar dynamics occur in the context of generating arguments. Specifically, thinking of new arguments—for or against a position on a given issue, for example—might cause the forgetting of other arguments related to that issue. Participants studied arguments related to several issues before attempting to think of new arguments related to a subset of those issues. When given a later memory test, participants recalled the studied arguments less well if they had attempted to think of new arguments related to an issue than if they had not attempted to think of new arguments related to that issue, an effect that was observed regardless of whether participants attempted to generate arguments that agreed or disagreed with the arguments they had originally studied. Email: Julia Soares, jusoares@ucsc.edu

(3038) Eyewitness Recall, Recognition, and Subjective Experience in Young and Older Adults. MALEN MIGUELES, ELVIRA GARCIA-BAJOS, and ALAIZ AIZPURUA, University of the Basque Country. — We studied young and older adults’ eyewitness memory. After watching the video of a bank robbery, young and older adults were given a recall or a recognition task, including verbal and visual actions and details of the event, and they indicated their response confidence. There were more correct answers and more errors in recognition than recall. Older adults had more errors than younger adults in the actions of the event, and the young adults had more errors in details than actions. Accuracy was greater in the young than older adults, in actions than details, and in visual than verbal information. Older adults gave greater confidence than younger adults to visual details in correct answers and to verbal information in errors. The differences between young and older adults in accuracy, errors, and response confidence for verbal and visual actions and details showed their use of different processing strategies in event memory. Email: Malen Migueles, malen.migueles@ehu.es

(3039) Relational Memory Performance in Adults: Do the Eyes Reflect Memory Ability? YATING LIU, CARON ANN CAMPBELL CLARK, and JAMIE EDGIN, University of Arizona. — Relational memory refers to memory for the arbitrary associations among items and contexts encountered in daily life. We used eye tracking to examine whether adults’ (n = 22) viewing patterns during an associative memory task reflected their memory function. Participants learned face-scene pairings and were later required to select the matching face from three familiar ones based on a scene background. Participants were discouraged from responding until a response screen appeared at 5000ms, allowing for the determination of their viewing preferences. Splitting participants by memory accuracy, we found that both groups showed preferential looking to the matching face within 250–500ms after the onset of the test display in correct trials, but participants with high accuracy spent more time viewing the matching face, especially within the first 2000ms. Looking preferences to the selected face in incorrect trials emerged in a later time window (2000–3000ms), and good performers viewed the selected face longer than poor performers. Findings imply that good performers were more resolute in their choices overall. Further, there were no relations between performance on standardized memory assessments and looking preferences. Email: Jamie Edgin, jamie.edgin@gmail.com
**Age Differences in the Focus of Retrieval: Evidence From Dual-List Free Recall.** CHRIS WAHLHEIM, MARK HUFF, and LAUREN RICHMOND, Washington University in St. Louis. — In the present experiment, we examined age differences in the focus of retrieval using a dual-list free recall paradigm. Younger and older adults studied two lists of unrelated words and recalled from the first list, the second list, or both lists. Older adults showed impaired use of control processes to recall items correctly from a target list and prevent intrusions. This pattern reflected a deficit in recollection that we verified using a process dissociation procedure. We examined the consequences of an age-related deficit in control processes on the focus of retrieval using measures of temporal organization. Evidence that older adults engaged a broader focus of retrieval than younger adults was shown clearly when participants were instructed to recall from both lists. First-recalled items originated from more distant positions across lists for older adults. We interpret older adults’ broader retrieval orientation as consistent with their impaired ability to elaborate cues to constrain retrieval. These findings show that age-related deficits in control processes impair context reinstatement and the subsequent focus of retrieval to target episodes. Email: Chris Wählheim, cnwahlheim@gmail.com

**Spatial Memory Biases When Remembering Multiple Targets Depend on Age and Gender.** ANNE SCHUTTE and GREGORY J. DEGIROLAMO, University of Nebraska-Lincoln. — Literature suggests spatial memory performance differs depending on age and gender (Galea & Kimura, 1993; Schutte & Spencer, 2009). The current study examined how presentation features and gender impact the magnitude and direction of spatial biases in a sample comprised 24 teens (12-14 year olds) and 24 young adults (18-22 year old). Participants learned from videos the locations of ten targets in rectangular layouts presented from a ground-level or aerial view and in sequential or random order. Biases along the x- and y-axes were analyzed separately. For the x-axis, teens were biased toward the center of the rectangle, but which targets were biased depended on gender and viewpoint. The size and direction of the adults’ biases along the x-axis depended on target location, viewpoint and the order of target presentation. Spatial biases along the y-axis varied depending on location, age and viewpoint. There were no gender differences for the adults. Email: Anne Schutte, aschutte2@unl.edu

**Effects of Age on Sign Span in Deaf Signers Aged 45-85 Years: A Normative Study.** DAVID P. CORINA, University of California, Davis, GREG HICKOK, University of California, Irvine, SVENNA PEDERSEN, LUCINDA FARNAY, and URSULA BELLUGI, The Salk Institute. — The effect of aging on memory function is well-studied in the hearing population but little is known about how normal aging affects memory in the Deaf population. We administered a sign span task to 108 healthy Deaf individuals, aged 45-85 years, who use American Sign Language as their primary language. Signs were presented in lists ranging in length from 2 to 6 signs with four trials at each list length. ASL uses both one- and two-handed signs, which might contribute to stimulus complexity and therefore memory performance. Mean recall was 69.2%, collapsed across age, list length, and sign type. The number of signs recalled declined linearly with age, ranging from approximately 78% accuracy in the youngest participants to 61% in the oldest. One- versus two-handed sign stimuli had no effect on span, nor did age of acquisition of ASL. These data provide a baseline for studies of the effects of neurological disease on sign language ability. Preliminary data from a sample of Deaf stroke patients is also presented. Email: David P. Corina, dpcorina@ucdavis.edu

**Modeling the Role of Context and Prediction in Encoding Variability.** PER BENJAMIN SEDERBERG and TROY ANTHONY SMITH, Ohio State University. — Numerous studies of the neural correlates of episodic memory indicate that encoding efficacy during study contributes to whether information will be remembered. However, most models of episodic memory lack a clear mechanism for generating variance at encoding, such that the only source of variance in their simulations is retrieval noise. We present a new two-stage theory of episodic memory formation inspired by recent neuroimaging work in visual perception and normative models of reinforcement learning. First, the memory system uses the salient features of the current context to predict the subsequent input. Second, the resulting prediction error helps determine what we encode from our experience and how strongly we encode it. We illustrate the explanatory power of prediction-based encoding variability with simulations and new interpretations of the changes in memory performance as a function of a variety of factors, including spaced vs. massed repetitions, semantic relatedness of items, and mid-list changes in encoding task. Email: Per Benjamin Sederberg, sederberg.1@osu.edu

**Reducing False Memory by Reinstating Context.** TANYA R. JONKER, University of Waterloo, DANIEL L. SCHACTER, Harvard University, COLIN M. MACLEOD, University of Waterloo (Sponsored by Colin M. MacLeod). — Reactivating a memory can increase susceptibility to encoding a false memory (e.g., St. Jacques & Schacter, 2013). This phenomenon is thought to be a negative by-product of memory updating, which can occur when a memory is brought back into a labile state during reactivation. In our study, we examined whether a false memory resulting from reactivation can be reduced if memory for the original event is reinstated. Prior to testing for false memory, one group of participants was guided through a series of questions designed to reinstate memory for the study context; another (control) group performed a simple distractor task. Context reinstatement significantly reduced false memory, both when reactivation was achieved through additional presentations and when reactivation was achieved through retrieval. These results
(3045)
Overt Retrieval of Study Context Eliminates the Forgot-It-All-Along Effect. MARCUS LEPPANEN and KEITH LYLE, University of Louisville. — People tend to forget prior remembering that occurred in different contexts across acts of retrieval (the forgot-it-all-along effect, FIA). This is especially true for people reporting recovered memories of childhood sexual abuse. We explored means of helping people in the general population remember prior remembering amidst changing context cues. In three experiments, memory for prior retrieval of target words was worse when cue/context words were changed between first retrieval and second retrieval versus when they stayed the same. Having participants report whether the context had changed did not influence FIA. Re-presenting the study context after retrieval of target words reduced but did not eliminate FIA. A final experiment showed that, when participants themselves successfully retrieved the study context, FIA was eliminated. Findings are discussed in terms of the light they shed on why FIA occurs and why some people may be especially susceptible to it. Email: Keith Lyle, keith.lyle@louisville.edu

(3046)
Negation-Induced Forgetting: Assessing the Influence of Encoding and Retrieval Orientations. RACHEL E. DIANISK and CHRISTIAN MEISSNER, Iowa State University (Sponsored by Christian Meissner). — Recent research has found that correctly negating a feature of an item can impair subsequent memory for the item, compared to affirming a feature (Mayo, Schul, & Rosenthal, 2014). Previous studies have also shown a negation effect in the context of “yes” vs. “no” responses to encoding manipulations (Craik & Tulving, 1975). We conducted a meta-analysis and observed significant effects for both encoding-oriented, $d = 2.11$ [$1.36, 3.92$], and retrieval-oriented, $d = 0.79$ [$0.43, 1.24$] instructions; however, encoding produced a significantly stronger effect. In a subsequent study, we examined the replicability of this finding and the impact of the initial orienting task. Participants were shown images of simple objects and asked questions about features of these objects that elicited “yes” or “no” responses. Participants either studied all of the items and were then immediately tested on features of the items (retrieval orientation) or were presented with these questions during the study phase (encoding orientation). Performance on a final recognition test was assessed to determine if correctly negating a feature of an object impaired subsequent memory for the object. Email: Rachel E. Dianiska, dianiska@iastate.edu

(3047)
Planning and the Survival Processing Effect on Memory. LEISHA A. COLYN and RICHARD ANDERSON, Bowling Green State University. — The survival-processing (SP) effect refers to a benefit in memory performance for information encoded in a survival context. Planning might explain this effect. In two experiments, SP of highly-related information (DRM lists) was compared to two contextually rich encoding planning scenarios (SP, non-SP) and a pleasantness processing task. Free recall and recognition memory were measured. In Experiment 1, the SP effect existed on recall when compared to non-SP planning (true recall) and pleasantness (false recall) tasks. SP produced a greater proportion of words correctly categorized as old/new than non-SP planning. In Experiment 2, SP produced a lower proportion of words correctly categorized as old/new during the highly-associated block of the recognition task than the pleasantness processing task. Email: Leisha A. Colyn, leisha.colyn@gmail.com

(3048)
The Components of Episodic Memory: Connecting Human Behavior and Electrophysiology to a Rodent Model. STEPHANIE E. RHOTEN, LISA A. DESTEFANO, KAITLIN A. CURRAN, SHANNON M. TOTFELY, STACY A. WETMORE, SCOTT GRONLUND, and MICHAEL WENGER, University of Oklahoma. — Retrieval from episodic memory relies on the integration of different features, such as what happened as well as where and when it occurred. Previous animal studies (DeVito & Eichenbaum, 2010) suggest a model in which the hippocampus and medial prefrontal cortex are differentially important for the three types of episodic events. The present study attempts to assess the generality of this model using a task designed to conceptually replicate the conditions used by DeVito and Eichenbaum (2010). Behavioral and electrophysiological (EEG) data were collected in an episodic recognition task in which participants studied photos of women in two different virtual rooms separated by a distractor task that was either short (15 seconds) or long (3 minutes). During the test phase, participants made old and new judgments based on if they remembered studying the photo. Discrimination ratios were calculated separately for the what, where, and when components using RTs, accuracies, and the amplitudes and latencies of a set of ERP features. Results suggest the utility of examining the components of human episodic using this approach, and thus the generality of the rodent model. Email: Michael Wenger, michael.j.wenger@ou.edu

(3049)
Effect of Task Demands on ERP Correlates of Recollection. LESLIE ROLLINS, Christopher Newport University. — ERP studies suggest that the parietal old/new effect is influenced by recollection. Multiple methodological differences are present across recollection ERP studies, and it is unclear how these differences influence the results. One major difference between studies is whether recollection is measured using Tulving’s (1985) remember/know paradigm (i.e., subjectively) or accuracy for a contextual detail, such as list membership (i.e., objectively). The aim of the present three studies was to examine how various task manipulations influence the parietal old/new effect. Consistent with previous research, the
(3050) Proactive Control and Retrieval Orientation in Healthy Aging. ALEXA MORCOM, CAITLIN AFFLECK-BRODIE, and JESSICA KEATING, University of Edinburgh. — Healthy older adults are less likely to remember specific events than the young and make more memory errors. There is keen interest in the degree to which this reflects failures of memory control and declining executive function. We used electroencephalographic event-related potentials (ERPs) to investigate older and younger adults’ ability to control recollection proactively, before it occurs. Previous studies have shown that older adults can, but may not always, do this effectively. Here, we investigated the impact of age and executive ability both on the establishment of retrieval orientation and, downstream, on the degree to which only targeted information is retrieved. Retrieval orientation was measured using ERPs to unstudied items when targets were words encoded in two alternative tasks, and retrieval selectivity as the difference between parietal old/new effects for targets and non-targets. Implications are discussed in terms of the proposed shift from proactive to reactive control in aging. Email: Alexa Morcom, alexa.morcom@ed.ac.uk

(3051) Sequential Dependencies in Recognition Confidence Ratings. JUSTIN KANTNER, DAVID A. GRYBINAS, and IAN G. DOBBINS, Washington University in St. Louis. — Confidence ratings are central to theories of recognition memory and are sometimes taken as direct indicators of an item’s memory strength. If this assumption is correct, then confidence ratings during testing should be completely independent of one another, because test items are randomly ordered with respect to memory strength. However, Malmberg and Annis (2012) reported sequential dependencies in recognition judgments: old reports on trial N-1 increased the likelihood of old reports on trial N. We present analyses of prior data demonstrating sequential dependencies in recognition confidence ratings that are substantially stronger than dependencies in old-new responses across varied recognition paradigms. In a new experiment, sequential recognition confidence dependencies remained even when perceptual judgments were serially interleaved among the recognition trials, a pattern that was present regardless of the difficulty of the interleaved perceptual judgments. These findings suggest limits to the characterization of confidence as a pure index of memory strength. Email: Justin Kantner, kantner@psych.uchb.edu

(3052) A Bayesian Approach to Discriminating Between Biased Responding and Sequential Dependencies in Binary Choice Data. JEFFREY ANNIS, Vanderbilt University; CHAD DUBE and KENNETH J. MALMBERG, University of South Florida (Sponsored by Kenneth J. Malmberg). — Sequential dependencies occur when prior responses influence responses on subsequent trials and have been observed in a variety of memory and perception tasks (e.g., Malmberg and Annis 2012; Brown et al. 2008). An inherent problem in measuring them in binary response tasks is the ability to distinguish between sequential dependencies and response bias. We show the problem stems from the fact that the sequential dependency estimate within the frequentist architecture does not contain information regarding the number of observations upon which it is based and that this problem may be remedied by using a Bayesian approach. We describe two Bayesian measurement models of sequential dependencies in binary response tasks. Both models were successfully able to distinguish between sequential dependencies and response bias in simulated data sets. Lastly, the measurement models are applied to real-world data sets in which we test a critical assumption of the Annis and Malmberg (2013) process model which states that the underlying mechanisms of sequential dependencies are modulated by attention. The measurement models reveal increased vigilance during testing reduces sequential dependencies. Email: Jeffrey Annis, jeff.annis@vanderbilt.edu

(3053) The Butcher-on-the-Bus Reversed: Is There Convincing Evidence of Source Memory for Unrecognized Items? SIMONE MALEJKA and ARNDT BRÖDER, University of Mannheim (Sponsored by Arndt Bröder). — Can you identify an unfamiliar person on the bus as the butcher from the supermarket? In a recent study, Starns, Hicks, Brown, and Martin (2008) collected source judgments for old words that participants had claimed to be new and found above-chance source discriminability. In the long time debate between continuous-strength and discrete-state modeling of item/source memory, the finding was interpreted as supporting signal-detection theory but challenging the two-high-threshold model. Under the latter, “new” responses to old items only follow from an uncertainty state in which no mnemonic information is available. However, when asked for source judgments to unrecognized items, participants could infer that the items had been studied. To test whether this implicit feedback invited further retrieval attempts, we compared Starns et al.’s paradigm to a paradigm without such feedback. Because source memory without recognition was not replicated in the modified paradigm, we object to abandoning the two-high-threshold model and conclude that Starns et al.’s conclusion was probably premature: You can only specify that the unfamiliar person is your butcher when you realize that you do recognize the person after all. Email: Simone Malejka, malejka@uni-mannheim.de
The Revelation Effect: A Meta-Analysis of 25 Years of Research. ANDRE AßFALG, Albert-Ludwigs-University Freiburg, DANIEL M. BERNSTEIN, Kwantlen Polytechnic University, WILLIAM HOCKLEY, Wilfrid Laurier University. — Counterintuitively, judgments depend on the activity performed directly preceding the judgment—the revelation effect. For example, participants are more likely to claim that a stimulus is familiar after an intervening task, such as solving an anagram, than without an intervening task. We performed a meta-analysis of revelation-effect studies spanning 25 years of research. The meta-analysis included 34 published and unpublished manuscripts with a total of 143 effect sizes and 5,034 participants. A random-effects meta-regression revealed a moderate but significant overall effect size of g = 0.28 with considerable variance of the true effect. In recognition experiments, the revelation effect was about twice the size for “new” items compared to “old” items, representing an average increase of 10% in false alarms and 5% in hits, respectively. The type of intervening task had only a negligible influence on the revelation effect. Similarly, all judgment types received significant effect-size estimates, including truth, influence on the revelation effect. Similarly, all judgment types had only a negligible influence on the revelation effect. Overall, these experiments suggest that the generation effect may be stronger than previously thought and should be studied more to better determine the conditions under which the generation effect is most beneficial. Email: Andre Aßfalg, andre.asfalg@gmail.com

Physical Retrieval Dynamics of Unexpected Processing Fluency. JUAN D. GUEVARA PINTO and MEGAN PAPESH, Louisiana State University. — Inexplicable perceptual fluency often evokes feelings of familiarity, leading observers to interpret fluency as an indication of past experience. This discrepancy-attrition process (Whittlesea & Williams, 2001) is a central component of the Selective Construction and Preservation of Experience (SCAPE) framework (Whittlesea & Williams, 1998). SCAPE suggests that recognition memory entails two stages: (1) Production of mental states, (2) Evaluation of the success and efficiency of the Production stage. The current experiments used dynamic mouse-tracking to investigate the time-course of fluency effects within the SCAPE framework (Whittlesea, 1997; Whittlesea & Williams, 1998). Across experiments, participants studied words, pseudohomophones (e.g., kanger), and nonwords. During subsequent recognition or lexical decisions, we monitored participants’ dynamic mouse movements to fluent (old) items, dysfluent (new) items, and unexpectedly fluent items (e.g., old words presented as pseudohomophones). We observed inflated false alarms for unexpectedly fluent items, and used mouse-tracking to document the time-course of these fluency effects. Email: Megan Papesh, mpapesh@lsu.edu

Unconstrained Generation Improves the Generation Effect: Benefits for Item and Context Memory. MATTHEW MCCURDY, RYAN LEACH, and ERIC D. LISHIKAR, University of Illinois at Chicago (Sponsored by Audrey Duarte). — Self-generated information is often better remembered than given information (Slamecka & Graf, 1978). This effect has been robust for item memory across different generation tasks, stimuli, and memory tests, but inconsistent for other types of memory including memory for contextual details. However, previous generation tasks used to study this mnemonic often apply constraints on the to-be generated word, likely causing prior work to underestimate the magnitude of the benefit from self-generation. In two experiments an unconstrained generation task is compared to a previously used generation task (scramble) to more accurately assess the benefits of self-generation on memory retrieval for item and context memory. Results of these experiments revealed that words in an unconstrained generation task were consistently better remembered than words in the scramble task across both recognition and cued recall memory tests. Overall, these experiments suggest that the generation effect may be stronger than previously thought and should be studied more to better determine the conditions under which the generation effect is most beneficial. Email: Matthew McCurdy, mmccur3@uic.edu

A World of Clutter: Recognizing Objects From Partial Representations. KYLE A. BURKLE, CARRICK WILLIAMS, and ALISHA KENT, California State University, San Marcos. — Are visual details or object form the reason that pictures are remembered so well? By occluding one solid side of the object (e.g., top 50%), we emphasized the visual details of the other half; in contrast, by occluding 50% of the object with stripes (like a picket fence), we emphasized overall object form. We presented occluded objects at encoding, test, both, or neither (a fully visible control). On a token discrimination test, memory was best in the fully visible control, but, whether the object was occluded with solid or stripe occlusion at encoding or test, memory performance in the occlusion conditions was the same. However, when objects matched occlusion at both encoding and test or when the occlusion moved at study, solid occlusion led to better accuracy than stripe occlusion. These results suggest that details may be more important in distinguishing between studied and unstudied object tokens. Email: Carrick Williams, carrickwilliams@gmail.com

Associative Recognition for Word Triplets in Complex Networks. LIANGZI SHI and NORMAN BROWN, University of Alberta. — We explored the judgment making strategies of word-triplet recognition with two complex networks. Based on the transition theory (Brown et al., 2012), we proposed that word-triplet recognition depended upon the association of repeated words and unique words (non-repeated) within a network and the word change between two networks, and correspondingly, there were two possible recognition strategies: link-based recollection and list-membership heuristic. In Experiment 1, we compared the probability of accepting the same- and different-list foils, and found that recognition judgments relied on the retrieval of word links. In the follow-up experiments, we increased the accessibility of list-membership cues by informing of the word change between lists (Experiment 2) and choosing repeated words from pre-existing categories instead of randomized
ones (Experiment 3). The results of the last two experiments suggested that participants would use a combination strategy of link-retrieval and list-membership only if they perceived the between-list word transition during encoding. Email: Norman Brown, norman.brown@ualberta.ca

(3059)
Recognition Memory for Familiar and Unfamiliar Words: Links Between Encoding and Retrieval. EMILY FREEMAN and GABRIEL TILLMAN, The University of Newcastle. — A robust finding in the recognition memory literature for familiar items is the word frequency mirror effect in which low-frequency words have higher hit and lower false alarm rates than high-frequency words. In contrast, when familiar (e.g., words) and unfamiliar (e.g., pseudowords) items are compared, unfamiliar items tend to have both higher hit and false alarm rates than words. Explanations of this pseudoword effect have focused on retrieval mechanisms for words and pseudowords, with little focus on encoding differences. In the current study, participants completed a lexical decision encoding task for familiar (high- and low-frequency words) and unfamiliar (very low-frequency words and pseudowords) items followed by a recognition memory test containing either familiar and unfamiliar items, or only familiar items. A hierarchical Bayesian decision-making model, the Linear Ballistic Accumulator, is used to examine encoding differences for these items. The relationship between encoding differences and recognition memory performance is examined. Email: Emily Freeman, emily.e.freeman@gmail.com

(3060)
Recognition Memory Response Bias for Paintings, Words, and Faces. KAITLYN FALLOW, University of Victoria, MAXIMILIAN RABE, University of Potsdam, D. STEPHEN LINDSAY, University of Victoria. — Recognition memory experiments in our lab have demonstrated that participants tend to exhibit a conservative response bias when they study and are tested on scans of paintings. This effect is robust both when paintings are the only stimuli and when they are intermixed with words at study and test. The underlying cause of this materials-based bias effect remains unknown. In an attempt to better understand the particular characteristics of paintings that might promote conservative responding, we conducted a new experiment with three groups of participants: One group studied and were tested on words, another on paintings, and a third on a diverse set of photos of faces. Results are presented both at the group and item level and discussed in the context of subjective memorability and distinctiveness. Email: D. Stephen Lindsay, slindsay@uvic.ca

• FALSE MEMORY II •

(3061)
Sleep and Retention Interval Increase the Susceptibility to Misinformation. DUSTIN CALVILLO, JOCELYN A. PARONG, BRIANA PERALTA, DERRICK OCAMPO, and RACHAEL VAN GUNDY, California State University San Marcos. — When individuals witness an event and are exposed to misleading post-event information, they often incorporate the misleading information into their memory for the original event, a phenomenon known as the misinformation effect. The present study examined the role of sleep and retention interval (i.e., the duration between witnessing the original event and exposure to misleading information) in the misinformation effect. Participants (N = 177) witnessed two events; were exposed to misleading post event information either immediately, 12 hours later the same day, 12 hours later the next day, or 24 hours later; and then took a recognition test. Acceptance of misinformation increased with retention interval, and in the two 12 hour interval conditions, the misinformation effect was larger among those who slept between the original events and the misleading information than among those who did not sleep. These results suggest that sleep increases susceptibility to misinformation. Email: Dustin Calvillo, dcalvill@csusm.edu

(3062)
Beware of Critical Lure. The Effect of Explicit Warning and Training on Memory Performance. JUSTYNA OLSZEWSKA, University of Social Sciences and Humanities, JOANNA ULATOWSKA, Maria Grzegorzewska University. — The Deese/Roediger-McDermott (DRM) paradigm reliably elicits false memories for critical, non-presented words in recall and recognition tasks. The present study used either an explicit warning instruction or training in detecting critical lures in order to increase participants’ awareness of the nature of false memories formation and minimizing the likelihood of false memories. Consistent with previous studies, the explicit warning prior to the study did not eliminate false recall or recognition. The training led to decrease of false memory; however at the cost of memory of studied words. It suggests that the training might have changed encoding strategy by making it focused more on detecting lures than memorizing target words. Email: Justyna Olszewska, justynaolszewska1@gmail.com

(3063)
The Influence of Item-Specific and Relational Encoding Strategies on False Memory in Healthy Aging, Mild Cognitive Impairment, and Alzheimer’s Disease. MICHAEL TAT, VA Medical Center-Jamaica Plain, ANOTHAI SOONSAWAT, VA Boston Healthcare System, CORINNE BULMAN NAGLE and ELIZABETH A. VASSEY, Boston University School of Medicine, PAUL R. SOLOMAN, Williams College, ANDREW E. BUDSON, Boston University School of Medicine. — In addition to rapid forgetting, patients with mild Alzheimer’s disease (AD) exhibit more false memories compared to healthy individuals. Studies show that
when healthy individuals engage in a strategy requiring them to identify a unique characteristic of a study item, their false memory is reduced (McCabe et al., 2004). We examined if older adults, patients with mild cognitive impairment (MCI), and patients with mild AD could reduce their false memory when engaging in aforementioned strategy. Participants studied categorized lists of words. For each word, they provided a unique characteristic of the item (Item-Specific encoding) or determined how the word was related to others in the same list (Relational encoding). A recognition memory test was then given consisting of old items, unstudied critical lures, and unrelated new items. False memory was lower in the Item-Specific condition compared to the Relational condition, but only for older adults and patients with MCI. Only a subset of the mild AD patients could utilize the strategy. These results suggest that patients with MCI and AD can use Item-Specific encoding to reduce their false memory, but the degree of cognitive impairment influences their use of this strategy.

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(3064)
‘A Picture is Worth a Thousand Words’ Reconsidered. The Effects of Doctored Videos, Photos and Texts on Misinformation Susceptibility. JOANNA ULATOWSKA, Maria Grzegorzewska University, JUSTYNA OLSZEWSKA, University of Social Sciences and Humanities. — The present study examined the susceptibility to misinformation after encoding original events in one of three formats: video, slides, or written narrative. Using computer editing, the video and slides were doctored and served as post-event information (PEI) along with changed narrative. The results of a fully crossed design revealed that the memory performance was influenced the most by encoding the narrative, meaning that the misinformation effect was the lowest when the narrative served as the original information, and the strongest when served as the PEI, which indicates the strength of verbally encoded information. On the other hand, when information was encoded as video and misinformed by the same but doctored material the memory for original information was the most accurate. The results are discussed in the light of source monitoring framework.
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(3065)
Comparing Suggestibility to Additive and Contradictory Misinformation in Younger and Older Adults Following Explicit Error Detection. MARK J. HUFE, Washington University in St. Louis, SHARDA UMANATH, Claremont McKenna College, DAVID A. BALOTA, Washington University in St. Louis. — In two experiments, we assessed suggestibility to misinformation using a paradigm that involved additive and contradictory misleading details. After reading a fictional story, participants answered related questions that contained misleading details that were either additive (not originally included) or contradictory (errors that changed an original detail). To mitigate suggestibility, participants were either warned about these errors, instructed to mark any detected errors, or were not warned prior to exposure to misleading questions. On a final test, additive misinformation was endorsed much more frequently than contradictory; however, contradictory misinformation was reduced when participants had been warned of its presence. In a second experiment comparing younger and older adults, older adults detected both types of misleading details more frequently. Interestingly, they then showed similar suggestibility to additive misinformation but reduced suggestibility to contradictory misinformation. Thus, older adults’ greater misinformation detection was only beneficial when misinformation was discrepant to the original story.
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(3066)
The Influence of Age and Accuracy on the Social Contagion of Memory. KATYA NUMBERS, Macquarie University, MICHELLE MEADE, Montana State University, AMANDA BARNIER, Macquarie University (Sponsored by Michelle Meade). — The Influence of Age and Accuracy on the Social Contagion of Memory. We examined the influence of confederate characteristics on the social contagion of memory (Roediger, Meade, & Bergman, 2001). Participants were asked to recall previously viewed household scenes with a confederate who falsely suggested certain items had been present in the scenes. Confedere characteristics were manipulated by varying the age of the confederate (younger v. older) and by varying the proportion of inaccurate items they suggested (0%, 33%, 100%). Participants in all conditions incorporated the confederate’s suggestions into their own memory reports. The magnitude of the social contagion effect was not reduced when the confederate was an older adult, or when the confederate was partially (33%) or entirely (100%) inaccurate. Further, age and accuracy did not interact to reduce the contagion effect. Participants misremember erroneous suggestions from both highly accurate and highly inaccurate partners, regardless of whether they were a same-age peer (younger) or an older adult.
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(3067)
The Use of Recollection Rejection and the Effects of Delay in the Misinformation Paradigm. KARA N. MOORE, JAMES MICHAEL LAMPINEN, and JOEL S. FREUND, University of Arkansas., (Sponsored by Joel S. Freund). — The misinformation effect occurs when false details are integrated into memory. Misinformation may be rejected through the use of recollection rejection. Recollection rejection occurs when recalling an event excludes the possibility of another event having occurred. The purpose of these studies was to examine the use of recollection rejection in misinformation paradigm. In Experiment One, we manipulated the types of misinformation presented. Participants watched a video of a crime and then received misinformation that contradicted what they saw (i.e., exclusive to what was in the video) or added to what they saw. Participants took a recognition test, provided confidence, and self-report judgments. We measured recollection rejection in three ways: comparing misinformation rates, ROC curves, and self-report. All participants used recollection rejection did so more for contradictory misinformation. In Experiment Two, we manipulated the
Metamemory Monitoring Failure Produces False Memories. ALEXIS JONES and DEBORAH K. EAKIN, Mississippi State University. — Metamemory has been proposed to play a role in the production of false memories by failing to monitor false information at test (Mazzoni & Kirsch, 2002). Using a new paradigm, the current study examined the role of metamemory monitoring in the production of false memories. Participants first studied a list of related word pairs (e.g., FROG–LEG). Then they made judgments of learning (JOLs) and gave old/new recognition judgments for each of three types of word pairs: a) old word pairs b) new word pairs, and c) false-target word pairs (old cues re-paired with a related target, e.g., FROG–GREEN). As anticipated, because false-target pairs capitalized on the implicit associations activated during study (e.g., Roediger & McDermott, 1995), a significant number of false alarms were found for false-target pairs. However, the JOLs were equal for hits (old pairs) and false-target false alarms, indicating a failure of metamemory monitoring for false-target pairs. Email: Deborah K. Eakin, deakin@psychology.msstate.edu

Integrative Item-Context Encoding Increases False Memories of Encoding Context. JASON ARNDT, DOROSI VALLE FLORES, JULIE GOODFRIEND, and ERIN REA, Middlebury College. — An experiment presented participants with DRM word lists, with each list presented in a different encoding context (type font). Participants either focused on the word-font relationship during encoding, a task that should enhance binding of words and contexts, or rated the word for pleasantness, a task that should enhance word memory but not binding of words and contexts. At test, participants were presented with studied items, DRM lure items, and unrelated new items and were asked to judge which of four fonts the item was studied in (or if the word was unstudied). Results indicated that focusing on the word-font relationship during encoding enhanced memory for studied words’ encoding context, and increased the probability lure items were falsely attributed to the context in which their studied associates were encoded. This outcome is consistent with global-matching explanations of false memory formation and contradicts monitoring-based explanations of false memory. Email: Jason Arndt, jarndt@middlebury.edu

The Tip-of-the-Tongue (TOT) Heuristic: Inferring From TOT States That Unretrieved Targets Have Higher Value and More Positive Attributes. ANNE CLEARY and SHELLY STALEY, Colorado State University. — Previous research has shown that participants use the presence of a tip-of-the-tongue (TOT) state to make inferences about the characteristics of the unretrieved target, such as to infer that the target is more likely to have fluent characteristics (Cleary & Claxton, 2015). Our study examined whether TOT states would similarly be used to infer positive qualities of the unretrieved information. Participants studied answers to 40 general knowledge questions before receiving 80 randomly-ordered questions, half of whose answers were studied. Our focus was on test questions that failed to be answered. Among these, when participants indicated that they were in a TOT state, they judged the unretrieved target to be more likely to have had a higher assigned value at study, even among unstudied targets (Experiment 1), and as more likely to be a positively-valenced word (Experiment 2). During retrieval failure, TOT states may have a positively biasing role in decision-making. Email: Anne Cleary, anne.cleary@colostate.edu

The Tip-of-the-Tongue Heuristic: Inferring Partial Word Attributes From the Mere Presence of a Tip-of-the-Tongue State. ALEXANDER CLAXTON and ANNE CLEARY, Colorado State University (Sponsored by Anne Cleary). — Research on the tip-of-the-tongue (TOT) phenomenon has long suggested that TOT states can be accompanied by partial word attribute retrieval (such as the word’s first letter). Cleary and Claxton (2015) reported that participants infer from a TOT state itself that the unretrieved word has characteristics consistent with high fluency. This suggests that, rather than directly accessing partial word attributes, people may sometimes merely infer them from the presence of a TOT state. The present study examined this possibility. No study list was used; participants simply...
attempted to answer general knowledge questions, report on whether a TOT state was present, and make an additional judgment about the unretrieved target. Not only were participants biased in TOT states to judge an unretrieved word as a more frequently-occurring word (Experiment 1), but TOT states also biased them to judge targets as more likely to start with a consonant than a vowel (Experiment 2).

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(3073) Why Do Relatedness and Testing Influence Judgments of Learning: Heuristics or Beliefs? AMBER WITHERBY and UMA (S. K.) TAUBER, Texas Christian University, NATE KORNELL, Williams College (Sponsored by Nate Kornell). — Metacognitive cues affect judgments of learning (JOLs) through two types of processes: beliefs and heuristics. We examined two metacognitive cues and asked whether they influence JOLs via beliefs or heuristics. In Experiment 1, participants studied word pairs and gave item-by-item JOLs. There were related pairs unrelated pairs (which rhymed). At the end of the study participants were asked whether they believed related or rhyming pairs were more memorable. Self-reported beliefs predicted item-by-item JOLs, suggesting that beliefs affected JOLs. Yet participants who believed unrelated pairs were more memorable gave higher JOLs to related pairs, suggesting that heuristics also affected JOLs. In Experiment 2 beliefs appeared to affect JOLs, yet participants who did not believe presentation was more effective still gave higher JOLs to presented items. Beliefs and heuristics often work simultaneously; whether they work in concert or opposition depends on the participant and cue. Email: Amber Witherby, amber.witherby@tcu.edu

(3074) The Contribution of Fluency and Beliefs to the Concreteness Effect on Judgments of Learning, AMBER E. WITHERBY and UMA (S. K.) TAUBER, Texas Christian University (Sponsored by Uma (S. K.) Tauber). — Judgments of learning (JOLs) are sensitive to word concreteness because participants tend to assign higher JOLs to concrete words (e.g., table) than to abstract words (e.g., justice). This effect may occur because concrete words are processed more fluently than abstract words and because participants have explicit beliefs about the influence of concreteness on memory. Thus, in a series of experiments we explored the contributions of both fluency and beliefs. To do so, participants studied words that were concrete or abstract and received a free-recall test. In each experiment we measured processing fluency (e.g., self-paced study) or participants' beliefs (e.g., JOLs made prior to studying each item). Results revealed that study time did not differ between items, and participants believed that concrete words are more memorable than abstract words. These results suggest that people's beliefs play a large role in the concreteness effect on JOLs.

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(3075) Remembering Corrective Feedback: A Matter of Confidence. LAUREN GRIFFITHS and PHILIP HIGHAM, University of Southampton (Sponsored by Anne Hillstrom). — The aim of this study was to experimentally manipulate confidence to investigate the hypercorrection effect, which states that high-confidence errors are more likely to be corrected than low-confidence errors. One explanation is that participants are surprised and pay more attention when corrected on high-confidence errors. Participants were given a multiple-choice test and rated their confidence for each answer. We used two types of question for which feedback might be surprising. They received immediate feedback for all questions and after a delay, they were given a cued-recall test of the same questions. Performance on test one was comparable across question type but accuracy was higher for trick questions on test two. Participants were more confident and corrected more errors for trick questions than deceptive but there was evidence of a stronger hypercorrection effect within the deceptive question condition, suggesting that there is a qualitative difference in the type of errors produced.

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(3076) A Metacognitive Catch 22: Over and Under-Confidence During Paired Associate Learning. MARIO DE JONGE, GERDIEN VAN EERSEL, DIANE PECHER, PETER VEROEIJEN, and HUIJIB TABBERS, Erasmus University Rotterdam. — In the present study we investigated the accuracy of performance estimates during paired associate learning. Participants learned a list of 20 paired associates during alternated study and test cycles. After reaching the criterion of at least 10 correct responses on the test, participants gave retrospective test performance estimates. In Experiment 1 and 2, when participants were asked to give global estimates of performance (the number of correct responses), we found that actual performance was underestimated. In contrast, in Experiment 3, when participants were asked to give item by item estimates, actual performance was overestimated. We conclude that performance estimates can be highly dependent on how learners are asked to give an estimate. Moreover, we argue that improving and calibrating learners’ metacognitive self-assessments during paired associate learning might prove difficult, given that learners can be both over and under-confident at the same time.

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(3077) Truthiness and the Availability Mechanism: Semantically Related Information Enhances Judgments of Truth. ELISE FENN, California State University, Northridge, ERICA ABED and KATHY PEZDEK, Claremont Graduate University. — The truthiness effect occurs when viewing target stimuli alongside related but non-probative photographs makes the stimuli feel truer. One cognitive mechanism proposed to account for this effect is that non-probative photographs increase the availability of semantic memories related to target stimuli, and availability signals truth. In Experiment 1, participants made true/false judgments of trivia statements...
presented alone or with non-probative photographs with high, medium, or low amounts of perceptual detail. In Experiment 2, participants made true/false judgments of trivia statements presented alone or with photographs with high, medium or low amounts of semantic detail. The truthiness effect was replicated across both experiments; compared to the no-photograph control, photographs increased perceptions of truth. However, the magnitude of the truthiness effect depended on the availability of semantic information (Experiment 2) but not perceptual information (Experiment 1). These results suggest that the availability of semantic but not perceptual non-probative information enhances truthiness. Email: Kathy Pezdek, kathy.pezdek@cgu.edu

(3078) Identity Priming Consistently Affects Perceptual Fluency, but Only Affects Metamemory When Primes Are Salient. JONATHAN A. SUSSER, ANDY JIN, and NEIL MULLIGAN, University of North Carolina at Chapel Hill (Sponsored by Peter Ornstein). — Perceptual fluency manipulations influence metamemory judgments, with more fluently-perceived material judged as more memorable. However, it can be unclear whether this influence is driven by actual experienced processing fluency or by a belief about how fluency manipulations affect memory. The current study used an identity-priming paradigm—in which words are preceded either by matched or mismatched primes—to examine the two influences. Participants named and made judgments of learning (JOLs) for critical words and then completed a memory test. Experiment 1 used briefly presented primes and found a priming effect on naming latencies but not on JOLs. Experiment 2 used primes of longer duration and, again, found an effect on naming, along with an effect on JOLs. A mediation analysis revealed that naming latencies did not account for the prime-JOL relationship. This pattern of results demonstrated a manipulation of perceptual fluency that influenced JOLs only when belief-based information was salient. Email: Jonathan A. Sussers, josusser@unc.edu

(3079) Retrieving Memories: Effects of Mild Traumatic Brain Injuries on Source Monitoring. JENNIFER TOMES, Mount Allison University, MATTHEW D. MILLER, University of Windsor. — Previous research has often focused on the immediate effects of mild traumatic brain injury or concussion on cognitive processing, but emerging findings suggest that there are also subtle long-term impacts. The current study examined the source monitoring performance of previously concussed and non-concussed participants. Individuals were presented a series of words in either bolded or italicized font. Later a recognition test was given and participants were asked to indicate the source of words recognized from the original list (bold or italic). Both groups of participants recognized the same number of words, suggesting similar levels of overall memory for the list items, however, previously concussed participants made significantly fewer correct source judgments than non-concussed participants. This finding of decreased source monitoring performance in previously concussed individuals adds to the literature concerning the long-term effect of concussion on cognitive processing. Email: Jennifer Tomes, jtomes@mta.ca

(3080) Font Size and Value Framing Effects on Memory and Metamemory. SHARON NOH, University of Texas at Austin, TYSON KERR, ADAM B. BLAKE, and ALAN CASTEL, University of California, Los Angeles (Sponsored by Jesse Rissman). — We investigated how people’s prior beliefs regarding font size and value of information influenced their subsequent memory and judgments of learning (JOLs). In order to test this, participants studied 3 lists of words that varied in font size and were told a) that larger words were more important to remember, b) that smaller words were more important to remember, or c) to remember as many words as possible, for a later memory test. In general, participants showed enhanced recall for what they were told were more valuable items. More interestingly, there was an interaction between value and font size for JOLs such that individuals who were told that larger words were valuable showed enhanced JOLs for larger words, but those who were told that smaller words were valuable gave equally high ratings for large and small words. These findings suggest that prior beliefs interact with value and influence JOLs. Email: Sharon Noh, ssnoh@utexas.edu

(3081) Dual Process Dissociations Reveal how Free Recall Tests Interspersed During Learning Can Bolster the Efficacy of Value-Driven Strategy Use. MICHAEL COHEN, Northwestern University, JESSE RISSMAN, ALAN CASTEL, MARIAM HOVHANNISYAN, and BARBARA KNOWLTON, University of California, Los Angeles. — Value-directed remembering encourages selective engagement of semantic strategies during encoding of high-value words (Cohen et al., 2014). Such strategies, in other contexts, enhance both recollection and familiarity (Yonelinas, 2002). In the present experiments, participants learned lists of words with high or low point values. In some experiments, a free recall test with score feedback was given after each list. A recognition test was always presented 5 minutes after the final word list. Process dissociation was accomplished using Remember/Know judgments, source memory at recall, and/or task dissociation (plurals vs. speeded recognition). After experiencing recall tests, recollection and familiarity were both strengthened for high-value words. Without those tests, or with the tests but considering only individuals who reported being insensitive to value, only recollection was improved. The dual process dissociations in our results suggest that interspersed recall tests guide learners’ use of metacognitive control to selectively apply effective encoding strategies. Email: Michael Cohen, michael.cohen@northwestern.edu
**PROSPECTIVE MEMORY**

(3082) The Effects of Cue Focality and Context Expectation on Prospective Memory Performance. CINDY REESE-MELANCON, Oklahoma State University, THOMAS HANCOCK, University of Central Oklahoma, KERI KYTOLA, Oklahoma State University, TERRENCE KOMINSKY, Cherokee Nation. — The effects of context expectation and cue focality on event-based prospective memory (PM) were examined. Participants completed a lexical decision task (LDT) with five embedded PM targets. Participants were randomly assigned to either a condition where they were informed when the targets would likely occur or they were given no contextual information. The PM targets were either words from a memorized list (focal condition) or words from a designated category (nonfocal condition). Results indicated that PM performance did not differ across manipulated conditions, but the LDT latency data suggest that for those in the no context conditions the equivalent PM performance was achieved at the expense of performance on the ongoing task. These findings suggest that associating PM intentions with a specific context can help confine the cost or interference of a PM task to those situations where the opportunity to fulfill the PM intention can reasonably be expected. Email: Cindy Reese-Melancon, celinda.reese@okstate.edu

(3083) The Effects of Response Sequencing on Prospective Memory Retrieval and Commission Errors. SAMANTHA SPITTLER, Louisiana State University, ANNA-LISA COHEN, Yeshiva University, JASON HICKS, Louisiana State University. — Two response conditions were created to modify an event-based prospective memory (PM) task embedded within a lexical decision task. PM target trials were specific words shown in a perceptually salient context. The Replace response condition required participants to replace their usual word response with a PM key press to fulfill the intention. The Sequenced response condition required participants make word responses first and then fulfill the intention on a trial transition screen. Participants encountered PM targets in an intention-active block and then encountered the same targets after the intention was canceled. Commission errors were very low in the canceled-intention block, but occurred more often for those in the Replace condition. Surprisingly, accurate PM performance in the initial intention-active block was lower in the Sequenced condition, despite the salient event context. Email: Jason Hicks, jhicks@lsu.edu

(3084) Practice Does Not Make Perfect: Commission Errors in Prospective Memory. MICHELLE N. DASSE and MICHAEL K. SCULLIN, Baylor University (Sponsored by Charles Weaver, III). — Prospective memory (PM) commission errors occur when a finished/cancelled intention is erroneously re-executed. We examined whether practicing a PM task (press Q for corn during a lexical decision task) reduced commission error risk to the same extent as performing the PM task during "active" trials. In the no-practice condition (n=24), the PM words never appeared in the practice or active blocks. In the practice condition (n=25), the PM words appeared twice during the practice block, but never during the active block of trials. In the performance condition (n=25), the PM words appeared twice during the active block (but never during practice). Participants were then told that the PM task was finished. However, in a later lexical decision block the target words reappeared, and Q presses indicated commission errors. Participants in the no-practice (63%) and practice (46%) conditions were significantly more likely to make a commission error than participants in the performance (20%) condition (ps = .002 and .04 respectively; Barnard’s exact test). Thus, practice is not the same as active performance; PM intentions need to be performed in an active block of trials to be successfully deactivated. Email: Michelle N. Dasse, michelle_dasse@baylor.edu

(3085) Equivalent Task Interference From Multiple Prospective Memory Targets Versus Responses. ADAM G. UNDERWOOD and MELISSA J. GUYNN, New Mexico State University. — Prospective memory (PM) refers to remembering to fulfill an intention at an appropriate moment. Task interference is the finding that maintaining an intention produces costs on an ongoing task. The present experiment investigated task interference when an intention involved multiple PM targets and/or PM responses (versus just one). A lexical decision task served as the ongoing task. The PM manipulation varied between participants and consisted of either 1 target/1 response (1T1R), 1 target/4 responses (1T4R), or 4 targets/1 response (4T1R). The results indicated significant (and equivalent) interference to the ongoing task with 1T4R and 4T1R, but not 1T1R. Additionally, the results indicated a greater cost to a verbal PM response with 1T4R compared to 1T1R and 4T1R. The study suggests both multiple targets and multiple responses interfere with the ongoing task, but only multiple responses interfere with PM responding. Results are discussed in terms of retrieval mode and target checking. Email: Melissa J. Guynn, mguynn@nmsu.edu

(3086) Prospective Memory With a Focal Target in a Familiar Context. JOSHUA L. BRUNSMAN, REBEKAH SMITH, and R. REED HUNT, University of Texas at San Antonio. — Prospective memory (PM) tasks, or remembering to perform an action in the future, are considered more focal when processing demands of the PM task overlap with processing demands of other ongoing activities. In the current study, participants viewed photographs representing a walk through a familiar campus environment and decided whether there were six or more people in each photograph. The PM task was to remember to return a book to a friend. The target person appeared one time midway through the ongoing task. One PM group was told where the friend would appear. A second PM group was not given location information. A control group performed the ongoing task only. The results showed that providing relevant location information reduced cost to the ongoing task, both before and after the target event occurs, relative to
the cost for a group performing the same focal prospective memory task performed without contextual support. Email: Rebekah Smith, rebekah.smith@utsa.edu

(3087)
Response Dynamics in Time- and Event-Based Prospective Memory. ANGELA CONTE and DAWN MCBRIDE, Illinois State University, DREW H. ABNEY, University of California, Merced (Sponsored by Jeffrey Wagman). — Studies have shown performance and reaction time differences between time-based and event-based prospective memory (PM) tasks (Conte & McBride, 2014). The current project investigated these differences between the types of PM tasks in terms of PM accuracy and PM cost using mouse tracking data. Subjects completed either a time-based or event-based PM task within a lexical decision ongoing task. As seen in past studies, PM performance was significantly higher in the event-based task. Despite no evidence of mean reaction time differences across tasks, mouse movement dynamics suggest processing differences across PM task type. This study highlights the utility of examining mouse tracking data in PM tasks. Email: Angela Conte, amconte@ilstu.edu

(3088)
On the Relationship Between Prospective Memory and Financial Gains and Losses. GABRIEL COOK, Claremont McKenna College, JAN RUMMEL and SEBASTIAN DUMMEL, Heidelberg University. — We examined motivational influences of event-based prospective memory (EBPM) by manipulating monetary contingencies for detecting cues in different ongoing tasks. We associated a monetary punishment (loss frame) for failing to respond to cues and a monetary reward (gain frame) for remembering to respond to cues and compared those contingencies to control condition, which had no associated gain or loss. EBPM improved for both the loss-frame and the gain-frame conditions relative to the control condition. Importantly, a significant increase in intention-induced ongoing task interference did not accompany this value-related improvement in EBPM. In addition, equated recognition memory for ongoing-task items in Experiment 2 suggests that improved EBPM was associated with improved episodic memory, which could have resulted from strategic monitoring. Our results replicate findings that financial incentives can improve EBPM and that this benefit generalizes to manipulations of financial losses. The absence of differences in strategic monitoring raises interesting questions about how motivation might affect the allocation of attention to the prospective-memory task or to all cognitive tasks in the task set. Email: Gabriel Cook, cook.gabriel@gmail.com

(3089)
Metacognitive Monitoring and Prospective Memory Abilities in Obsessive-Compulsive Checking. HELEN LOUISE WILLIAMS and JAMIE ADAMS, Keele University. — Metacognitive beliefs and prospective memory (PM) deficits are suggested to contribute towards the development and maintenance of checking behaviors in Obsessive-Compulsive Disorder (OCD). In this study we examined the metacognitive monitoring abilities of those with high and low obsessive-compulsive checking behaviors on a Judgment of Learning (JOL) task and two PM tasks. Participants (N = 238) were divided into high and low checking groups based on scores on the checking subscale of the Padua Inventory-Revised (van Oppen, Hoekstra & Emmelkamp, 1995). Participants made immediate and delayed JOLs for Swahili-English word-pairs, underwent a cued-recall test, and completed event-based and time-based PM tasks. JOL confidence, cued-recall performance, and time-based PM were equivalent across groups and delayed JOLs more accurately predicted later recall than did immediate JOLs in both groups. However, participants reporting high checking behaviors had better JOL accuracy and, in contrast to previous research, better event-based PM than those reporting low checking behaviors. Findings are discussed in relation to hypothesized conservative risk-taking behavior in high checkers (Shachar, Lazarov, Goldsmith, Moran, & Dar, 2013). Email: Helen Louise Williams, helenwilliams098@gmail.com

• WORKING MEMORY II •

(3090)
Visual Working Memory for Surface Roughness. HIROYUKI TSUDA and JUN SAIKI, Kyoto University. — In contrast to a wealth of studies on perception of materials and textures, much less is known about how humans encode and retain them in memory. In the current study we investigated visual working memory (VWM) for surface roughness, a fundamental attribute to describe the appearance of material. We measured the precision of VWM for roughness of a spherical object by using a continuous report task and we investigated how it is affected by memory load and exposure duration of the sample array. Results showed a trade-off between memory precision and array size, in which larger array sizes led to progressively lower precision. However, when participants were allowed to view the sample array longer, there was no decline in memory precision, at least for the array size of up to 3. This suggests that when encoding limitations are minimized, high fidelity of VWM for surface roughness can be retained. Email: Jun Saiki, saiki@cv.jinkan.kyoto-u.ac.jp

(3091)
The Effects of Long-Term Conceptual Knowledge and Categorical Distinctiveness on Object Bindings in Working Memory. KYLE WEICHMAN (Graduate Travel Award Recipient) and LISA BLALOCK, University of West Florida (Sponsored by Ian Neath). — The effect of higher-level knowledge on consolidation in visual working memory (VWM) was investigated by varying the similarity of stimuli along conceptual dimensions. To-be-remembered items and masks were taken from categories controlled for perceptual distinctiveness and distinctiveness in kinds (e.g., there are many kinds of cars, few kinds of bowties). Participants completed a change detection task in which the memory array consisted of exemplars from either a conceptually similar or distinctive category, followed by a mask array of items from either the same category or a category not
included in the memory array at varying intervals. The results showed greater interference from conceptually similar masks compared to the other conditions, and effects were found for both perceptual and conceptual distinctiveness. An interaction between categorical distinctiveness and stimulus-onset-asynchrony did not reach significance. Implications for VWM models incorporating long-term memory connections and visual feature filters are discussed. Email: Kyle Weichman, klw50@students.uwf.edu

(3092) Forgetting No-Longer Necessary Items From Visual Working Memory. HIROYUKI TSUBOMI, University of Toyama, KEISUKE FUKUDA, Vanderbilt University, ATSUSHI KIKUMOTO, University of Oregon, EDWARD K. VOGEL, University of Chicago. — The severe capacity limit of our visual working memory (VWM) necessitates updating of VWM representations from moment to moment. In the present study, we investigated how no-longer necessary VWM representations are dropped. While participants were holding 4 colored squares in mind, we presented a circle-cue to instruct participants to forget all four squares from VWM (i.e. forget-all condition) or to forget three items leaving one square in mind (i.e. selective-forget condition). The result showed that the contralateral delay activity (CDA), a neural index of the number of items in VWM, dramatically reduced following the forget-all cue but not following the selective-forget cue. A subsequent behavioral study also showed that the participants failed to report the colored square only following the forget-all cue but not following the selective-forget cue when asked by surprise. These results suggest that dropping all VWM representations is far easier than selectively dropping a subset of them. Email: Hiroyuki Tsubomi, htsubomi@hmt.u-toyama.ac.jp

(3093) The Intricacy of Interference in Short-term Memory. SOPHIE SCOTT, STEVEN ROODENRYS, and LEONIE M. MILLER, University of Wollongong. — It is widely assumed that items in verbal short-term memory interfere with one another, based on such findings as the phonological similarity effect, that recall is worse for lists of similar sounding words than lists of dissimilar sounding words. To our knowledge, no studies have been reported examining the details of how items within a list of words interfere with each other by isolating the effect of specific items on each other. We report two experiments in which participants recalled lists containing CVC words in which a target word shared each of its three phonemes with one of the other words, and control lists with no overlap. In one experiment the target word preceded the overlapping words while in the other experiment it followed the overlapping words. The results show greater interference when the vowel is shared than when consonants are shared, and greater proactive interference than retroactive interference within a list. Email: Steven Roodenrys, steven_roodenrys@uow.edu.au

(3094) Visual Working Memory and Change Detection: Reassessing Whole Display Interference. STEPHEN RHODES and MARIO A. PARRA, University of Edinburgh, NELSON COWAN, University of Missouri, ROBERT LOGIE, University of Edinburgh (Sponsored by Alan D. Baddeley). — In their influential paper Wheeler and Treisman (2002) used the change detection task (CDT) to assess whether object features are bound in visual working memory (VWM). When their participants were tested with a single probe, performance in individual feature and binding conditions was comparable, whereas with multiple test items (whole display) binding performance was impoverished. However, the two CDTs used pose different demands in terms of the number of items that must be held in VWM in order to detect a change/no-change. Specifically the single probe task overestimates binding performance (Cowan, Blume, & Saults, 2013). The present work uses simple processing models of VWM as well as slight procedural modifications to compare the two CDTs more effectively. These experiments converge on the finding that performance with a whole display test is slightly worse relative to a single probe, but this is not specific to conditions assessing feature binding. Email: Stephen Rhodes, s.rhodes@sms.ed.ac.uk

(3095) Does the Multi-System View of Working Memory Explain the Nature of the Updating Working Memory Task? MICHEL ISINGRINI, University François-Rabelais, FREDERIC DOISEAU, LUCIE ANGEL, SEVERINE FAY, and BADIAA BOUAZZAOUI, University of Tours. — To support the multi-system view of working memory (WM), we investigated the nature of the updating working memory task (UWMT). Three groups of young, older and older-older adults were tested under seven upload levels. A factor analysis on these outcomes resulted in a two factors solution confirming that the UWMT involves two independent components, interpreted as a short-term storage process and an updating process depending on the WM central executive system. Age groups comparison and correlation analyses involving independent measures of executive functioning, WM, and short-term memory confirmed that these two components were dissociated. The factor reflecting the central executive system was correlated to age, and to executive functioning and WM tests. Whereas the factor reflecting short-term storage was only correlated to the short-term memory test. These results support that the UWMT involved two independent components, and are compatible with the multi-system view that working memory is composed of a central executive system separated from short-term storage systems. Email: Michel Isingrini, isingrini@univ-tours.fr

(3096) Identifying the Underlying Visual Search Mechanisms During the N-Back Task. CLAYTON STEPHENSON, University of Southern California, SUSANNE JAEGGI, University of California, Irvine, MARTIN BUSCHKUEHL, MIND Research Institute. — Bilateral eye-movements have been shown to be related to improved recognition
memory, improved episodic memory, and contextual information. However, little is known whether bilateral eye-movements influence working memory performance. We tested participants' performance in a spatial n-back task that was presented in three different orientations: scattered, vertical, and horizontal; with the latter requiring mostly bilateral eye-movements. The spread of the visual stimuli (blue squares) was evenly dispersed for all conditions. Overall, there was no difference in hit accuracy or reaction times for hits when comparing orientations. There was, however, a difference in false alarm rates among conditions as the n-back level increased in difficulty. That is, for the 3-back condition, there were twice as many false alarms in the horizontal condition than the scattered condition, and twice as many false alarms in the vertical condition as the horizontal condition. Furthermore, reaction times increased for false alarm rates in the horizontal and vertical conditions significantly more compared to the scattered condition. Implications about future research on bilateral eye-movement in working memory tasks will be discussed. Email: Clayton Stephenson, clstephe@usc.edu

(3097)
Focus of Attention Flexibility and Set Size Differences for Sequentially Presented Information. JOSHUA SANDRY, Montclair State University. — The most recent serial position is typically the fastest and most accurate item retrieved from the focus of attention when information is presented sequentially and there is not additional time for active maintenance. This finding has been interpreted as support for a static focus of attention; however, recent contrary evidence suggests that the focus of attention is a flexible resource (Sandry, Schwark & MacDonald, 2014). Non-recent items can be maintained in a highly active state within the focus of attention without additional time for processing if participants are rewarded for orienting to certain list positions. Flexibility seems to come at a cost to the other information maintained in working memory. The present study replicated this finding and further investigated the role of set size in understanding the limits associated with focus of attention flexibility. The findings revealed different resource trade-off patterns between the long and short set sizes. This finding may suggest that the pattern of flexibility within the focus of attention depends on the amount of information that enters working memory. Email: Joshua Sandry, joshsandry@gmail.com

(3098)
Episodic Retrieval and the SNARC Effect. PETER DIXON, University of Alberta. — The SNARC effect is a numerical stimulus-response compatibility effect in which righthand responses are faster to large digits and lefthand responses are faster to small digits. A possible account of this effect is that the presentation of a stimulus prompts a search of working memory for previous trial episodes with similar stimuli; the SNARC effect occurs because these episodes tend to be indexed spatially. To test this account, blocks of trials were constructed in which two digits were repeated 75% of the time. I assumed that trial episodes with these two stimuli would be readily available in working memory, independent of any tendency to use a spatial organization. Consistent with the episodic-retrieval account, there was no overall SNARC effect. Instead, response times were determined by the relationship of the presented stimulus to the repeated stimuli. In particular, responses were faster when the stimulus was numerically close to a repeated digit with the same response. Email: Peter Dixon, peter.dixon@ualberta.ca

(3099)
Increasing Between-Stream Similarity Effects in Serial Recall and Decreasing Block-One Intrusions in Cued Recall With a Proactive Interference Paradigm. MADELEINE ARBER, Australian Catholic University, GERALD TEHAN, University of Southern Queensland, GEORGINA TOLAN, Australian Catholic University (Sponsored by Georgina Tolon). — Between-stream similarity effects occur in short term memory when an irrelevant speech stream shares similar characteristics to that of the recall list. Forty participants completed either a cued recall task or a serial recall task. A proactive interference paradigm was used where a foil item was inserted in the first block of items within the list, designed to interfere with target item recall. In addition to this, the target or foil item was primed via phonemes shared between the items and the irrelevant speech. In the serial task, rhyming filler items were placed around the target in the second block of words, which isolated the target to increase target recall. The results show a significant increase in target recall irrespective of position due to the isolation effect. In the cued task, two items sourced from a similar category to that of the target's were placed around the target. This significantly decreased proactive interference of the foil which thereby increased target recall. This research suggests the similarity between irrelevant speech content and list items plays a role in target item recall in both serial and cued recall tasks. Email: Madeleine Arber, madarber@hotmail.com

(3100)
Survival Processing Increases Stroop Interference: When Poor Performance Has Adaptive Value. STEPHANIE A. KAZANAS, University at Albany, SUNY, KENDRA M. VAN VALKENBURG, University of New Haven, JEANETTE ALTARRIBA, University at Albany, SUNY. — The current study was designed to investigate the impact of survival processing with a novel task for this paradigm: the Stroop color-naming task. The literature is mixed with regards to task generalizability (see Kazanas & Altarriba, 2015, for a review), with survival processing promoting better word recall and recognition (Nairne, Pandeirada, & Thompson, 2008; Nairne, Thompson, & Pandeirada, 2007), while also increasing the number of intrusions (Otgaa & Smets, 2010). Using the Stroop task provides a unique contribution, as identifying items by color is an important evolutionary adaptation and not specific to humans, as is the case with word memory. Our results indicate that presenting the survival passage does not motivate better color-naming performance than color-naming alone. Moreover, survival processing led to a larger amount of Stroop interference. These findings, in addition to those from intrusion data, are discussed with regards to both semantic and evolutionary theories. Email: Jeanette Altarriba, jaltarriba@albany.edu
The Loss of Information From Working Memory Is Distinct From Allocation of Attention. EREN GUNSELI, JOHANNES FAHRENPORT, KONSTANTINOS DAOULTZIS, and CHRISTIAN OLIVERS, VU University Amsterdam, MARTIJN MEETER, Vrije University Amsterdam (Sponsored by Martijn Meeter). — The loss of uncued items depends on retro-cue reliability. Reconciling previous contradictory findings, costs of invalid retro-cueing on recall performance were found only for highly reliable cues, while valid cue benefits were present for both levels of reliability. Contralateral delay activity (CDA) in the EEG, an index of VWM maintenance, was modulated only after a highly reliable cue, suggesting that the loss of uncued items depends on retro-cue reliability. The allocation of attention, on the other hand, could be tracked in both conditions through decoding cued location in alpha band power (i.e. 8-12 Hz) during the maintenance interval, though decoding accuracy was larger for highly reliable cues. The results suggest a dissociation between mechanisms of maintenance and of attention within VWM. Email: Eren Gunseli, gunseli.eren@gmail.com

Sampling Improves Short-Term, But Not Long-Term, Memory of Exceptions to Rules During the Learning of Abstract Rule Structures. APOORVA BHANDARI, RYAN FUGATE, and DAVID BADRE, Brown University. — In real-world reinforcement learning tasks, human subjects often have control over which stimuli they encounter, and thus learn about. It has been suggested that such active sampling may have a role to play in learning, for instance by enabling efficient hypothesis testing or efficient use of working memory resources. In this study, we examined the role of active sampling in the learning of abstract rule structures. We find that subjects learn a variety of abstract rule structures and that their sampling biases are consistent with the specific rule structures they learn. A commonly used structure is a rule+exception structure in which a simple rule describes most of the S-R-outcome contingencies, with a few exceptions. Across three behavioral experiments, we show that sampling is associated with a specific performance benefit for exceptions during learning blocks. However, this performance benefit does not translate into improved learning when measured in blocks where sampling is disallowed. In other words, short-term, but not long-term memory for exception is improved by active sampling. We consider the implications of this finding in the context of the wider literature on the role of active sampling in learning. Email: Apoorva Bhandari, apaxon@gmail.com

A Bayesian Discrete-State Model for Working Memory. EDA MIZRAK, Koç University, HENRIK SINGMANN, University of Zurich, ILKE ÖZTEKIN, Koç University (Sponsored by Ilke Öztekin). — The response deadline speed-accuracy trade-off (SAT) procedure allows a full time-course function that describes how cognitive processing unfolds over time. In memory research, SAT data have been utilized to independently estimate retrieval success from processing speed, as well as to differentiate the contributions of automatic and controlled memory processes. Typically, SAT functions have been evaluated with an exponential approach to a limit. We developed a Bayesian version of the exponential SAT model based on the 2-high-threshold (2HT) discrete-state memory that allowed two different SAT functions for the two 2HT memory parameters Do (i.e., probability to detect an item as old) and Dn (i.e., probability to reject a new item). The model was applied to previously published SAT studies of working memory. Our findings suggest that the proposed approach can be a viable way to model and dissociate retrieval processes that contribute to working memory. Email: Eda Mizrak, emizrak@ku.edu.tr

Environmental Support in Visuospatial Working Memory: Comparing Overt and Covert Rehearsal. LINDSEY LILIENTHAL, Pennsylvania State University-Altoona, JOEL MYERSON, RICHARD A. ABRAMS, and SANDRA HALE, Washington University in St Louis. — Our previous research (Lilienthal et al., 2014) has shown that when participants are asked to remember a series of locations, their memory spans decrease with increases in retention time unless environmental support for visuospatial rehearsal is provided (i.e., unless the array of possible locations remains present during opportunities for rehearsal). Two experiments were conducted to further examine the effects of environmental support on forgetting. In Experiment 1, participants were allowed to rehearse during retention intervals using eye movements (overt rehearsal). In Experiment 2, participants were required to fixate during retention intervals, and thus could only rehearse using shifts of spatial attention (covert rehearsal). Importantly, when participants were limited to covert rehearsal, environmental support no longer prevented forgetting over time. These results suggest that covert visuospatial rehearsal is not as effective a strategy as overt rehearsal for preventing forgetting of location information. Email: Lindsey Lilienthal, lindsey.lilienthal@yahoo.com

Output Processes and the Frequency Effect in Serial Recall. LEONIE MILLER, ALISON DONAGHY, and STEVEN ROODENRYS, University of Wollongong. — In previous research we have observed the complexity of the frequency effect in serial recall, in the specific contexts of mixed high- and low-frequency lists. The advantage for high frequency words is not ubiquitous, and under some circumstances the effect is eradicated in later list positions. The patterns of recall in mixed-list contexts suggests there is an interplay between effects arising from the familiarity with language and...
processes associated with spoken output, that is not explained by current theory (e.g., redintegration). Utilising a serial recall task that deconfounds presentation order from recall order (Cowan, Saults, Elliot, & Moreno, 2002), we demonstrate that it is likely that the frequency effect continues throughout recall, but can be masked by the relative resource cost or benefit from the output of items in the first half of the list.

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(3106)
The Relationship Between Visuo-Spatial Memory and Reasoning Is both General and Task-Specific. JADE N. L. YONEHIRO and ZACH SHIPSTEAD, Arizona State University. — The visual arrays task is commonly used to study the properties of visuo-spatial working memory. However, several lines of research indicate that this task also measures a more general component (e.g., focus of attention; attention control). Using correlations between visual arrays performance and both verbal and spatial reasoning tasks, we demonstrate that visual arrays performance indexes both general and domain-specific aspects of cognition. When the measurement of reasoning was visuo-spatial, the correlation to visual arrays was strong, when the measurement of reasoning was verbal, the correlation disappeared. Critical variance that visual arrays performance shares with verbal working memory tasks had a strong correlation to reasoning, regardless of the types of task that were used to measure reasoning ability.

We conclude that use of the visual arrays task to study the properties of visuo-spatial working memory confounds visuo-spatial memory with the domain-general focus of attention.

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• VISUAL SEARCH •

(3107)
Age Differences in Associative Learning to Guide Conditional Visual Search. SOWON HAHN, Seoul National University, DANIEL R. BUTTACCIO, University of Maryland. — Previous literature suggests that older adults’ deficient episodic memory may be due to the associative learning deficits. By using the retrieval guidance paradigm, we compared younger and older adults’ abilities in utilizing probability based feature cues to simplify a perceptually demanding visual search task. On each trial, participants viewed a memory prompt that contains the diagnostic information regarding the target color, and conducted a visual search task. During the study phase, a prompt-target pair was presented without distractors, and the explicit knowledge for the association was tested after each block of trials. Our results showed that both younger and older adults only partially utilized the diagnostic information, but older adults were particularly less efficient when the prompt was associated with two colors instead of one. The results are discussed in terms of the age differences in learning and utilizing the associative information to guide visual search.

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(3108)
An Investigation of Visual Search Performance Among Easterners and Westerners. YIN-YIN TAN and SHANE MUELLER, Michigan Technological University. — Previous research suggests that Westerners pay more attention to salient, fociobjects, whereas Easterners focus on distributed information and contextual detail (e.g., Masuda & Nisbett, 2001; Boduroglu et al, 2009; Freeth, 2013). These biases may be reflected in relatively superior performance in two aspects of visual search—deliberate serial search for feature conjunctions, and attention-based pop-out for salient features. To examine this, we tested Easterners and Westerners in two experiments using a visual search task. Results revealed broad consistency across nationalities for experimental variables (salien, number of distractors and number of targets), while none of these effects were moderated by nationality. In contrast, mean response time did differ significantly across nationality, but inconsistently across experiments. Overall, this suggests that putative east/west differences in visual processing attention may not be universal across tasks, may be dependent on sampling issues, and could be subject to file-drawer problems that are of growing concern in the replication crisis.

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(3109)
Keeners and Slackers: Investigating Individual Differences in Visual Cognition Between Voluntary Signup Across University Semesters. DAVID CHAN, JASON RAJSIC, and JAY PRATT, University of Toronto (Sponsored by Jay Pratt). — University-based psychological research typically relies on the participation of undergraduate students for data collection. With such participants, daily circadian timing effects have been shown to modulate attention and cognitive control. On a longer time scale, researchers have anecdotally commented that semester differences may produce different outcomes in attentional and cognitive experiments, with early sign up participants being more attentive and focussed than end of the semester participants. The purpose of our study was to test this anecdotal claim, and investigate the effect of time of semester across a set of attentional and cognitive tasks. To do so, participants completed a wide range of visual cognitive tasks (attentional blink, visual working memory, multiple object tracking, flanker interference, singleton distractor). Our results demonstrate that students at the end of the semester show no significant difference in performance compared to early semester students.

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(3110)
Learning Experience Shapes the Deployment of Visual Attention: An ERP Study. ANNA SCHUBO and TOBIAS FELDMANN-WUSTEFELD, University Marburg. — In order to cope with the huge amount of incoming information, the visual system has to assign priorities to each stimulus in the visual field. Traditionally, it has been assumed that visual attention carries out this prioritization. We developed a paradigm to investigate how learning experience affects attention deployment. Participants performed a visual learning task which was combined with a visual search
task; we examined event-related potentials (N2pc and its subcomponents NT and PD). Results showed differential attention deployment induced by learning: when color was predictive in the learning task, color distractors also captured attention in the search task before they could be actively suppressed. Learning-induced differential attention deployment was observed in randomly intermixed tasks as well as in blocked tasks and even when tasks were performed on different days. Hence, besides bottom-up and top-down processing, learning experience affects attention deployment and changes the way the visual environment is perceived.

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(3111)

Visual Search Asymmetry Depends on Target-Distractor Feature Similarity: A Test of Two Competing Theories. RAVEN ZHANG and SERGE ONYPER, St. Lawrence University. — Previous studies have shown that, in visual search, varying the target and distractor familiarity produces a search asymmetry: Detecting a novel target among familiar distractors is more efficient than detecting a familiar target among novel distractors. One explanation is that novelty is a pre-attentive cue that attracts greater attention. Conversely, novel items may merely usurp processing resources without attracting greater attention. The current study postulates that target-distractor feature similarity, in addition to target or distractor novelty, is a key determinant of visual search efficiency, and manipulates it experimentally. The results support our hypothesis: Visual search is more (and equally) efficient for novel and familiar targets when distractors are familiar compared to familiar targets among novel distractors, but only when the target-distractor feature similarity is high. When similarity is low, the search asymmetry disappears and both novel-target/ familiar-distractors and familiar-target/novel-distractors conditions result in equally efficient search times compared to the familiar-target/familiar-distractors condition.

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(3112)

The Influence of Target Prevalence on Miss Errors in Visual Search. CHAD PELTIER, MARK W. BECKER, and CARLEN G. WILUTIS, Michigan State University (Sponsored by Mark W. Becker). — Observers are more likely to miss rare (versus common) targets in visual search tasks. Wolfe and Van Wert (2010) suggest low target prevalence lowers a “quitting threshold” and shifts decision criterion when evaluating inspected items, resulting in both incomplete searches and recognition errors. To evaluate these claims, we tracked eye movements during search for target “T” among distractor offset “L”. Target prevalence was varied (10%, 50%, 90%) over three blocks. The number of items inspected per trial decreased with prevalence level, supporting the hypothesis that the prevalence effect (PE) is caused by incomplete search. Comparing the percentage of trials where a target was fixated upon but missed showed that as prevalence decreased, recognition errors increased, supporting the view that decision criterion are somewhat impacted by prevalence. Overall, results suggest altering quitting thresholds as the main cause of the PE, with criterion shifts in decision making playing a minor role.

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(3113)

On the Deployment of Visual Attention in Speeded and Accurate Visual Searches Within the Framework of the Response Selection Bottleneck. CHRISTINA B. REIMER and TORSTEN SCHUBERT, Humboldt-Universität zu Berlin, TILO STROBACH, Medical School Hamburg (Sponsored by Tilo Strobach). — During conjunction search, visual attention binds item features. The resulting serial search process reflects the limited capacity of visual attention. Here, we investigated whether speeded and accurate conjunction searches are subject to the response selection bottleneck, which induces sequential performance of the response selection processes of two tasks. In two experiments, participants completed two tasks separated by experimentally-modulated temporal intervals (Stimulus Onset Asynchrony, SOA). Task 1 required an auditory two-choice discrimination. In conjunction search Task 2, participants located a target amongst 6-18 items, which were presented until response (speeded; Exp. 1) or briefly before masking (accurate; Exp. 2). We analyzed search times according to the locus-of-slag method, and found that feature binding in both experiments could be performed concurrently to response selection processes. Furthermore, d’ was not reduced at short compared to long SOA in accurate search. We conclude that visual attention and response selection rely on different capacity limitations.

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(3114)

Greater Than Parallel: Distinguishing Features Can Be Combined for Efficient Object Identification in Dual-Target Search. STEPHEN WALENCHOK, Arizona State University, HAYWARD GODWIN, University of Southampton, JOSEPH HOUPUT, Wright State University, MICHAEL HOUT, New Mexico State University, STEPHEN GOLDFINGER, Arizona State University (Sponsored by Stephen Goldinger). — Imagine searching for two friends in a crowd, one wearing a red shirt and the other wearing a blue shirt. You must both guide your attention to relevant features (e.g., the color of their shirts), and decide whether each person you see is either of your two friends. We examined the process of rejecting distractors in dual-target search (e.g., determining a person you see is neither of your friends) using the capacity coefficient, which measures the change in processing efficiency as the number of targets changes. We recently demonstrated that the capacity coefficient indicates that distractor rejection in dual-target search is faster than independent parallel (“supercapacity”), but only when searching through complex real-world items. One explanation is that complex stimuli afford more features with which to disqualify non-targets. We tested this account with artificial stimuli by systematically increasing the number of features comprising all stimuli. Dual-target search was at supercapacity only when distractors and targets shared no overlapping features. In summary, people combine unique
features that individuate both targets from non-targets, and use this pool of features for efficient decision-making. 
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(3115)
Visual Search Influenced by Auditory Distractors Naming Targets, but not Location or Response Hand. DONALD J. TELLINGHUISEN and STEVEN LEWIS, Calvin College. — The present studies explored the influence of auditory stimuli presented simultaneously with the onset of visual target arrays. Participants searched for one of two target letters (X or N) in a letter-circle. In some conditions, auditory distractors named the identity of items in the target set (“X” or “N” spoken). These distractors influenced responding such that target incompatible auditory stimuli slowed responses. This was particularly the case when the target array perceptual load was high. In other conditions, auditory stimuli were presented that named direction (“left” or “right” spoken). These distractors did not influence responding, whether they were compatible or incompatible with target response hand or target letter location in the search array, for either low and high perceptual loads. These results suggest that incompatible auditory distractors slow responding when they correspond the identity of the target item, but not when they name target locations or target response hands. Email: Donald J Tellinghuisen, dtelling@calvin.edu

(3116)
Relatedness Proportion Influences Priming of Popout. BRYAN R. BURNHAM, University of Scranton. — Priming of popout (PoP) is the finding that visual search is faster when the features of a singleton target and nontargets repeat between trials than when the target and nontarget features switch between trials. This study examined what effect relatedness proportion (RP; i.e., proportion of repeat to switch trials) has on PoP effects at the level of mean RTs and the underlying RT distributions by fitting the Exponential-Gaussian function. Subjects completed a feature search task when the proportion of red and green singleton targets was equal (RP-equal) and when one color was more likely (RP-high). The PoP effect was larger in the RP-high condition, with the increase resulting from greater shifting of the RT distribution between repeat and switch trials and slightly more skewing by the longest RTs. Results also showed that the PoP and RP effects in mean RTs and the Exponential-Gaussian parameters were related to measures of attentional control. Email: Bryan R. Burnham, bryan.burnham@scranton.edu

(3117)
Moving at the Speed of Search: Long-Term Visual Search and the Influence of Lapses in Time Between Search Activity. JUSTIN MERRILL ERICSON, JONATHAN WINKLE, and STEPHEN MITROFF, Duke University. — Professional searchers (e.g., airport security personnel, radiologists) often search for targets that rarely appear (e.g., bags seldom contain explosives). Given such infrequency, an important question arises—is search performance affected by the amount of time that passes between occurrences of a particular target type? Does a searcher become less effective at detecting a particular target type if it has been minutes, days, weeks or months since that specific target was last detected? Moreover, natural breaks (lunch, days off, vacation) introduce delays between any search activity, and it vital to understand how such breaks affect performance. Timing-related effects are difficult to address in the lab, but can be examined in the “big data” environment afforded by the mobile application Airport Scanner (Kedlin; Mitroff et al., 2015, JEP:HPP). We will discuss data from 500,000 participants, which revealed several time-related effects, including that more proficient searchers have smaller time lapses between searches. Email: Justin Merrill Ericson, justin.m.ericson@gmail.com

(3118)
Multisensory Integration Is Strongly Dependent on Bimodal Task Demands. SARAH BYCE and MICHAEL WESNER, Lakehead University (Sponsored by Jim McAuliffe). — Multisensory integration (MSI) is a phenomenon in which behavioral responses to concurrently presented stimuli through multiple modalities are facilitated, either by shortened response times and/or by increased accuracy in the detection or discrimination of targets. We investigated interactions between multisensory integration (MSI) and attentional load using three discrimination tasks spanning the processing hierarchy. Participants indicated the location of visual targets in a preattentive pop-out task, an intermediate task, and an attention-demanding conjunction search task. Targets were presented both unimodally and accompanied by auditory tones. Results showed no facilitatory effect of bimodal stimuli in the preattentive task and decrements in discriminating bimodal stimuli in the difficult conjunction search task. A trend towards facilitation was observed in the intermediate task. These results suggest that MSI requires at least some form of attention, but that high attentional load actually leads to declines in performance. Email: Sarah Byce, smclasen@lakeheadu.ca

(3119)
When Meaning Matters: The Temporal Dynamics of Semantic Influences on Visual Attention. FLOOR DE GROOT, VU University Amsterdam, FALK HUETTIG, Max Planck Institute for Psycholinguistics, CHRISTIAN OLIVERS, VU University Amsterdam (Sponsored by Christian Olivers). — To what extent is visual attention driven by the semantics of individual objects, rather than by their visual appearance? We continuously measured eye movements, while observers searched displays of common objects for an aurally instructed target. On crucial trials, the target was absent, but the display contained objects that were either semantically or visually related, allowing us to directly compare semantic and visual biases. In several experiments, we varied the timing of target instruction between presenting it either before, during, or after picture presentation (the latter representing memory search). We found that visual orienting is driven by priority settings that dynamically shift between visual and semantic representations, with each of these types of bias operating largely independently. The findings support a cascaded activation model, and show that the question whether visual
orienting is driven by semantic content is better rephrased as when visual orienting is driven by semantic content.

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(3120) Intrinsic Position Uncertainty Impairs Overt Search Performance. YELDA SEMIZER and MELCHI M. MICHEL, Rutgers University (Sponsored by Melchi M. Michel). — Previous measurements indicate that position uncertainty impairs detection and localization performance in periphery, for both extrinsic uncertainty regarding where a stimulus might appear (EPU), and intrinsic uncertainty regarding the distal source of the perceived stimulus (IPU). We investigated the role of IPU in overt visual search. Human observers completed a detection task to measure sensitivity to the target as a function of visual field position, followed by a search task, which required localization of the target signal within a noisy environment. Display was either tiled uniformly with feature clutter to maximize effect of IPU or the clutter at irrelevant locations was removed to decrease effect of IPU. The amount of EPU was also manipulated across conditions. We developed a constrained ideal searcher model, in which searcher is limited by IPU measured for human observers. Introducing IPU to ideal searcher impaired overall overt search performance, but not uniformly. In the uncluttered condition, performance decreased steeply as a function of increasing EPU. In the cluttered condition, effect of IPU dominated and performance flattened as a function of EPU. Measured performance for human searchers showed similar trends. Email: Yelda Semizer, yelda.semizer@rutgers.edu

(3121) Improving Rare Target Detection Via Process-Based Feedback. MARK W. BECKER, CHAD PELTIER, and SAMUEL HEMSTEGER, Michigan State University. — In visual search, as targets become rare the likelihood of misses increases dramatically. This target prevalence effect is due to reduced quitting thresholds that result in rapid, incomplete searches before responding target absent. The effect may have real-world consequences; many important real-world search tasks (e.g., radiology/baggage screening) have low target prevalence rates. However, the effect is stubborn and many attempts to improve rare target detection have failed. Here we report a method that improves rare target detection. Observers searched for Waldo from “Where’s Waldo?” books while their eye movements were tracked. Waldo appeared in only 10% of the displays. Control participants received no feedback. Experimental subjects received process-based feedback; each part of the scene that had been fixated was highlighted to inform participants about the regions that they had and had not inspected. Compared to the control condition, process-based feedback resulted in higher hit rates, equivalent false alarm rates, and more complete inspections of images prior to responding target absent. Results are discussed in terms of the critical role that feedback may play in setting appropriate quitting thresholds. Email: Mark W. Becker, becker54@msu.edu

(3122) Video-Game Playing and Useful Field of View. JAMES PATTEN and THOMAS SPALEK, Simon Fraser University. — Several aspects of attention and perception are thought to be affected by time spent playing action-oriented video-games. Two such aspects are Useful Field of View (UFOV) and speed of processing (SOP). It has been shown that Video-Game Players (VGPs) show improved UFOV compared to non-gamers; however these findings have used a single-target UFOV paradigm. Such a paradigm might actually be measuring the ability to diffuse attention broadly across space, rather than the ability to monitor peripheral vision while performing a focused task, which is traditionally considered to be the essence of UFOV. In a first experiment, we examined this issue by using a conventional two-target UFOV paradigm with gamers and non-gamers. Consistent with previous findings VGPs were shown to have an improved UFOV compared to non-gamers. A second experiment measured both SOP and UFOV to assess to what extent the UFOV improvement was due to SOP. Email: Thomas Spalek, tspalek@sfu.ca

(3123) Mixed Benefits From Conducting Visual Search in Stereoscopic Depth. HAYWARD J. GODWIN, TAMARYN MENNEER, and SIMON LIVERSEDGE, University of Southampton, KYLE CAVE, University of Massachusetts, NICK HOLLIMAN, University of York, NICK DONNELLY, University of Southampton. — Visual search studies typically present participants with non-overlapping objects on a single depth plane. We addressed whether the difficulties associated with search performance in overlapping displays (increased reaction times, decreased accuracy) could be ameliorated by presenting objects at different depth planes to one another. In four different experiments, participants searched displays containing different stimulus types (opaque polygons, transparent polygons, opaque household objects, and transparent images from airport X-ray baggage screening). For opaque polygons, depth decreased response accuracy while also decreasing response times. For the remaining stimulus types, depth increased response accuracy while increasing response times. Across all stimulus types, wherever we did find effects of depth, they were rather limited. Overall, depth in these studies had mixed benefits to visual search performance, and those benefits depended upon the type of stimuli used (e.g., abstract or familiar objects, embedded within opaque or transparent displays). Email: Hayward J Godwin, hg102@soton.ac.uk

(3124) Going Beyond the ‘Visual’ In Visual Search: Semantic Search for Related Words. ARRYN ROBBINS and MICHAEL HOUT, New Mexico State University, GEMMA FITZSIMMONS and TAMARYN MENNEER, University of Southampton, HAYWARD J. GODWIN, University of Southampton. — Standard search tasks typically focus on how people look for specific, visually-defined targets amongst a set of distractors. Often, however, such specificity is unavailable to the searcher (e.g., searching for any pen, or textual information on a website). We examined search behavior when participants
were given visually-imprecise semantic information about the target. People searched among different words, looking for a target that was semantically related to the cue (e.g., cue of “bride” and target of “groom”). Participants were more likely to respond ‘target present’, and were more rapid in their responses as the degree of semantic relatedness increased between cue and target. Faster responses resulted from a reduced number of fixations in trials containing target words which were highly related to the cues. Our approach offers a new route into studying a number of real-world searches, including looking for relevant information in text documents or on Web pages. Email: Michael Hout, mhout@nmsu.edu

• ATTENTION: FEATURES AND OBJECTS •

(3125) Difficulty in Allocating Attention to Two Items in Visual Working Memory: Further Insights From an Error Analysis. MASAE TAKENO, TAIJI UENO, ATSUNOBU SUZUKI, and SHINJI KITAGAMI, Nagoya University, RICHARD J. ALLEN, University of Leeds, GRAHAM J. HITCHE and ALAN D. BADDELEY, University of York (Sponsored by Atsunobu Suzuki). — Selective attention to two items within visual working memory (i.e., two items are signaled by a spatial cue during retention) cannot enhance recognition accuracies for these to-be-attended items whilst attention to a single item can. Further insights on this capacity limitation can be gleaned by an error analysis. Specifically, participants were required to remember the color-shape combination of four objects (e.g. green triangle), and were asked to recall a paired feature upon a single feature-probe (e.g. a green blob prompted an oral recall of ‘triangle’). If one can attend at least one of the items when asked to attend two items, then an error should derive from the attended, yet untested item more frequently than other non-attended items, which was not the case. Thus, when asked to attend two items in visual working memory, one cannot prioritize even a single item. Rather, if you run two hares, you will catch neither. Email: Masae Takeno, takeno.masae@k.mbox.nagoya-u.ac.jp

(3126) What Are We Fighting For? How Distractors Interfere With Partial Report. DAKOTA LINDSEY and GORDON LOGAN, Vanderbilt University (Sponsored by Gordon Logan). — In the partial report task, distractors reduce the number of targets subjects can report. Distractors could compete for slots in STM, attentional processing capacity, or both. We tested these predictions using a two-display partial report procedure in which subjects had to select and retain target objects from two sequentially presented displays. Distractors impaired target report, suggesting competition for attention or slots in STM. Distractor intrusion rate was non-zero, suggesting that distractors compete for slots in STM. To determine the role of capacity limitations we fit models to the data, using variations of Bundesen’s (1990) Theory of Visual Attention. The models fit target reports well, but model variants with limited attentional capacity fit intrusion rate better. Thus, distractors fight for attention and then fight for slots in STM. Email: Dakota Lindsey, dakota.rb.lindsey@gmail.com

(3127) Expectation to Report Plays a Critical Role in Binding Information Into Working Memory, Even for a Solitary, Attended Object. HUI CHEN and BRAD WYBLE, The Pennsylvania State University. — It has traditionally been assumed that attention plays a central role in combining features into a working memory representation. However, here we show that observers often failed to produce a reportable representation for a simple object that was directly attended. In a series of experiments with varying conditions we presented color words (RED, BLUE, YELLOW, or PURPLE) in different colors and asked observers to report whether the print color of the word matched the word itself. Then, on a surprise trial, we asked them to report the color of the word that they had just seen. Many observers mistakenly reported the identity of the word instead of its color even though they had just used that color. Control trials revealed that observers could easily remember the color of the word once they had an expectation to do so. The results suggest a binding deficit when report is not expected. Email: Hui Chen, psychenhui@gmail.com

(3128) Extinction in Evaluative Conditioning: Effects of Feature-Specific Attention Allocation. JOLIEN VANAEELST, ADRIAAN SPRUYT, TOM EVERAERT, and JAN DE HOUWER, Ghent University (Sponsored by Andre Vandierendonck). — Evaluative Conditioning (EC) refers to the change in the liking of a neutral stimulus (CS) due to its pairing with another stimulus that has a clear evaluative meaning (US). In two experiments, we examined whether extinction of EC effects is moderated by feature-specific attention allocation. In both experiments, CSs were abstract Gabor patches that varied along two orthogonal, perceptual dimensions. During the acquisition phase, one of these dimensions was predictive of the valence of the USs and participants were encouraged to selectively attend this dimension. During the extinction phase, CSs were presented alone and participants were asked to categorize the CSs either according to their valence (Valence Condition), the perceptual dimension that was task-relevant during the acquisition phase (Relevant Condition), or the perceptual dimension that was task-irrelevant during the acquisition phase (Irrelevant Condition). In line with our expectations, explicit valence ratings of the CSs revealed a reduction of the EC effect in the Irrelevant Condition only. Results obtained with an implicit attitude measure (i.e., the AMP) partly corroborated this finding. Email: Jolien Vanaelst, jolien.vanaelst@ugent.be

(3129) The Strength of Object-Based Attentional Selection Is Affected by Closure. ADAM S. GREENBERG and GRACE NICORA, University of Wisconsin-Milwaukee. — During Object-Based Attention (OBA), spatial locations are prioritized via relations to visual objects. However, it is unknown how the
strength of OBA is affected by objects that are not fully closed. We manipulated a set of vertical rectangles by removing the two short horizontal connectors that capped the ends of each rectangle. A centrally presented rectangle (rectangles condition) or two parallel lines (lines condition) were flanked by four identical objects. One end of the central rectangle was then exogenously cued. A set of 10 target/distracter letters were presented on the objects and subjects performed a letter discrimination on the target. Flankers were either congruent or incongruent with the target. Results showed that flankers only have effects when the target/distracters lie on a contiguous region, and when the target object is cued. Since attention was not "bound" to the object in the lines condition, flankers were able to influence performance on the target. However, in the rectangles condition, attention was more restricted to the closed object, preventing flankers from influencing performance. Thus, object closure can cause changes in the strength of object-based attention.

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(3130)
The Role of Selective Attention in Following Social and Non-Social Cues. SAMUEL HARDING, RICHARD SHIFFRIN and BENNETT BERTENTHAL, Indiana University (Sponsored by Richard Shiffrin). — How and why do social cues better direct attention than non-social cues? Participants responded to a centrally presented pointing hand or arrow cue; non-diagnostic social or non-social congruent or incongruent cues were presented as to-be-ignored flankers. Pointing hand flankers interfered with a central arrow cue, but not vice versa. One hypothesis holds that attention is initially broadly distributed over the cue and flankers, but shrinks over time to select the central cue, with differences between arrows and hands manifest in the rate of contraction. An alternative hypothesis posits a spatial distribution of attention that does not vary temporally, but with a faster evidence gain for social stimuli. These hypotheses were explored with variations of a Drift Diffusion Model.

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(3131)
All You Need Is <3. WILLIAM KENDALL, ALAN KINGSTONE, and REBECCA TODD, University of British Columbia. — Cartoon or schematic images differ from realistic images in several ways, including how holistically they are processed. However, there has been little exploration into how the realism of an image relates to the information it communicates—i.e., do photos and cartoons differ in the meaning they convey? To examine this issue we paired realistic and schematic faces with realistic and schematic symbolic imagery (e.g., a cloud above a face to represent a negative emotion). Participants judged if the expression on the face matched the symbolic cue (e.g., a cloud). We found that the presence of any non-realistic element in a face/symbol dyad facilitated processing by decreasing response latencies, and this occurred regardless of which element it was (e.g., face or cloud or both). This suggests that non-realism acts as a cue to the perceiver facilitating detection of meaningful semantic links between items in an image.

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(3132)
It’s About Time: The Influence of Time to Encode a Perpetrator Versus a Weapon on Eyewitness Identification. DAVE YOUNG and CURT CARLSON, Texas A&M University-Commerce, DAWN RACHELLE WEATHERFORD, Arkansas State University, MARIA CARLSON, JANE BEDNARZ, JESSICA MAYBERRY, and ALEX WOOTEN, Texas A&M University-Commerce (Sponsored by Curt Carlson). — We examined boundary conditions for the weapon focus effect based on time available to encode a perpetrator’s face versus his weapon. Participants viewed a mock crime video of a purse-snatching with either a: (a) 3 s view of perpetrator brandishing a handgun, (b) 10 s view of perpetrator brandishing the handgun, or (c) 10 s view of perpetrator prior to him producing the handgun, or (d) 10 s view of perpetrator with no weapon. Participants later made a decision from either a perpetrator-present or –absent lineup. A surprising finding was that, even after a relatively long look at the perpetrator’s face, showing the weapon at the end still reduced discriminability compared to the no weapon condition, which is a novel extension of the weapon focus effect. However, participants in all conditions were reasonably calibrated; highly confident participants tended to be highly accurate when choosing from a lineup.

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(3133)
Use of Referential Objects for Speeded Selection of Target Stimuli in Flanker-Type Tasks. NICOLE MURCHISON and ROBERT PROCTOR, Purdue University (Sponsored by Peter Urcuioli). — Arguments have been made that enhanced visual processing occurs in the area of the palms of the hands due to greater density of bimodal neurons. An alternative explanation is that the hands serve as reference objects relative to which attentional resources are allocated. Two experiments were conducted to determine whether the palms are unique in speeding responses in an Eriksen flanker-type task. In Experiment 1, the hands were crossed and positioned so that the palms faced outward toward the outer letters. Results yielded reductions in the flanker interference effect much as obtained when the palms face inward. This reduction was regardless of whether the center or outer positions of the letters were designated as the target. Experiment 2 replicated these results using as reference objects wooden blocks that mimicked the hands' physical contours. The results lend support to the referential coding account of the reduction of flanker interference.

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(3134)
Do ‘Local’ Numbers Facilitate or Interfere With Solving Simple ‘Global’ Equations? MONCIA L. ROSEN, MARK MILLS, and MICHAEL DODD, University of Nebraska-Lincoln (Sponsored by Michael Dodd). — The present study examined the influence of compound cues (e.g., numerical Navon stimuli) to investigate the relationship between task-relevancy and global/local processing within a problem solving task. More specifically, the goal of the research was to explore the effects of solving simple arithmetic equations for which
the possible answer to the equation was presented before, after, or as a local cue/distractor embedded within the global equation. We observed a relationship between the congruency of the local number with the actual answer, presented-true answer, or presented-false answer. That is, when local numbers were relevant to the task (answer was embedded in the global equation) they interfered more than when they were not. These findings suggest an interaction between cognitive-load on problem solving in a multi-level attention task. Email: Moncia L. Rosen, rosen.monica@huskers.unl.edu

(3135) Coding Spatial Position in the Human Perceptual System. STEPHEN DOPKINS and DARIN HOYER, George Washington University. — How does the human perceptual system represent spatial position? Each element of an extrinsic representation is labeled to show its meaning with respect to the external world. Such labeling is not present in an intrinsic representation. Collectively, the elements of such a representation encode relationships among the aspects of the external world to which they correspond. We present evidence that, in assessing distances in a frontal plane, the perceptual system represents spatial position intrinsically. One consequence of the intrinsic representation of position is that the horizontal and vertical aspects of position are not explicitly distinguished. We present evidence that, for the purposes of assessing horizontal and vertical distances, the position elements of the representation can be re-mapped onto the external world so as to emphasize the horizontal and vertical aspects of position. Email: Stephen Dopkins, dopkins@gwu.edu

(3136) How Do We See Hands? Attentional Deployment When Observing Hand Images. RYOSUKE NIIMI, The University of Tokyo. — Hand is one of special stimuli for human vision. To understand the way we observe hand, in particular the role for attention, eye movements during observers passively viewed hands were analyzed. The stimuli were hand pictures, either back or palm, shown on non-sense background image with 1/f spatial frequency spectra (i.e., equivalent to natural scene image). In each trial the stimulus was displayed for 20 seconds. Propotion of time during the gaze was on the hand image (proportion hand-attended time) was measured. The mean proportion hand-attended time was higher for palm images than for back images. Further, the proportion of time during the gaze was on the upper 1/3 region of hand image (i.e., fingertips) relative to the whole hand-attended time was analyzed. The mean proportion fingertip-attended time was lower for palm images than for back images. These results suggest that palm draws more attention than back. Email: Ryosuke Niimi, niimi@u.tokyo.ac.jp

(3137) Effects of Irrelevant Perceptual Grouping on Attentional Selection in Partial Report. RASMUS LUNAU and THOMAS HABEKOST, University of Copenhagen. — Perceptual grouping is the involuntary and effortless grouping of elements with similar features. It is known to modulate performance in attention tasks such as visual search and change detection. In the present study, we investigated whether grouping of targets by a task irrelevant feature influences performance in the partial report paradigm. In the organized condition, the colors of the display elements were arranged according to the selection criterion (i.e., alphanumerical class), and in the scrambled condition colors were assigned randomly. We calculated the cost associated to processing of distractor elements by subtracting performance in trials with added distractors (partial report) from performance in trials with no distractors (whole report), and results showed no modulation of distractor costs in any condition. The data thusly suggests that grouping of irrelevant features does not interfere with visual selection in partial report. The finding was followed up by experiments with selection by size and selection by luminance. Email: Rasmus Lunau, rasmus.lunau@psy.ku.dk

(3138) Lag-1 Sparring in Accuracy but Not Reaction Time: Evidence for Multiple Bottlenecks in the Attentional Blink. HAYLEY LAGROIX, VINCENT DI LOLLO, and THOMAS SPALEK, Simon Fraser University (Sponsored by Vincent Di Lollo). — Perception of the second of two rapidly sequential targets (T1, T2) is impaired when presented soon after the first (attentional blink; AB). In an exception, known as Lag-1 sparing, T2 performance is relatively unimpaired when it comes directly after T1 (Lag 1). Lag-1 sparing is typically observed only when T1 and T2 are presented in the same spatial location; otherwise, Lag-1 deficit is in evidence. We replicated this finding using the conventional dependent measure of T2 accuracy. With reaction time as the dependent measure, however, Lag-1 deficits occurred even when T1 and T2 were presented in the same location. These results suggest that Lag-1 sparing and the AB arise from bottlenecks at more than one level within the system. This is inconsistent with theories in which the AB is said to occur at a single stage of processing. Email: Hayley Lagroix, hlagroix@sfu.ca

(3139) I before U: Temporal Order Judgments Reveal Attentional Prioritization for Self-Owned Items. MERRYN DALE CONSTABLE, TIMOTHY N. WELSH, and JAY PRATT, University of Toronto. — To date, the only demonstration that the ownership status of an object influences attention comes from research involving event-related potentials. We sought to determine if the effect of ownership status on attention could be observed at a behavioral level. To this end, we selected a task that is a sensitive measure of the prioritization of visual information: the temporal order judgement. Participants completed temporal order judgements with pictures of opposing “own” and “experimenter’s” mugs to either side of a central fixation cross. There was a variable onset delay between each picture, ranging between 0 ms and 105 ms, and participants were asked to indicate which mug appeared first. The results indicated a small but reliable point of subjective simultaneity in favour of their own mug. This finding suggests that participant’s own mug enjoyed prioritized attention and was available to conscious report prior to the experimenter’s mug. Email: Merryn Dale Constable, merrynconstable@gmail.com
(3140) Gender Differences for Emotional Expressions in Social Anxiety. KEN TAKASHI ISHI KAWA, Senshu University Graduate School of the Humanities, MATIA OKUBO, Senshu University (Sponsored by Matia Okubo). — Men with social anxiety cope with negative emotions by showing aggressive behavior (Hanby et al., 2012) while women with social anxiety do by repressing such emotions (Kashdan et al., 2007). We investigated the effect of gender difference in emotional coping style among people with social anxiety focusing on facial expressions. We used face photographs of 45 models (Men = 21, Women = 24), who were divided into high and low social anxiety groups on a basis of social anxiety scores. Seventy-nine independent raters evaluated the photographs in terms of emotional intensity and extraversion. Male models with high social anxiety were rated to be emotionally more expressive and more extraverted than those with low social anxiety. This pattern was precisely reversed for female models. These results indicated clear gender difference in emotional coping style in social anxiety: Male expressive and female repressive styles of social anxiety. Male models with high social anxiety were evaluated the photographs in terms of emotional intensity and extraversion. Male models with high social anxiety were rated to be emotionally more expressive and more extraverted than those with low social anxiety. This pattern was precisely reversed for female models. These results indicated clear gender difference in emotional coping style in social anxiety: Male expressive and female repressive styles of social anxiety.

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(3141) Temporal Characteristics of Angry Face Interference Within Observers. DEAN G. PURCELL, Oakland University, ALAN L. STEWART, Stevens Institute of Technology. — Observers judged whether or not two sequentially presented faces expressed the same emotion — anger or happiness. Response times are longer when the first or second face has an angry expression. This Anger Inferiority Effect (AIE) is stronger if the first face is angry. We sought to determine if the interfering effects of an angry first face dissipates over time. Accordingly, we tested a range of stimulus onset-to-onset asynchronies (SOAs) between the first and second face. In previous experiments the comparisons were conducted between observers. Here we use a within-observers task to compare three different SOAs. Longer SOAs improved decision time performance but had no consistent effect on accuracy. There were no indications of the dissipation of interference from an angry first face. However, the decision time AIE was reduced for second faces at the longest SOA (809 ms). Email: Dean G Purcell, purcell@oakland.edu

(3142) Women Dislike What Men Look At: Gender Difference in Preference for Gaze-Cued Objects. TAKASHI MITSUDA and TSUYOSHI YAMAMOTO, Ritsumeikan University. — Following another individual’s gaze direction is a social cognitive process that shifts the observer’s attention towards the sender’s object of interest. Previous studies have shown that gaze cuing increases the observer’s level of preference for the object located by the gaze direction. This study examined the gender difference in gaze-evoked preference for domestic commodities, using a 2-alternative forced-choice task. Findings revealed that gaze-evoked preference interacted with the gender of both the gaze sender and the observer. Male observers showed an increased preference for objects gazed at by females, but no difference for those gazed at by males. In contrast, female observers showed an increased preference for female gaze cuing and a decreased preference for male gaze cuing. These results show that the gaze-evoked change of affective evaluation is closely linked to social recognition. Email: Takashi Mitsuda, mitsuda@ci.ritsumei.ac.jp

(3143) Semantic Properties of Real-World Objects Modulate Early Visual Cortical Activity. GEORGE L. MALCOLM, National Institute of Mental Health, CHONG-IN NAH, George Washington University, SUMMER SHEREMATA, Florida Atlantic University, SARAH SHOMSTEIN, George Washington University. — Behavioral evidence from our lab suggests that task-irrelevant semantic properties of objects affect attentional allocation, with attention biased towards semantically related objects. Here, using fMRI, we investigated the neural mechanisms that enable semantic relationships to bias attention by focusing on whether early visual cortex and lateral occipital cortex showed semantic-based modulation and if the inferior parietal sulcus (IPS) was responsible for eliciting early sensory modulations. Participants viewed three objects arranged in a triangle. One peripheral object was always semantically related to the central object while the other was not. After an average of four seconds, a target appeared. Targets occurred equally on all three objects, making the objects’ semantic relationships task-irrelevant. We observed that neural activity was biased toward the semantically related object throughout visually responsive cortex and IPS. This demonstrates that object semantic properties modulate cortical activity even at the earliest stages, biasing spatial attention. Email: George L Malcolm, george.malcolm@nih.gov

• LANGUAGE PRODUCTION/WRITING I •

(3144) Asymmetrical Costs During Intra-Sentential Language Switching: Eye Movement Evidence. IRINA PIVNEVA, ABIGAIL FREE, and DEBRA TITONE, McGill University. — Among bilinguals, switching into one’s native language (L1) is often more difficult than switching into one’s second language (L2), and such asymmetrical costs can be reduced by increased L2 proficiency in single-word production tasks. However, an open question is whether asymmetrical switch costs occur during intra-sentential language switching, and whether they are also modulated by L2 proficiency. To investigate this question, 48 French-English bilinguals in Montreal named L1 and L2 images in a sentence form (e.g., The A and the B are above the C), while eye movements and speech output were recorded. The second (B) image was named in either the same language as the first (A) and third (C) images (stay trials; e.g., L1-L1-L1, L2-L2-L2) or in the opposite language (switch trials; e.g., L1-L2-L1, L2-L1-L2). The results indicated that eye movement measures indicative of speech planning were longer for L1 switch vs. stay trials but not for L2 switch vs. stay trials, consistent with asymmetrical switching. Moreover, greater L2 proficiency reduced this asymmetry. Thus, it appears that bilingual
language switching is consistent across tasks involving intra-sentential language switching and single picture naming. Email: Irina Pivneva, pivneva.irina@gmail.com

(3145)
Revisiting Variability in Non-Native Speech. CHARLOTTE VAUGHN, MELISSA MICHAUD BAESE-BERK, and KAORI IDEMARU, University of Oregon. — The speech of second language learners is often characterized as more variable than native speech. Of the few studies that have directly addressed this issue, some have indeed found greater variability in non-native speech (Baese-Berk & Morrill, under review; Jongman, Wade, & Sereno, 2007), while others have found greater variability in native speech (Baker et al., 2011). However, these studies have typically examined learners of English, and have tested one linguistic feature at a time. The present project analyzes Japanese sentence production by learners of Japanese from two different language backgrounds (English and Chinese), and native Japanese speakers. We consider multiple linguistic features, both segmental (spectral and durational) and suprasegmental. By describing variability patterns in several features of native and non-native speech, we provide a more general account of the predictors of variability. These results have implications for understanding cues to non-native speech, and how listeners adapt to such cues. Email: Charlotte Vaughn, cvaughn@uoregon.edu

(3146)
The Influence of L1 on the Functional Phonological Unit in Planning Spoken Word Production in L2. CHUCHU LI, University of Maryland, College Park, MIN WANG, University of Maryland, YAKOV KRONROD, University of Pennsylvania, JOSHUA DAVIS, University of Maryland (Sponsored by Min Wang). — Functional phonological unit refers to the phonological unit retrieved from lexicon at the beginning of word form encoding in planning spoken word production. Previous literature showed that the functional phonological unit is phoneme in English, atonal syllable in Mandarin, and mora in Japanese. The present study recruited native Mandarin speakers and native Japanese speakers who speak English as a second language (L2) as well as native English speakers as comparison group to investigate the functional phonological unit in English L2 and whether it is influenced by L2 learners’ native language (L1). A set of three picture-naming tasks with the form preparation paradigm were conducted. The names of the pictures may share the same initial phoneme, mora, or syllable, or have nothing systematically in common. Results suggest that the functional phonological unit in L2 is influenced by speakers’ L1, and that L2 speakers tend to draw on their L1 functional phonological unit in planning L2 spoken words. Email: Chuchu Li, psycc719@gmail.com

(3147)
Examining Structural Constraints in Spanish-English Bilingual Speech Production. CHRISTIAN NAVARRO-TORRES, PAOLA DUSSIAS, and JUDITH KROLL, Pennsylvania State University. — Research on bilingual lexical processing shows cross-language activation but few studies have examined syntactic co-activation and its consequences for domain general cognition. Using a speech production task, we investigated adjective placement in prenominal and relative clauses in Spanish-English bilinguals and English monolinguals. Following the Statistical Preemption Hypothesis (Boyd & Goldberg, 2011), relative clauses should be preferred for a-adjectives (asleep) over typical adjectives (sleepy). We predicted that bilingualism might affect performance on this task. If bilinguals have less experience in each language, then monolinguals should produce a more stable preference pattern. If bilingualism enhances metalinguistic abilities, bilinguals may be more sensitive than monolinguals to these subtle usage differences. Preliminary results showed that both groups exhibited the a-adjective constraint but differed in two important ways. Bilinguals were slower than monolinguals, potentially reflecting reduced English frequency, but also more stable in their preference for a-adjectives, suggesting a role for domain-general cognitive processes. Email: Judith Kroll, jfk7@psu.edu

(3148)
Computational Models of Sentence Generation Based on a Statistical Analysis of Japanese Corpus. YUTARO SHIRAMIZU and ASUKA TERAI, Tokyo Institute of Technology, WANYING WANG, Tsinghua University, MASANORI NAKAGAWA, Tokyo Institute of Technology. — Selection restrictions are co-occurrence constraints or possibilities which are observed between given lexical items. Namely, a sentence which is grammatically correct but is hardly interpreted (e.g. “The typhoon attacks happiness.”) is referred as a sentence with violations of selection restriction. In the present study, three types of computational models are constructed that generate sentences, in the form of “Subject-Object-Verb” in Japanese, considering the selection restriction based on the result of a statistical analysis using Japanese corpus. The statistical analysis estimated probabilistic knowledge structure in Japanese. One model is a Bayes model and the two others are network models. A psychological experiment is conducted to elucidate which model generates human sentence most successfully. Comparison among the results of psychological experiment and model simulation, endorses that the Bayes model brings about best performance. Email: Asuka Terai, terai.a.aa@m.titech.ac.jp

(3149)
Using Twitter to Examine Geo-Linguistic Variation at the National Border. DANIEL SCHMIDTKE and VICTOR KUPERMAN, McMaster University (Sponsored by Elisabet Service). — This study investigates the influence of the national border on geo-linguistic variation. Using computational linguistics tools (Szmelecanyi, 2014; Wieling et al., 2011), the research goal was to examine the correspondence between dialectal lexical preferences and national boundary location. We analyzed millions of geo-tagged Twitter posts of speakers who live close to the England-Scotland or US-Canada border. One analysis used generalized additive modeling to predict lexical divergence between English and Scottish dialects (e.g., little vs. wee; boys vs. lads) as a function of the longitude and latitude of the tweet locations. Our findings reveal that the true lexical boundary between England and Scotland does...
not correspond to the location of the national border, and also enable us to identify dialects within and across nations. In summary, our results provide novel insights into the relationship between dialectal phenomena, social factors and geography.

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(3150)
Extralinguistic Deficits in Aphasia After Stroke Revealed With the Russian Version of the Birmigham Cognitive Screen. BRENDAN STUART WEEKES and EKATERINA KUZMINA, The University of Hong Kong. — The role of cognition in assessment of aphasia was recognised by Luria. However, there is a lack of standardised extra-linguistic test of cognition in Russian. This study has two goals (1) to validate a Russian Cognitive Screening (RCoS) test based on extant instruments in English and (2) investigate extralinguistic deficits in stroke survivors with aphasia. 48 patients with aphasia (39-70 years; M=59.8) and 40 healthy controls (32-74 years; M=56.2) were tested with RCoS, Montreal Cognitive Assessment (MoCA), Russian Quantitative Language test and Nonverbal test scores. The RCoS has significant inter-rater and test-retest correlations, good convergent and divergent validity and construct validity consistent with equivalent cognitive tests. Compared with senior healthy controls, the clinical group had significantly lower scores on tests of short-term and long-term memory, language and non-verbal executive control. Re-testing of patients after 1 year showed the RCoS has potential to predict long-term changes in cognitive functioning.

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(3151)
Speakers Prioritize Driving Over Talking, but Only When They’ve Warned Their Listeners. RACHEL OSTRAND, BEN BERGEN, and VICTOR FERREIRA, University of California, San Diego. — Talking and driving both require attention, yet people do them at the same time. How do drivers allocate attention between these two tasks? A driving simulator experiment assessed how drivers and passengers adapt their speech based on the driving environment. Subject pairs (one driver, one passenger) drove through two courses, while one person retold a fairy tale to his or her partner. Driving conditions were difficult (foggy, rainy weather) or easy (clear weather), and the passenger could either see the environment conditions were difficult (foggy, rainy weather) or easy (clear weather), and the passenger could either see the environment conditions were difficult (foggy, rainy weather) or easy (clear weather), and the passenger could either see the environment. Result shows that the durations between successive strokes located at the radical and logographeme boundaries are longer than durations not located at the boundaries after controlled for distance traveled. We suggest that the duration difference is a result of the retrieval and planning of the functional writing units used in their writing process. However, replicating such results among normal individuals is difficult, if not impossible, since they seldom make mistakes in their writing. This study investigated normal Chinese people’s writing process in a dictation task using an android tablet. Result shows that the durations between successive strokes located at the radical and logographeme boundaries are longer than durations not located at the boundaries after controlled for distance traveled. We suggest that the duration difference is a result of the retrieval and planning of the successive functional writing units in the writing process. The result confirms that radicals and logographemes are functional writing units used by normal Chinese people.

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(3152)
Differences in Chaining Mechanisms in Speech Production and Sentence Typing. DUANE WATSON, CASSANDRA JACOBS, LORETTA YIU, University of Illinois at Urbana-Champaign, SVETLANA PINET, Aix-Marseille Université. — Typing and speech have been argued to depend on different sequencing processes. Snyder and Logan (2014; JEP:HPP) found that typists generate chains of key presses, and are faster when two words overlap at the beginning. In two experiments, we (1) replicated the effects of Snyder and Logan (2014) but (2) found that in a more variable typing task where individuals produced sentences that contained keys that overlapped word-initially and word-finally (e.g. Prime with initial/ final overlap: The beetle/speaker shrinks. Target: The beaker flashes.), this chaining effect was eliminated. By contrast, in a spoken version of the same task, we found lengthening of the target words when primes overlapped word-initially and word-finally. While this is evidence that speech and typing rely on different sequencing processes, the importance of overlap in a task that more closely approximates natural typing suggests that chaining does not always occur.

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(3153)
The Processing Units in Chinese Character Writing. KAI-YAN DUSTIN LAU, Hong Kong Polytechnic University, ANTHONY PAK HIN KONG, University of Central Florida, SAM PO LAW, University of Hong Kong (Sponsored by Sam Po Law). — Studies that investigate the writing process usually involve observing the writing errors produced by dysgraphic patients suffered from strokes who have premorbid normal writing abilities. Through analyses of substitution, addition, deletion and transposition errors, researchers hypothesized the functional writing units used in their writing process. However, replicating such results among normal individuals is difficult, if not impossible, since they seldom make mistakes in their writing. This study investigated normal Chinese people’s writing process in a dictation task using an android tablet. Result shows that the durations between successive strokes located at the radical and logographeme boundaries are longer than durations not located at the boundaries after controlled for distance traveled. We suggest that the duration difference is a result of the retrieval and planning of the successive functional writing units in the writing process. The result confirms that radicals and logographemes are functional writing units used by normal Chinese people.

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(3154)
Errors Reveal First-Order Constraint Learning in Visual Sequences. JILL A. WARKER, University of Scranton, SIMON FISCHER-BAUM, Rice University, NATALIE DELLA POSTA and AYSSA RODEMANN, University of Scranton. — Phonotactics constrain what sounds can occur together in languages. Adults can learn new first-order constraints (e.g., /s/ only begins syllables) from experience producing them. Speech errors provide evidence of learning: when speakers mispronounce, their errors reflect the experienced constraint. We investigated whether the
mechanism responsible for first-order constraint learning in production extends to non-linguistic stimuli. Participants saw sequences of shapes where particular shapes were restricted to particular positions and then recalled the order in which the shapes appeared. Participants' memory errors reflected the constraints on shape position after a testing session. These results suggest that a domain-general learning mechanism is responsible for first-order constraint learning in production.

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• PSYCHOLINGUISTICS II •

(3155) The Role of Words in Reading, LIANG TAO, Ohio University, ALICE F. HEALY, University of Colorado, Boulder. — This study proposes that words might not always constitute the basic processing units in reading. English text presents clear inter-word spaces, but Chinese text presents inter-character spaces with no indication of word boundaries although most Chinese words are formed by 2 or more characters. Native Chinese and native English speakers and learners of the 2 languages with varying proficiency levels of Chinese participated. Experiment 1 tested word identification in passages containing scrambled real words. Experiment 2 examined word parsing in prose passages. In both experiments, it was much easier to parse words in English than in Chinese passages. Experiment 3 examined reading Chinese and English with or without inter-word spaces. All passages were followed by comprehension questions. Reading time was faster for English passages with inter-word spaces but was faster for Chinese passages without inter-word spaces. Even native English speakers from advanced Chinese language classes were slowed down by the extra inter-word spaces in processing Chinese texts. The findings indicate that reading text is not aided by clear word presentations in all languages.

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(3156) Investigating the Time Course of Phonological Coding During Reading, MALLORIE LEINENGER, University of California, San Diego (Sponsored by Nathalie N. Bélanger). — Results from eye tracking and neurophysiological recording seem to converge in support of an early time course for phonological coding during silent reading. Influences of phonological coding emerge as early as 80-100ms in the EGG record during the reading of single words (e.g., Ashby, 2010) and as early as the first fixation on a word during sentence reading (e.g., Rayner et al., 1998; Slattery et al., 2006). The current line of research seeks to more precisely characterize the time course of phonological coding during silent reading using distributional analyses of eye movement data. Participants' eye movements were recorded while they read sentences containing either a correct target word, a phonologically identical homophone or pseudohomophone of the target word, or an orthographic control. Survival analyses were conducted in an effort to determine the earliest discernible influence of phonological coding on the eye movement record.

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(3157) The Effect of Plausibility on Eye Movements in Reading: A Bayesian Analysis of E-Z Reader's Null Predictions. MATTHEW ABBOTT, University of California, San Diego, ADRIAN STAUB, University of Massachusetts (Sponsored by Adrian Staub). — The E-Z Reader 10 model of eye movements in reading (Reichle, Warren, & McConnell, 2009) posits that the process of word identification strictly precedes the process of integration of a word into its syntactic and semantic context. The present study reports a single large-scale (N = 112) eyetracking experiment in which the frequency and plausibility of a target word in each sentence were factorially manipulated. The results were consistent with E-Z Reader's central predictions: frequency but not plausibility influenced the probability that the word was skipped over by the eyes rather than directly fixated, and the two variables had additive, not interactive, effects on all reading time measures. Evidence in favor of null effects and null interactions was obtained by computing Bayes factors, using the default priors and sampling methods for ANOVA models implemented by Rouder, Morey, Speckman, and Province (2012). The results suggest that though a word's plausibility may have a measurable influence as early as the first fixation duration on the target word, in fact plausibility may be influencing only a post-lexical processing stage, rather than lexical identification itself.

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(3158) Rhythmic Context Affects Online Ambiguity Resolution in Silent Reading. MARA BREEN and JOHANNA KNIEFEL, Mount Holyoke College. — Under the implicit prosody hypothesis (Fodor, 1998), prosodic factors that affect syntactic ambiguity resolution in listening can affect disambiguation in silent reading. We tested this hypothesis by measuring readers' eye movements while they read temporarily ambiguous sentences like (1) containing stress-alternating noun-verb homographs (PERmit = noun; perMIT = verb). Targets were preceded by a one-syllable (dumb) or two-syllable (trochaic) word (stupid). We predicted that the avoidance of stress clash in "dumb permit" would push readers toward the dispreferred verb interpretation (DUMB perMIT) while avoidance of stress lapse in "stupid permit" would favor a noun interpretation (STUpid PERmit). Eye-tracking results demonstrated both of these effects: "dumb" led to shorter reading times of the verb disambiguation and "stupid" led to shorter times for the noun disambiguation, suggesting that implicit rhythmic representations affect online syntactic ambiguity resolution. (1) It's that the dumb/stupid permit (is a nuisance for everyone| the spending of their savings).

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WONIL CHOI, University of South Carolina, MATTHEW W. LOWDER and JOHN M. HENDERSON, University of California, Davis. — We conducted an eye-tracking experiment to examine how global paragraph difficulty influences eye movements during reading and the extent to which these effects are modulated by individual differences. Participants read paragraphs representing a wide range of difficulty levels (assessed using Flesch Reading Ease scores) and completed a battery of individual differences measures. Results showed robust relationships between text difficulty and online reading measures: As texts became increasingly more difficult, readers had longer fixation durations, larger saccadic amplitudes, and slower reading rates (measured in words per minute). Further, these effects were modulated by individual differences in language ability (e.g., print exposure, vocabulary) such that readers with higher scores on these measures showed enhanced processing benefits as the texts became easier. These results suggest that eye movement behaviors are sensitive to objective measures of global text difficulty and that the size of this effect depends critically on individual differences in language ability. Email: Wønil Choi, wichoi79@gmail.com

(3160) Message Valence Relates to Language Structure in Online Reviews. DAVID VINSON and RICK DALE, University of California, Merced (Sponsored by Rick Dale). — Some recent theories of language see it as a complex and highly adaptive system, adjusting to factors at various time scales. Patterns of language use may adjust to the cognitive affective states of the language user. Until recently, datasets large enough to test how subtle effects of cognitive states influence language change have been difficult to obtain. We analyzed over one million online business reviews using information theory to quantify the extent to which these effects are modulated by individual differences. Results showed robust relationships between text difficulty and online reading measures: As texts became increasingly more difficult, readers had longer fixation durations, larger saccadic amplitudes, and slower reading rates (measured in words per minute). Further, these effects were modulated by individual differences in language ability (e.g., print exposure, vocabulary) such that readers with higher scores on these measures showed enhanced processing benefits as the texts became easier. These results suggest that eye movement behaviors are sensitive to objective measures of global text difficulty and that the size of this effect depends critically on individual differences in language ability. Email: David Vinson, dvinson@ucmerced.edu

(3161) Behavioral and Neural Measures of Reading: Eye Movements & ERPs. GIULIA CHRISTINE PANCANI, PETER C. GORDON and RENSKE S. HOEDEMAKER, University of North Carolina at Chapel Hill, MATTHEW LOWDER, University of California, Davis, MARIAH MOORE, University of Minnesota (Sponsored by Peter C. Gordon). — Both eye movements and Event Related Potentials (ERPs) provide information about the fast-paced processes underlying word recognition during sentence comprehension. However, the evidence provided by these two types of measures shows some inconsistencies in the time-course and relative magnitudes of effects. Word frequency has robust effects on first-pass eye movement measures, such as skipping rates and gaze durations, showing that word frequency very rapidly affects early word recognition processes that operate on parafoveal and foveal information. In contrast, evidence for early frequency effects on ERPs has been sparser, with most studies reporting frequency effects only around 300-500 ms post stimulus presentation, when the eyes would likely already be fixating a subsequent word. The current study identifies the effects of word frequency on eye-tracking and ERP measures collected on the same participants in order to more precisely determine patterns of covariation in behavioral and neural indicators. Email: Giulia Christine Pancani, gpancani@unc.edu

(3162) Sublexical Frequency Measures and Sonority: What Contributes to Syllable Segmentation in Silent Reading in French Dyslexic Children? NORBERT MAIONCHI-PINO, Clermont Auvergne Université, AUDREY CARMONA, Université de Franche-Comté. — In French, the syllable is an early and robust prelexical and segmental unit during reading acquisition. But is syllable segmentation possible when no reliable statistical and distributional information is available? We proposed that the sonority might be another reliable source for syllable segmentation. We studied whether dyslexic children compared with chronological-age matched and reading-level matched controls are sensitive to universal sonority-related markedness within the syllable boundary. We used an adapted version of the illusory conjunction paradigm. The statistical and distributional properties were null or quasi-null around and within the syllable boundary, while sonority-related markedness was manipulated along a continuum from legal, unmarked clusters to illegal, marked ones. Our results show that syllable segmentation strategies primarily depend on sonority-related markedness. As markedness decreases, children better detect the syllable boundaries, while as markedness increases, children promote syllable onsets. This is true with dyslexic children and controls. While this universal phonological sensitivity does not depend on reading level, syllable segmentation abilities develop with reading experience. Email: Norbert Maionchi-Pino, norbert.maionchi_pino@unic-bpclermont.fr

(3163) Gradient Structure in Verb-Particle Constructions. LAUREL BREHM and MATT GOLDRICK, Northwestern University. — In English, many combinations of verbs and particles (e.g., climb up) have meanings that are transparently related to their constituent lexical items; in contrast, others have more idiosyncratic meanings (e.g., “up” in “climb up the tree” vs. “drink up the milk”). To capture this distinction, theories have proposed that some verb-particle phrases have compositional structures (e.g. "climb up") while others are processed holistically (e.g., "drink up"). We examine whether this distinction is instead better captured as a continuum of structure with phrases exhibiting gradient degrees of compositionality. Using a recognition memory paradigm, we examined perceptual migration of particles in sentences. As degree of compositionality increased, false beliefs that a particle was present became more likely. This
suggestions that there are degrees of compositionality in verb-particle constructions, reflected in the degree of transparency of meaning, and implies that mental representations may be best conceived as gradient blends of structures. Email: Laurel Brehm, laurel.brehm@gmail.com

(3164)  The Conventionalization and Reviving of English Sentential Metaphors. MATT JONES, JAMES M. FOSTER and ALBERT KIM, University of Colorado Boulder. — This project examines the processes that allow novel and conventional metaphorical representations to be computed online during sentence comprehension. Novel metaphors are unfamiliar figurative expressions in which the comparison and mapping between two concepts must be constructed from scratch. Repeated exposure to metaphors involving a particular source concept may encourage that concept to become conventionalized, such that the metaphorical meaning is directly retrieved from memory. Goldstein, Arzouan, & Faust (2012) showed how familiar two-word Hebrew noun phrases can also become revived by having the subject explain their meaning. This project examines the effects of such conventionalization and reviving mechanisms on the processing of English sentential metaphors. We investigate (1) whether novel metaphors can be conventionalized and (2) whether conventional metaphors can be revived by focusing language comprehenders on the meaning involved in metaphoric expressions. Furthermore, we attempt to observe electrophysiological (ERP) correlates of these processes of conventionalization and reviving. Email: Matt Jones, mci@colorado.edu

(3165)  Frontal Theta and Disconfirmed Predictions in Language. JOOST ROMMERS, DANIELLE S. DICKSON, and JAMES M. FOSTER, University of Illinois, Urbana-Champaign, EDWARD W. WLOTKO, Tufts University, KARA D. FEDERMEIER, University of Illinois, Urbana-Champaign. — Despite strong evidence for prediction during language comprehension, the underlying mechanisms—and the extent to which they are specific to language—remain unclear. Here, we investigated spectro-temporal EEG signatures of dealing with disconfirmed predictions. In nonverbal tasks, similar manipulations have been associated with frontally distributed theta (4-7 Hz) increases. In the present study, 32 participants read predictable words or plausible alternatives in strongly or weakly constraining contexts (The children went outside to play/look and joy was too frightened to move/look; Federmeier et al., 2007). A frontally distributed theta increase to plausible alternatives relative to predictable words was seen only in strongly constraining sentences. A late frontal ERP effect from the same contrast, reflecting processing differences for confirmed vs. disconfirmed expectations, correlated with the theta effect across participants. The results are in agreement with those observed in nonverbal tasks, consistent with mechanisms that are not specific to language. Email: Joost Rommers, jrommers@illinois.edu

(3166)  The Utility of Rereading: Comparing Two Types of Reduced Relative Clause Structures. KIEL CHRISTIANSON, University of Illinois at Urbana-Champaign, STEVEN G. LUKE, Brigham Young University, ERIKA HUSSEY, University of Illinois at Urbana-Champaign. — Two eye-tracking experiments compared online reading and offline comprehension of main verb/reduced relative garden-path sentences and local coherence sentences. The Selective Reanalysis Hypothesis (Frazier & Rayner, 1982) predicts different rereading patterns for ambiguous versions of each sentence. In garden-paths, early material should be reread to reanalyze the parse. In the latter, rereading of early material, if it occurs, should be confirmaory, as no reanalysis is required. Both structures caused considerable difficulty, but online and offline measures for the structures differed in important ways. Local coherence structures elicited signals of reading disruption that arose earlier and lasted longer, and their comprehension was also better than garden paths. There was no relationship between structural differences and sentence regions targeted for regressions or rereading, nor between amount of rereading and comprehension. In fact, comprehension of ambiguous versions of both structures remained at chance (or worse). Results are discussed in terms of Good-Enough processing. Email: Kiel Christianson, kiel@illinois.edu

(3167)  Noisy Channel Sentence Comprehension: Adaptation to Some but not all Factors. MICHELLE HOLCOMB, TESSA WARREN, MICHAEL WALSH DICKEY, and REBECCA HAYES, University of Pittsburgh. — Sentence comprehension occurs over a noisy channel, with comprehenders using Bayesian-like estimation to determine the likelihood that they received the input their interlocutor intended (e.g., Gibson, Bergen & Piantadosi, 2013). Gibson et al. showed that comprehenders rapidly adapt to contextual statistics: they weight semantics more heavily in contexts with very noisy syntax (many typos), and syntax more heavily in contexts with many semantic anomalies. The current experiment looked for similar adaptation driven by syntactic priming, seeing whether the rate of literal interpretation of ‘reversible’ prepositional object (PO) vs. double object (DO) sentences was influenced by whether the preceding sentence was a PO or DO. POs were interpreted literally more often than DOs (consistent with Gibson et al., 2013), but there were no syntactic priming effects. However, effects of target-sentence verb surprisal (verb-specific likelihood of PO/DO structure) suggest participants adapted to the high likelihood of POs and DOs in the experiment. Email: Tessa Warren, tessa@pitt.edu

(3168)  Semantic and Morphophonological Information Affect the Comprehension of Subject-Verb Agreement in German: An Auditory ERP Study. HEIDI LORIMOR, Bucknell University, CARRIE N. JACKSON, Pennsylvania State University, JULIANE DOMKE and KATHARINA SPALEK, Humboldt-Universität zu Berlin, JANET G. VAN HELL, Pennsylvania State University/Radboud
University, Nijmegen. — Cross-linguistically, semantic and morphophonological information influence subject-verb agreement production, but such effects are often elusive in comprehension (but see Kreiner et al., 2012; Severens et al., 2008). The present auditory ERP study investigates the comprehension of verb number agreement with German conjoined noun phrases (NPs), like Die Seife und das Wasser "the.FEM soap and the.NEUT water". Conjoined NPs exhibit variable subject-verb agreement, thereby maximizing opportunities for semantic and morphophonological effects in comprehension (Lorimor, 2007; Lorimor et al., under review). Results show that, when the nouns in the conjoined NP have different gender, singular verbs elicit N400 effects with animate/count nouns and P600 effects with mass/deverbal nouns. NPs containing same-gendered nouns elicit P600 effects with singular verbs, and semantic properties modulated the magnitude of these effects. Therefore, like production, comprehension of subject-verb number agreement is not just driven by grammatical number, but is also sensitive to semantic and morphophonological information. Email: Heidi Lorimor, hml003@bucknell.edu

(3169)

Rapid Learning of a Verb Bias. RACHEL RYSKIN, University of Illinois at Urbana-Champaign, ZHENGHAN QI, Massachusetts Institute of Technology, SARAH BROWN-SCHEIDT, University of Illinois at Urbana-Champaign (Sponsored by Sarah Brown-Schmidt). — Verbs often participate in multiple syntactic structures, but individual verbs can be biased (used more in one structure than the other): In “Hit the bunny with the flower,” the phrase “with the flower” more likely indicates an instrument with which to “hit,” rather than which “bunny” to hit. How do these biases come about? Are they determined by the semantics of the verb or is there a role for language experience? We conducted an experiment in which participants received verb bias training. They were repeatedly exposed to (initially) equi-biased verbs or picture-based presentation of the base-rates, and problem content was congruent, incongruent, or neutral. The main predictions were that pictures would bias decisions toward the base-rates on incongruent problems as well as decrease the decision time vs. text-based presentations. Results show support for the RT hypothesis (d = .28), but not for decision

(3170)

The Reliability and Stability of Individual Differences in ERP Measures of Language Comprehension. DARREN TANNER and NYSSA Z. BULKES, University of Illinois at Urbana-Champaign. — Recent research using ERPs has begun to identify individual differences in the neural mechanisms supporting language comprehension. This research has focused in particular on the magnitude of and interplay between the N400 and P600 components. However, this prior research has not yet established the psychometric reliability of these ERP measures. Establishing such reliability is crucial to researchers studying the cognitive and experiential factors influencing ERP correlates of comprehension. To investigate
accuracy. It appears that the stereotype information is extremely difficult to overcome, even when the base-rate information’s salience is increased with a visual representation. Email: Alexander Swan, swan@psych.ucsb.edu

(3173)
An Investigation of Reasoning Errors in Coordinating Theory With Data. AUDREY LUSTIG MICHAL, Northwestern University, PRITI SHAH, University of Michigan, STEVEN FRANCONERI, Northwestern University. — Coordinating theory with evidence is an important skill for scientific reasoning (Kuhn & Pearsall, 2000). Theory-evidence coordination often requires students to translate between text and graphed data; however, many students find translation among multiple types of representations difficult (Ainsworth, 1999). We studied the types of reasoning errors that students made when verifying a text-based hypothesis about trends in real-world data from earth sciences, biology, physics, & chemistry. Participants (80 high school students) verified whether a hypothesis was consistent with the pattern in the graphed data and explained their reasoning. We categorized errors at three different processing stages: data interpretation, hypothesis comprehension, and coordination. Multiple types of reasoning errors occurred at all three processing stages (e.g., irrelevant data comparisons, misreading hypotheses, framing errors). We discuss potential interventions for improving graph-hypothesis coordination, such as spatiotemporally highlighting text and relevant subsets of data. Email: Audrey Lustig Michal, audrey.lustig.michal@gmail.com

(3174)
Comparative Versus Separate Evaluation of Scientific Explanations: The Role of Causal Connectives. KATJA WIEMER, LILLIAN K.E. ASIALA, and JANE NEAL, Northern Illinois University. — Students frequently overestimate the quality of scientific explanations. Consideration of alternatives has been proposed to improve students’ ability to evaluate them. Sixty students evaluated 24 scientific explanations presented alone or in comparison with a comparable or a better explanation. Target explanations were further presented with or without “because”. The presence of a causal marker has been shown to robustly increase perceived explanatory strength. It was predicted that comparison with better alternatives would reduce the causal marker effect on evaluations. Participants’ evaluation of the target answer was significantly lower when it was presented with better alternatives. The connective effect on evaluations was only trending (p=.07, µ2=0.13), and as predicted, the effect was only significant for explanations presented without an alternative explanation (t(23)=1.91; d’ = 0.27). The results suggest that comparison does indeed help evaluation ability if the alternatives are of better quality, and can counteract the effect of a causal marker. Email: Katja Wiemer, kウィemer@niu.edu

(3175)
Reasoning About Evolutionary and Modern Threats When Heuristics Are Not Helpful. JOHN POWELL TAYLOR and CASEY YOUNG, Southern Oregon University. — This study aimed to investigate the difference between the way participants reason in a given scenario between an evolutionary threat (poisonous berries) and modern threat (prescription pills). Given these scenarios participants were then shown a set of rules and asked to make a reasoning decision through a Wason Selection Task. We modified the basic task to combine two rules together (e.g., If A then B, If B then C, or If B then not C). Participants made a forced-choice of whether a given condition (containing A or not A plus C or not C) was possible or not possible with the rules provided. All conditions contained three exemplars and were counterbalanced into six different lists. Findings suggest that response times were quicker for both evolutionary and modern threat scenarios than abstract scenarios, despite equally accurate selections. We interpret the results in light of evolutionary influences on reasoning. Email: John Powell Taylor, taylorj3@sou.edu

(3176)
Science, Psychology, and Free Will: An Investigation of the Relationship Between Neurocentrism and Determinism. CHRISTOPHER H. RAMEY and JEFFERY S. DURBIN, University of Kansas. — Many psychologists hold that the brain (as opposed to the mind) constitutes much of what it means to be a human being. This neurocentric position is also present in popular media and poses challenges to believers of free will (FW). In two studies (N = 300) we investigated a variety of factors that would predict a commitment to the concepts of FW or scientific determinism, including support for mind-body dualism. Results suggest that individuals who identify with neurocentric statements more frequently agree that individuals’ actions are determined by genetic or neurological factors and, individuals who subscribe to dualism believe that actions are determined by an external force such as fate, as opposed to FW. Support for mind-body dualism, thus, was not required for a belief in FW. Those who believed in FW scored lower on a measure of cognitive reflection (i.e., tended not to think critically about counterintuitive problems). Email: Christopher H. Ramey, christopher.ramey@mac.com

(3177)
The Temporal Dynamics of Causal Illusions. ROBERT THORSTAD and PHILLIP WOLFF, Emory University (Sponsored by Phillip Wolff). — People are susceptible to causation illusions, that is, to seeing causation where it does not exist. The nature of these illusions was examined in three experiments. In Experiment 1, participants entered an elevator and saw a man appear to open the elevator door by moving his hands without actually touching the doors, an illusion made possible by a confederate pressing the outside button. Nearly all of the participants reported seeing causation, despite the impossibility of the event. In Experiment 2, participants’ real-time impressions of causation were examined by having them turn a circular dial to indicate whether an animated event was causal. In clear cases of causation, participants turned the dial unambiguously, but in the case of causal illusions, participants initially turned the dial as if they were looking at a causal event before turning it in a different direction. In Experiment 3, we found that different components of participants’ causal impressions could be selectively affected
by a secondary task. In sum, the results imply that inferring a causal relation involves at least two processes: an initial perceptual process and a subsequent inferential process. Email: Robert Thorstad, rthorst@emory.edu

(3178)

A Bayesian Analysis of Distracted Negotiation. PAUL ATCHLEY and BRANDON J. BAILEY, University of Kansas (Sponsored by Paul Atchley). — Two experiments were performed to gauge negotiation performance while engaged in driving behaviors in a simulator. Participants engaged in a free-form negotiation incorporating three types of bargaining across eight topics, while assigned to driving or non-driving conditions. Performance was evaluated in an objective metric (how well the agreement was in P's interest) and a subjective metric (how P's felt about the negotiation). Bayesian analyses were performed due to the high variability of the data; Bayesian analysis also affords easier interpretation and communication of findings with a nonacademic audience than traditional analysis techniques. Preliminary analyses show drivers perform approximately 20% worse than non-driving negotiators with respect to objective value. Email: Brandon J Bailey, brandonbailey@ku.edu

(3179)

Similarity, and Then Conceptual Knowledge, Drive Inductive Inference. EOIN TRAVERS, AIDAN FEENEY, and JONATHAN J. ROLISON, Queen’s University Belfast (Sponsored by Aidan Feeney). — To make inductive inferences about objects and their properties, we must draw on knowledge about how different objects are related. Some theories of induction rely on conceptual knowledge about category membership, while others are based on associative knowledge such as similarity or co-occurrence. Here, we examine whether reasoning draws upon both types of knowledge. Participants completed a forced choice triad task where inferences based on perceptual similarity and category membership were placed into conflict. We used natural (experiment 1) and artificial (experiment 2) categories, and recorded mouse cursor trajectories. Participants’ early (< 700 msec) mouse movements were primarily towards the perceptually similar response, regardless of category membership. On most trials, this initial movement was overridden as participants ultimately responded based on category membership. This override was more likely during inferences about properties which rendered conceptual knowledge more salient. We conclude that induction is initially driven by similarity, with conceptual knowledge activated later in the process. Email: Eoin Travers, etravers01@qub.ac.uk

(3180)

Dissociating Different Suppression Effects Using the Dual-Source Model of Probabilistic Conditional Reasoning. HENRIK SINGMANN, University of Zurich, KARL CHRISTOPH KLAUER, Albert-Ludwigs-Universität Freiburg, SIEGHARD BELLER, University of Bergen. — The suppression of otherwise endorsed inferences after introducing additional premises (Byrne, 1989) was one of the major findings shaping the understanding of human reasoning as non-monotonic. We investigated suppression effects using the dual-source model (Klauer, Beller & Hütter, 2010), a formal measurement model of probabilistic conditional inferences, according to which two different types of information are integrated via a mixture-weight parameter: a knowledge-based component reflecting background knowledge about the underlying probability distribution and a form-based component reflecting the subjective probability with which an inference schema is seen as warranted. Our results revealed a hitherto unobserved dissociation of the effects of disablers and alternatives: While both types of additional information suppressed the influence of the form-based components, disablers also suppressed the credibility of the conditional via decreasing the mixture-weight, whereas alternatives decreased the knowledge-based component. These results show that different types of suppression effects are not produced by the same cognitive processes, a possibility mostly neglected by existing theories. Email: Henrik Singmann, singmann@gmail.com

(3181)

Understanding Belief in the Extraordinary: Anomalistic Belief and Probabilistic Reasoning. TOBY PRIKE, MICHELLE ARNOLD, and PAUL WILLIAMSON, Flinders University (Sponsored by Michelle Arnold). — A growing body of literature has shown people who hold anomalistic (e.g., paranormal) beliefs may differ from nonbelievers in their propensity to make probabilistic reasoning errors. One aim of the current two studies was to develop a better measure of anomalistic belief, called the Anomalistic Belief Scale, by expanding the questions to include a wider range of paranormal beliefs (e.g., psychic healing, extra-terrestrials). The second aim was to investigate the relationship between anomalistic belief and probabilistic reasoning errors on tasks measuring proneness to commit the conjunction fallacy and bias against disconfirming evidence (BADE). As expected, results showed there was a relationship between anomalistic belief and errors in probabilistic reasoning for both conjunction fallacies and BADE. Importantly, by using regression on the factors that make up the Anomalistic Belief Scale, it was shown that the relationship between anomalistic belief and probabilistic reasoning varied for different anomalistic beliefs and scale factors. Email: Toby Prike, toby.prike@flinders.edu.au

(3182)

The Relationship Between Experience and Belief in Ghosts. WILLIAM LANGSTON and TYLER HUBBARD, Middle Tennessee State University. — Beliefs can have significant effects on behavior and can be relatively resistant to change (e.g., beliefs that vaccines cause autism). Experience can play an important role in the development of beliefs. The goal of the present research was to evaluate the effects of a relatively mild intervention (a ghost walk tour) on belief in ghosts. People attending the tour reported their prior belief and experience with ghosts, and then reported belief again at the end of the tour. With respect to prior belief, those who had experienced a ghost were more likely to believe than those who had not. The tour also had the effect of increasing belief...
in the group with low prior belief, even though participants did not experience any paranormal phenomena on the tour itself. A manipulation of the tour format (a relatively informal story-based approach or a more formal iPad show) had no effect on the change in belief. In conclusion, a relatively mild intervention presenting anecdotal eyewitness reports and ghost investigator experiences, coupled with the social support of people on a ghost walk tour, was sufficient to increase belief. Email: William Langston, william.langston@mtsu.edu

• DECISION MAKING II •

(3183)
Irrelevant Cue Activation in an Inference From Memory Decision Task. DANIEL BUTTACCIO and MICHAEL DOUGHERTY, University of Maryland, RICK THOMAS, Georgia Institute of Technology, TOBY HAMOVITZ, University of Maryland. — We examined if participants use irrelevant information in memory-based decisions. During training, participants learned the associations between fictitious companies and their attributes as well as the importance of each attribute for determining company success. Following the training, participants engaged in a decision task in which they were to use a Take-the-best or weighted additive decision strategy to select which of two companies would perform better in the following fiscal year. Reaction time data suggested that participants retrieved the irrelevant information, although they had clearly learned that some of the attributes were irrelevant to the decision task. We argue that cue-usage in inference tasks is constrained by memory-retrieval variables, and that the specific cues that one brings to bear on a decision task is driven more-so by memory than by cue validity. Email: Daniel Buttaccio, buttacciodr@gmail.com

(3184)
The Use of Personal Interviews to Design and Test New Pre-Storm Evacuation Messages. ELISABETH PLORAN, MARY ANNE TRASCIATTI, and E. CHRISTA FARMER, Hofstra University. — Despite coastal storm surge warnings and evacuation orders starting several days before landfall, only 33% of coastal residents in Long Beach, NY left their homes prior to Superstorm Sandy. The resulting damage from the storm caused 90% of residents to evacuate due to damage to their homes, surrounding infrastructure, and threats to personal safety from the aftermath. The current project used personal interviews with residents, both those who did and did not evacuate, to determine the sources of information and influence most critical to personal evacuation decisions. Messages were then developed around the emerging themes and tested for effectiveness in persuading residents to heed evacuation orders in a hypothetical scenario. The results suggest that messages noting actions taken by authorities (e.g., evacuating their own families or going door-to-door) and the potential loss of water/sewer service may have a high level of influence not previously identified. Email: Elisabeth Ploran, elisabeth.j.ploran@hofstra.edu

(3185)
Probabilistic Weather Forecasts: Age, Education, and Numeracy. SUSAN JOSLYN and MARGARET GROUNDS, University of Washington. — Previous research suggests that people make better decisions in weather-related decision tasks when they are given probabilistic information about the outcomes (Joslyn & Leclerc, 2012). However, this work was done exclusively with college students who were similar in age and education. It is unclear whether a less educated user could take advantage of probabilistic forecasts to the same extent. In a study designed to investigate this issue, participants were recruited from a large, online database with a variety of ages and educational experiences. Participants made decisions about whether to spend limited resources to salt roads to prevent icy conditions. Half of participants used probabilistic the other half deterministic forecasts. All participants also completed a numeracy assessment. The differences in decision quality and types of risk taken due to forecast format, age, education, and occupation, as well as the role of numeracy will be discussed. Email: Susan Joslyn, susanj@uw.edu

(3186)
Social Cognition and Deception. SCOTT MEEK and BRITTANY WORTMAN, University of South Carolina Upstate. — Research in the field of deception is limited in the number of factors that are incorporated into the design, often only examining memory retrieval and response manipulation/inhibition, demonstrated by differences in reaction time. Few models examine the impact of social processing in the formation of deceptive responses. The current study aims to incorporate a social factor into the typical deception paradigm used in the literature to determine if evaluation of social factors changes the deceptive process. Differences in reaction times will be compared when participants listen to a question asked by a human voice or a computerized voice, as well as when participants read a question on a computer screen. We anticipate that deceptions that involve meaningful social processing will require more cognitive processing and will result in longer reaction times before response. Email: Scott Meek, smeeck@uscupstate.edu

(3187)
Temporal Relationship Between the Timing of Intent and Execution of Easy and Difficult Choices. EVE A. ISHAM and KRYSTAL WULF, University of California, Davis. — A seminal work by Libet et al. (1982) illustrated that the timing of intent (W) to perform a simple motor act preceded the moment of execution by approximately 200 ms. This time gap implies that W is a unitary index of conscious decision. However, different types of decisions, beyond simple, mechanistic motor acts, are made daily. How might different levels of decisional difficulty influence the temporal relationship between the timing of intent and the timing of execution? In a modified Libet paradigm, participants were asked to evaluate and choose between two choices. To indicate choice, a motor response was made. Moreover, the participants reported the moment of intent to act (i.e., W) by reading the time from a clock, and rated the difficulty of the decision. We observed that the temporal relationship between the timing of
intent and execution indeed varied with decisional difficulty. Interestingly, easy decisions elicited a longer time gap than difficult ones. The observation suggests that $W$ is not unitary as previously interpreted; instead $W$ may depend on decision-making components such as intuition and deliberation. Email: Eve A. Isham, eaisham@ucdavis.edu

(3188) Precrastination Increases With Memory Load. EZANA TADDESE and LISA FOURNIER, Washington State University. — Precrastination is the “tendency to begin a task as soon as possible” (hastening subgoal completion; Rosenbaum et al., 2014). We examined whether people precrastinate in order to reduce prospective memory load. If so, increasing demands on working memory (WM) should increase precrastination. Participants picked up and carried one of two buckets (left or right) along a 16’ walkway to a central target platform (transport task). One group performed a digit-span task during the transport task, and the other group did not. On most trials, one bucket was closer to the participants’ starting position, with the other closer to the target platform. Participants were asked to transport one bucket using their spatially-compatible hand, and to choose the easiest option on each trial. As expected, loading WM increased precrastination (tendency to pick up the bucket closest to the start position). It also increased a bias in selecting the bucket with the dominant hand. Email: Lisa Fournier, lfournier@wsu.edu

(3189) A Comparison of Models for Two-Choice Decision Making. CHELSEA VOSKUILEN and ROGER RATCLIFF, The Ohio State University (Sponsored by Roger Ratcliff). — There are numerous mathematical models for analyzing response time and accuracy data from 2-choice decision-making tasks. We investigate the extent to which conclusions about individual differences depend on the choice of model. We analyze data from three different tasks (recognition memory, lexical decision, and a numerosity task) from a group of participants with a wide age range (college-age up to 90 years old), and with a wide IQ range (from 83 to 146), using three different models: the diffusion model, the linear ballistic accumulator model (LBA), and the leaky competing accumulator model (LCA). All of the models were able to provide reasonable qualitative fits to most of the data sets and corresponding parameters across the models were significantly correlated. Email: Chelsea Voskuilen, cvoskuilen@gmail.com

(3190) Perfectionism, Decision-Making, and Post-Error Slowing. KEVIN POTTER, University of Massachusetts Amherst, TRISHA VAN ZANDT, The Ohio State University. — The construct of perfectionism is an important topic of research due to its influence on a large number of psychopathologies. Recently researchers have sought to better understand the cognitive mechanisms associated with perfectionism using forced-choice two-alternative tasks. In particular, perfectionist characteristics were expected to predict the behavioral measure of post-error slowing. However, research has found little association between inventory scores of perfectionism and post-error slowing. We developed a quantitative model for the Simon task, and tested several hypotheses regarding the mechanisms underlying post-error slowing and their association with perfectionism. We controlled for several confounding effects such as fatigue, motivation, learning, and multiple types of post-error adjustments. Critically, a core assumption past researchers have made regarding the interpretation of post-error slowing was found not to hold, leading to important implications regarding the study of the cognitive mechanisms underlying perfectionism. Email: Kevin Potter, kevin.w.potter@gmail.com

(3191) Testing Models of Deferred Decision Making. JARED HOTALING, JÖRG REISKAMP, and SEBASTIAN GLUTH, University of Basel. — Deferred decision making (DDM) is when an individual collects evidence about two or more risky alternatives and decides when to stop and make a final choice. Real world examples include physicians running tests before diagnosing an illness, or commanders collecting intelligence before taking military action. We conducted a DDM study aimed at investigating how people know when to defer a decision and when to stop sampling and make a choice. Participants could purchase up to twenty independent observations about two mutually exclusive hypotheses before making a final choice. Their goal was to make accurate choices, while minimizing sampling costs. We tested several cognitive models and found that a sequential sampling model (SSM) outperformed others build on heuristic or backward induction frameworks. According to the SSM, individuals make explicit decisions to wait and sample more, and require less evidence to make a final choice over time due to collapsing decision bounds. Email: Jared Hotaling, jaredhotaling@gmail.com

(3192) The Piecewise Linear Ballistic Accumulator Model of Decision-Making Under Changing Information. JENNIFER S. TRUEBLOOD, University of California, Irvine, WILLIAM R. HOLMES, University of Melbourne, ANDREW HEATHCOTE, University of Newcastle. — In the real world, decision-making processes must be able to integrate non-stationary information that changes while the decision is in progress. We use a random-dot motion paradigm along with cognitive modeling to investigate how the decision process is updated when a stimulus changes. Participants viewed a cloud of moving dots, where the motion switched directions midway through some trials, and were asked to determine the direction of motion. To investigate the underlying changes in the decision process, we developed a piecewise linear ballistic accumulator (PLBA) model and used efficient approximate Bayesian methods for fitting. The PLBA revealed the presence of a long delay between presentation and integration of new stimulus information, but did not support increased response caution in reaction to the change. We also found the decision process was not veridical, as a symmetric stimulus change had an asymmetric effect on the rate of evidence accumulation. Email: Jennifer S Trueblood, jstruebl@uci.edu
Risk Attitudes Pertaining to Verbal Probabilities in Chinese and Japanese Speakers. YANG MO, Tsinghua University and Tokyo Institute of Technology, KIMIHIKO YAMAGISHI, Tokyo Institute of Technology. — We compared risk attitudes pertaining to verbal probabilities among native speakers of Chinese and Japanese. Our research question asks if we find systematic differences in the risk attitudes when we compare speakers of Chinese and Japanese when risks are shown in verbal probabilities. We adopted Hamm’s (1991) results when we seek a verbal description’s counterpart in numerical probabilities. For instance, we treated seldom as equivalent to 0.196. We tested, e.g., a pairwise choice between \{A sure gain of 784 yen\} and \{You seldom win 4000 yen\}. Here, we treat the 784 yen as the expected value of the latter. Results replicated the standard finding that people were risk averse in gains and risk seeking in losses. Moreover, the Japanese were less risk averse in gains and risk seeking in losses. We interpret this as reflecting cultural differences, such as the overwhelming popularity of insurance and lotteries among Japanese public. Email: Kimihiko Yamagishi, kimihiiko@ky.hum.titech.ac.jp

Similarity and Symmetry of Forecasts Drive Perceptions of Uncertain Climate Projections. DANIEL BENJAMIN and DAVID BUDESCU, Fordham University (Sponsored by David Budescu). — We compare the effects of sources of uncertainty of multiple climate projections. Participants viewed (1) a set of precise, conflicting forecasts (2) a set of agreeing, imprecise forecasts and (3) one (out of 30) set that was both conflicting and imprecise. People are sensitive to the relative precision and agreement of the forecasts. The joint effects of conflict and imprecision are task-dependent. Joint effects are additive when estimating probable values since participants show more bias when viewing hybrid sets compared to the conflicting or imprecise cases. Estimates are primarily driven by the symmetry of forecasts sets. The two effects are averaged when rating the sets on characteristics like credibility or vagueness. Participants rated imprecise sets highest, conflicting ones lowest, and hybrid sets in-between on all characteristics. Ratings are driven by the similarity of forecasts: intersecting and nested sets are rated similarly to imprecision, and tangent and disjoint sets similarly to conflict. Email: Daniel Benjamin, dbenjamin3@fordham.edu

Opinions of College Students (Future Teachers) About the Mathematics Taught in Elementary, Middle, and High School. PATRICIA BAGGITT, New Mexico State University, ANDRZEJ EHRENFEUCHT, University of Colorado. — In an anonymous survey, we asked undergraduate students planning to be teachers in grades K-12, and graduate students planning to teach at the college level, several questions dealing with K-12 mathematics education. The questions dealt with the decisions concerning content of K-12 math courses, their sequencing, their pedagogy, and the uniformity/variety in curricula. Examples of questions: Who should decide what mathematics students learn in elementary, middle, and high school? Who should decide whether a topic should be obligatory for all, and if it is not for everyone, who should decide which students take what courses? Who should decide which teaching methods should be adopted? We report the results, which show much less variety than we expected. Email: Patricia Baggett, baggett@nmsu.edu

Enlarging the Market yet Decreasing the Profit: Competitive Behavior When Investment Affects the Prize. EINAV HART, JUDITH AVRAHAMI, and YAakov KAREEV, The Hebrew University of Jerusalem (Sponsored by Yaakov Kareev). — In many situations, our investments increase our gains: Developing better products and research proposals may lead to higher contracts or patents and larger grants. Does increasing investment in such cases always guarantee higher gains? We used a repeated competition game in which prizes depended on contestants’ investments. We show that contestants indeed invested more when they increased the potential prize (enlarge the market), yet in some cases this tendency was counterproductive (decrease the profit): Contestants in fact diminished their earnings, compared to sitting out the competition and keeping their initial funds. Moreover, when one’s investment decreased the opponent’s prize, one tended to invest less; this, in turn, led to higher overall gains for both contestants. The results suggest that even in competitive situations, people care about increasing (or not decreasing) the overall pie—a tendency which in some cases can lead to a waste of resources. Email: Einav Hart, einavi@gmail.com
Friday Evening Posters 3198-3201

(3198)

Gains and Losses Respectively Promote Satisficing and Maximizing Behaviors. BO PANG, Texas A&M University, NATHANIEL BLANCO, and W. TODD MADDOX, University of Texas at Austin, DARRELL WORTHY, Texas A&M University. — In a seminal work Simon (1955) introduced the distinction between maximizing and satisficing in decision making. In three experiments we investigated whether incentive types (gains or losses) would affect preferences for satisficing versus maximizing choice alternatives. Participants chose from two alternatives on each trial. One option was a satisficing option because it consistently gave a larger immediate reward, although it caused future rewards for both options to decrease. The other option was a maximizing option because selecting it caused rewards for both options to increase on future trials, thus offering the possibility of maximizing cumulative reward. We found that participants were more likely to select the maximizing option when consistently selecting the satisficing option led to losses as opposed to gains, regardless of whether the maximizing option was objectively sub-optimal or optimal. These results suggest that losses are valued fundamentally different from gains and motivate one to maximize. Email: Darrell Worthy, worthyda@tamu.edu

(3199)

Sleep Deprivation Increases False Confessions. STEVEN FRENDA, New School for Social Research, SHARI R. BERKOWITZ, California State University, Dominguez Hills, ELIZABETH LOFTUS, University of California, Irvine, KIMBERLY M. FENN, Michigan State University. — Sleep deprivation increases memory suggestibility but the question of whether sleep deprivation affects the likelihood of false confession has remained unexplored. We experimentally tested this question in a multi-session study. Participants completed computer tasks and were repeatedly warned that pressing the “escape” key would cause the loss of important data. They returned for an overnight session, and either remained awake all night, or slept for 8 hours. In the morning, all participants were asked to sign a statement written by research staff, which alleged that the participant had pressed the “escape” key in a previous session, thereby compromising the data. A substantial number of participants signed the statement, and the odds of signing the statement were approximately 4 times higher for the sleep-deprived group compared to the rested group. These findings further underscore the seriousness of sleep deprivation in the context of criminal investigations, interrogations, and miscarriages of justice. Email: Steven Frenda, frendas@newschool.edu

(3200)

Political Affiliation Generalizes to M&M Color Choice. KAREN B. SCHLOSS and ISOBEL A. HECK, Brown University, ROLF NELSON, Wheaton College. — When judging abstract colored patches, members of social groups (universities, political parties) prefer their group’s colors more than their rival group does (Schloss et al., 2011; Schloss & Palmer, 2014). Does this bias generalize to the colors people approach/avoid in their environment? We addressed this question by observing Democrats’ and Republicans’ choice of M&M colors at a political event. Attendees encountered our table displaying bags of red, yellow, green, and blue M&Ms (one color per bag) and were encouraged to take one. Attendees indicated their political affiliation (Democrat/Republican/Other) by checking a box on a tag attached to their bag. Tags were face-down and therefore unreadable before color selection. More Democrats chose blue (Democratic color) than red (Republican color), more Republicans chose red than blue, and Others showed no difference. Results imply that affect toward groups associated with particular colors generalizes to choices of similarly colored objects, at least when objects are otherwise identical. Email: Karen B. Schloss, karenschloss@gmail.com

(3201)

Reducing and Reinstating Bias: The Influence of Attention on Preferences Between Risky Prospects. FELIX HENNINGER, University of Koblenz-Landau, Max Planck Institute, SUSANN FIEDLER and ANDREAS GLOECKER, Max Planck Institute for Research on Collective Goods, BENJAMIN HILBIG, University of Koblenz-Landau (Sponsored by Benjamin Hilbig). — The recently introduced Open Sampling presentation format for risky choices, in which outcomes are presented simultaneously and openly in matrix form, has been shown to enable fast and unbiased decisions. This has been attributed to automatic information acquisition processes, which sample extensively and representatively from the available information. If these assumptions are true, manipulating attention such that different information is sampled should influence decisions. In three eye-tracking studies, we confirm these predictions: We demonstrate that choices can be biased by subtle changes in the matrix display and that these biases are mediated by induced shifts in attention. Our results suggest that systematic choice tendencies and biases may be due to distortions in the information used, as opposed to transformations of data by decision makers, or faulty or heuristic integration processes. Email: Felix Henninger, mailbox@felixhenninger.com
• MULTI-SENSORY INTEGRATION •

(4001) **Proprio-Vector: How Moving Your Legs Can Induce Illusory Self-Motion Through Space.** ILJA FRISSEN, McGill University, JENNIFER CAMPOS and JAN L. SOUMAN, Philips Research, MARC O. ERNST, Universität Bielefeld. — Self-motion perception during locomotion depends on both exteroceptive (visual, auditory, and tactile) and interoceptive (proprioceptive and vestibular) information, and poses a major sensory integration challenge to the nervous system. Yet, very little is known about the mechanisms involved in this integration, particularly for interoceptive information. We investigated how self-motion perception is affected by walking in place on a large circular treadmill; a situation that creates conflicting inputs from the proprioceptive (I am walking) and vestibular (I am stationary) systems. In order to measure perceived self-motion instantaneously during walking, a continuous pointing method was employed. Across three experiments it was revealed that participants can and do experience illusory self-motion through space and that the magnitude of the illusion depends on walking speed and the direction of leg movement. The results suggest that contemporary maximum likelihood models of exteroceptive multisensory integration may also apply to interoception. Email: Ilja Frissen, ilja.frissen@mcgill.ca

(4002) **‘Close-far’ and Size Discriminations in 3D Apparent Motion Sequences.** BETEL MARTÍNEZ-VALDES, JOSE LUIS BAROJA-MANZANO, ANGEL EUGENIO TOVER Y ROMO, and GERMAN PALAFOX, Universidad Nacional Autónoma de México. — Our ability to discriminate shapes, sizes and spatial positions of objects is vital for our everyday interactions with the world. Multisensory spatial perception has been studied extensively with stimuli presented on the frontal plane showing a variety of auditory-visual distortions. We used apparent motion in depth (AMd) to probe auditory-visual interactions in 3D space. We matched and varied the ordering of auditory intensity and visual size of the middle stimulus of an AMd sequence under congruent (matched ordering), incongruent (reversed ordering) and displaced conditions, in 2AFC size and “spatial” discrimination tasks. We fit a Weibull cumulative distributions to our data and used Bayesian hierarchical techniques to account for condition and participant effects (assuming thus, that participants come from a common distribution with respect to their effect on the model parameters across conditions). Our results show large individual differences between participants across conditions and some small effects of intensity-size interactions. Email: German Palafox, germanpalafox@gmail.com

(4003) **Auditory Information Enhances Proprioceptive Drift in the Rubber Hand Illusion.** BENJAMIN R. KUNZ and BRIDGET O’MERA, University of Dayton. — The body schema, or representation of limb location and position, is a result of multi-sensory integration; in particular, the rubber hand illusion demonstrates the relative contributions of vision, touch, and proprioception to the body schema. Two experiments expand upon this illusion by investigating the contribution of auditory information to the body schema. With the participant’s hand concealed and a visible false hand parallel to the real hand, the real and false hands were simultaneously stroked with sandpaper. While visual and tactile stimulation is typically sufficient to override proprioception, creating a misperception that the real hand has drifted toward the rubber hand, we showed that auditory information (a prerecorded scratching noise) played from a concealed speaker under the false hand created a greater drift towards the false limb than when sound was absent. These findings are among the first to demonstrate auditory contributions to construction and maintenance of the body schema. Email: Benjamin R. Kunz, bkunz1@udayton.edu

(4004) **Determination of Somatosensory Horizontal Plane.** ATSUKI HIGASHIYAMA, Ritsumeikan University. — We determined the somatosensory horizontal floor plane on which the blindfolded observers perceive it to be parallel to the ground. The point of subjective equality (PSE) and difference limen (DL) of the horizontal plane were obtained as a function of posture, orientation, and age. The posture means the body attitude on the floor: Standing, sitting, or lying on the back. The orientation means the direction of the longitudinal axis of the lying observer: Parallel, orthogonal, or oblique to the rotation axis of the floor. The mean PSEs were less than 0.2 deg away from the objective horizon regardless of change in posture, orientation, or age. The mean DLs were larger for the orthogonal or oblique (1.5 deg) than the parallel orientation (1.1 deg) and were larger for the lying (0.98 deg) than the sitting or standing posture (0.83 deg), and no significant difference was between young and older adults. It was emphasized that the somatosensory horizontal plane is stable in PSE but is disturbed in DL. The effect of orientation on DL was interpreted by the different densities of body parts (i.e., the head is densest in the body). The effect of posture on DL was interpreted by the availability of joints at the legs and low back. Email: Atsuki Higashiyama, achan@lt.ritsumei.ac.jp
Factors Mediating the Correspondence Between Unfamiliar Faces and Voices. SHOKO KANAYA and YOSHIYUKI UEDA, Kyoto University, HIDEYUKI TOCHIYA and KAZUHIKO YOKOSAWA, The University of Tokyo. — We can infer voice qualities of an unfamiliar person from his/her face, based largely on common facial information. Our previous research suggests neutral faces and voices are judged to correspond to the same person based on perceived trustworthiness and perceptual properties (e.g., rough-smooth). The present study investigated the effect of emotional information on this correspondence. The first task used positive, negative, and neutral faces/voices. Participants selected the face which best matched a presented voice. Next, each face/voice was independently presented to participants who rated the attractiveness, trustworthiness, dominance, and perceptual properties. Results showed that faces and voices, matched in the first task, produced similar impressions for attractiveness, trustworthiness and perceptual properties. Further analyses suggest that categorical information (e.g., gender), identity (invariant information), and emotional state (temporary information) of faces and voices appear to be mediated by perceptual properties, trustworthiness, and attractiveness, respectively. Email: Shoko Kanaya, kanaya@cv.jinkan.kyoto-u.ac.jp

The Correspondence of Pitch and Size Dimensions Is Not Automatic. LAURA M. GETZ (Graduate Travel Award Recipient), University of Virginia, DANIEL SHANAHAN, Louisiana State University, MICHAEL KUBOVY, University of Virginia (Sponsored by Michael Kubovy). — It has been shown that pairing a large visual object with a task-irrelevant low-pitch tone produces facilitation in a speeded classification task compared to an incongruent pairing of large objects with high pitches. However, previous studies on the pitch-size correspondence lack a crucial control condition in that attention is only focused on one domain (i.e., size) while the other domain (i.e., pitch) remains outside focused attention. Therefore, the present study investigates whether the mapping of large/low and small/high can be modified under top-down attentional control. We present evidence that the correspondence depends on task instructions: participants asked to select either large objects or low pitches are faster to respond when those stimuli are paired; in contrast, when asked to select either large objects or high pitches, participants are faster to respond when those stimuli are paired. These results question the assumption of automaticity in this area of research. Email: Laura M. Getz, lauragetz@virginia.edu

Influence of Meaning on Synesthetic Color Choice for Japanese Kanji Characters With Abstract Meanings. MICHIKO ASANO, Rikkyo University, SOICHIRO TAKAHASHI and KAZUHIKO YOKOSAWA, University of Tokyo. — Although grapheme-color association in grapheme-color synesthesia is characterized as idiosyncratic, some regularities in synesthetic perception have also been reported. For Japanese Kanji script, wherein each character has its own meaning, it is known that synesthetic color choices for characters representing names of colors or objects with typical colors tend to depend on character meaning (Asano & Yokosawa, 2012). However, little is known about the influence of character meaning on synesthetic colors for Kanji characters with abstract meanings. This study explored this issue by examining synesthetic colors for Kanji antonym character pairs in 10 Japanese synesthetes. Results revealed that antonym character pairs that were learned early in life elicited synesthetic colors that were dissimilar to each other. This finding indicates that semantic relations are reflected in synesthetic colors, at least in early stages of abstract Kanji learning. This finding is consistent with the developmental model of Asano and Yokosawa (2013). Email: Michiko Asano, asano@rikkyo.ac.jp

Mental Transformations of Pitch: An Auditory Imagery Task. EMMA B. GREENSPON and PETER PFORDRESHER, University at Buffalo, State University of New York, ANDREA R. HALPERN, Bucknell University (Sponsored by Andrea R. Halpern). — Mental imagery leads to multimodal brain activity and thus may play an important role in cross-modal associations. In line with this, recent evidence suggests that auditory imagery may guide sensorimotor translation in singing; singers with a vocal pitch imitation deficit (VPID) reported less vivid auditory imagery than accurate imitators. We tested the role of auditory imagery in vocal pitch imitation directly by having participants produce and recognize novel and familiar melodies in their original form, or based on a mental transformation of its structure. VPID singers performed less accurately overall, but were also less disrupted by transformations than were accurate singers. Familiar melodies did not improve VPID performance. We interpret these results as reflecting poor imagery formation in VPID participants, with demands from transformations being similar across participants. As a result, mental transformations of a poor image have relatively smaller effects on production than transformations of a precise image. Email: Emma B. Greenspon, chgreens@buffalo.edu

Selective Adaptation of Crossmodal Speech Information: A Case of Small but Consistent Effects. JAMES W. WILLIAM DIAS and LAWRENCE D. ROSENBLUM, University of California, Riverside (Sponsored by Lawrence D. Rosenblum). — Selective adaptation of speech information can modulate perceptual categorization of ambiguous phonetic information (e.g., Vroomen & Baart, 2012). Results of a number of studies suggest that selective adaptation may be a unimodal phenomenon (e.g., Roberts & Summerfield, 1981; Saldaña & Rosenblum, 1994). For example, while auditory syllables can selectively adapt other auditory syllables, visual syllables have not been shown to significantly adapt auditory syllables. These findings seem inconsistent with other phenomena suggesting that crossmodal influences occur very early in processing (see Rosenblum, 2008, for a review). In the current investigation, a meta-analysis of two studies (Roberts & Summerfield, 1981; Dias & Rosenblum, 2015)
suggests that the small crossmodal effects observed in any one study were reliably consistent across studies. Following this meta-analysis, a study employing a much larger sample size was conducted and produced statistically significant crossmodal adaptation effects. The theoretical implications of these smaller crossmodal effects will be discussed. Email: James W. William Dias, jdias001@ucr.edu

(4010)
Effects of Context and Meaning on Multisensory Integration. ASHLEY WENDORF and GARY LUPYAN, University of Wisconsin-Madison (Sponsored by Gary Lupyan). — Although sensory modalities appear distinct, we know that the brain routinely integrates across them. What we hear is influenced by what we see, and vice-versa. We investigated whether such integration is based solely on physical properties of stimuli or if context and psychological similarity are also taken into account. We made use of the double-flash illusion wherein hearing two consecutive sounds accompanying a single flash causes people to see two flashes. Previous research has shown that the illusion is only obtained if the two sounds are identical. We replicated this finding, extending it to more ecologically valid sounds (ping pong balls and speech). We then showed that the strength of the illusion for a given pair of sounds can change depending on the context in which the sounds occurred. Multisensory integration depends not only on physical properties of stimuli but also on flexibly modulated psychological similarity. Email: Ashley Wendorf, awendorf@wisc.edu

(4011)
Trisensory Integration During Spatially Focused Attention. CARL ERICK HAGMANN and NATALIE RUSSO, Syracuse University. — Integration of sensory information across modalities has been shown to decrease perceptual ambiguity and increase reaction time and detection accuracy, relative to unisensory stimuli, suggesting that the integration of multisensory inputs confers behavioral advantages. We asked how combinations of auditory, visual, and somatosensory events alter behavior. Participants detected stimulation on one side of space (right/left) while ignoring stimulation on the other side of space. There were seven conditions: Auditory (tones from speakers), Visual (sinusoidal contrast gratings), Somatosensory (fingertip vibrations), Audio-Visual, Somato-Visual, Audio-Somato, and Audio-Somato-Visual. Response enhancement and race model analysis confirmed that bimodal and trimodal conditions enhanced response time relative to unimodal conditions. There was no statistical advantage for trimodal compared to the fastest bimodal condition (AV), despite producing the shortest response times. These findings suggest that adding somatosensory information to audio-visual events may not enhance responses in the same way as bimodal relative to unimodal stimulation. Email: Carl Erick Hagmann, carl.hagmann@gmail.com

(4012)
Seen Virtual Size Biases Unseen Felt Size. GIOVANNI F. MISCEO, Benedictine College. — Holmes and Spence (2005) found participants misjudged the felt location of their unseen arm to be at its seen location in a mirror. It is unknown, however, whether their result would hold for the felt size of an object. Fifty participants manually felt either the same sized or differently sized objects, one in each hand. Half could see and half could not see one hand in a mirror located in their midsagittal plane. The seen felt size in the mirror biased the participants' subsequent estimate of the felt size in their unseen hand behind the mirror. Although the judged size of the unseen object depended on its seen virtual size, the strength of the bias did not grow with the growth of the virtual size, i.e., the visual bias remained a constant fraction of the growth in the difference between the seen virtual size and the unseen felt size. Email: Giovanni F Misceo, gmisceo@benedictine.edu

(4013)
Does Tactile and Visual Mental Rotation Depend on a Specific Sensory Experience? Testing the Perceptual Equivalence Hypothesis. ANDRE CAISSIE, CHRISTOPH NAEFGEN, and MARKUS JANCZYK, University of Tübingen, Cognition and Action (Sponsored by Peter Wühr). — Mental rotation (MR) has been generally described as soliciting a visual strategy regardless of whether participants perform an MR task using touch or vision. Studies consistently show similar RT/accuracy functions to angular disparity and also visual activation during both visual and tactile MR of 2D stimuli (Prather & Sathian, 2002). In the present study, we tested whether MR on real 3D stimuli is a perceptually equivalent (or visual) process by using a within subject's design. We compared subjects on two consecutive tasks of 56 trials, either in different modality conditions (Visual-Visual and Tactile-Tactile) or same modality conditions (Visual-Tactile and Tactile-Visual). Our results show different effects of visual and tactile angular disparities on MR. Moreover, transfer analyses suggest that both visual and tactile MR can solicit sensory specific strategies, while visual experience shows no beneficial effect for tactile MR. Email: André Caissie, andre.caissie@uni-tuebingen.de

(4014)
Single Color Expression of Primary Triads. ERIKA KUMAKURA, AYUMI MUTO, and KAZUHIKO YOKOSAWA, University of Tokyo (Sponsored by Kazuhiro Yokosawa). — It has been reported that cross-modal associations between features of classical orchestral music (i.e. composers, tempo, and mode) and colors are mediated by shared emotions (Palmer et al., 2013). In situations where certain colors are chosen for primary triads consistently and idiosyncratically, the present study investigated whether the associations between primary triads, as basic musical harmony, and certain colors are mediated by shared perceptual/emotional features. Participants were asked to choose colors that matched best to each primary triad of C-major and A-minor tonalities. We also measured participants' perceptual/emotional associations; these were evaluated separately for each color and each primary triad by asking participants to
rate each of these items on ten descriptive scales (e.g., Happy/Sad). Factor analysis of rating scores showed that the arousal-related scales in the first factors of primary triads and colors were highly inter-correlated, suggesting that primary triads and the mediated colors share the arousal of emotions. Email: Erika Kumakura, kumakura@L.u-tokyo.ac.jp

**EVENT COGNITION**

(4015) Preschoolers Sort Photos of Real and Fabricated Animals: Not by Surface Similarity Alone. SHUQI YANG and ROCHEL GELMAN, Rutgers University. — Brenneman & Gelman (2003) report that 3-5-yr-old preschool children reliably sorted 21 photos of living animals and excellent fabricated copies into a “zoo” and “store” book. Adults’ ratings of “hard” vs. “easy” or “medium-hard” influenced errors. Here we assess the effect of dissimilarity in the B&B task. We randomly paired 18 “zoo” animal photos with a non-matching photo of the fabricated animals. Given this much greater surface difference between pairs, the 15 children in the 3- and 4-year new experiment should do better, but they did not. A Bayesian analysis yielded no difference between the two conditions for both age groups, p=0.208>0.05. There is more to similarity than what is on the surface. A context that highlights self-motion in animals seems to set up a comparison and contrast strategy. Children’s comments indicate that attention to biological and real self-motion parts contributed to performance. Email: Rochel Gelman, rgelman@ruccs.rutgers.edu

(4016) Interaction of Brain Networks During Suspenseful Film Viewing. MATTHEW BEZDEK, SHELLA D. KEILHOLZ, and ERIC H. SCHUMACHER, Georgia Institute of Technology. — How does the cognitive processing of narrative suspense unfold over time? Previously, we used fMRI to investigate the neural mechanisms underlying suspense. Moments of increasing suspense evoked changes in activity across several large-scale brain networks, consistent with an attentional narrowing hypothesis. In particular, we reported a decrease in activity in nodes of the default-mode network and an increase in nodes of the ventral attention network. Here we use a relatively rapid image acquisition sequence (TR = 700 ms), which permits analyses of changes in network dynamics on a faster timescale than typical for fMRI research. We identified local peaks and valleys of narrative suspense and calculated the time course of activity in relevant brain networks. Using sliding window correlation analyses, we assessed the functional connectivity between networks at moments of heightened suspense. These results reveal that experiencing suspense evoked by naturalistic stimuli involves the dynamic interaction of functional brain networks. Email: Matthew Bezdek, mbezdek@gatech.edu

(4017) An Event-Based Account of Conformity. DIANA KIM and BERNHARD HOMMEL, Leiden University (Sponsored by Bernhard Hommel). — People often change their behavior/beliefs when confronted with deviating behavior/beliefs of others, but the mechanisms underlying such phenomena of conformity are not well understood. Here we suggest that people cognitively represent their own actions and those of others in comparable ways (Theory of Event Coding: TEC), so that they may fail to distinguish one from the other. This suggests that even actions without any social meaning can induce conformity effects, especially if they are similar to one’s own actions. In two experiments, we show that female participants adjust their manual judgments of the beauty of female faces into the direction of distracting information without any social meaning (numbers falling into the range of the judgment scale). We also show that the strength of this conformity effect is further enhanced with distractor movies showing the actual manual decision-making act, suggesting that, as predicted, similarity between observed action and one’s own action matters. Finally, in a third experiment we show that the standard conformity effect (induced by presenting “average judgments” of a reference group) falls in between the number- and movie-induced effects. Email: Diana Kim, d.a.kim@fsw.leidenuniv.nl

(4018) Surprising Memory Effects in Perceiving Audio Dramas. ANNIIKA MAURER and MARKUS HUFF, University of Tuebingen, IRINA BRICH, Knowledge Media Research Center (Sponsored by Markus Huff). — Humans perceive an ongoing activity in terms of discrete events separated by event boundaries. Research has shown that memory of event boundaries is superior to memory of non-event boundaries. However, the underlying cognitive mechanisms are mainly investigated using visual stimuli. In three experiments, we examine the perception and memory formation of an audio drama. Experiment 1 extracted event boundaries based on participants’ perception of an audio drama. Experiment 2 tested the memory advantage effect of event boundaries whereas Experiment 3 examined the relationship between recognition performance and number of changes. Results of Experiment 2 indicate a superior memory on event boundaries as expected. Surprisingly, the data of Experiment 3 suggest that memory becomes worse the more changes occur on an event boundary. This leads to the new hypothesis that the neuronal visual system is involved in memory formation at event boundaries. Email: Annika Maurer, annika.maurer@uni-tuebingen.de

(4019) The Relationship Between Auditory Change Detection and the Encoding of Events. MICHAEL HALL and RACHAEL PECK, James Madison University, JEREMY GASTON, US Department of the Army, KELLY DICKERSON, Army Research Laboratory. — Change deafness and change blindness are considered analogous phenomena. However, without using similar experimental paradigms, it is difficult to establish common mechanisms. This issue was addressed
using an auditory analogue to the flicker paradigm that is typically used to study change blindness. Scenes were presented containing four easily identified and localized environmental sounds that were separated by 40 degrees along the azimuth, with one target sound oscillating with respect to virtual spatial position (left-to-right, right-to-left). Listeners identified targets under three conditions: flicker across successive 1s presentations/positions, a corresponding condition with a 3s initial array to determine if encoding time improved performance, and a "continuous" condition to determine if gradual target movement improved detection. Response times in (particularly, 3s) flicker conditions were faster and more accurate, especially when accounting for localization. These findings suggest that change deafness and blindness are not always analogous, and incomplete encoding increases auditory change detection errors.

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(4020) The Impact of Film Editing on Event Segmentation. JOSEPH MAGLIANO, and JAMES CLINTON, Northern Illinois University, DAVID WINER and MICHAEL YOUNG, North Carolina State University, THOMAS ACKERMAN, University of North Carolina School of the Arts, CHRISTOPHER KURBY, Grand Valley State University. — Narrative comprehension involves perceiving a structure to the events that are depicted. Understanders must be able to recognize when events begin and end, a process known as event segmentation. We explored the process of event segmentation in the context of narrative film. Specifically, we investigated the impact of editing on event segmentation. Participants viewed computer-animated versions of a scene inspired by a feature film that varied in the extent to which they were stylistically edited (i.e., No editing, Moderate editing, or High editing). Participants engaged in an event segmentation task while viewing one version of the scene. The results showed that participants’ level of segmentation agreement was higher when editing was present versus absent. Editing techniques are intended to make the narrative events more clearly depicted by directing viewers’ attention to the event structure. The results of this study provide empirical evidence that film editing can function in this manner.

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(4021) Comparing Three-Quarter View With Front or Side View in Pictograms. KENTARO INOMATA, Kwansei Gakuin University, SHINJI KITAGAMI, Nagoya University, FUMIHIRO HAYASHI, Office Slow Life. — Should pictograms be designed as two-dimensional (2D) or three-dimensional (3D)? Inomata and Nomura (2014) suggested that the semantic clarity of 2D pictograms was better than 3D pictograms. However, they only used a ready-made pictogram set as a stimulus. The referents were different between the 2D and 3D pictograms. Therefore, the effect of design of viewpoint on processing pictograms has not yet been revealed. In order to clarify this problem, we compared semantic clarity and view canonicality of 3D pictograms with 2D pictograms that were redesigned from 3D. The results indicated that most 3D designs had better semantic clarity and view canonicality than 2D designs representing same objects. These results suggest that the optimal design for pictograms is not always 2D. Furthermore, some objects indicated characteristic differences between 2D and 3D designs.

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(4022) Configural and Featural Contributions to the Left Cheek Bias for Emotion Perception. ANNUKKA KIM LINDELL, La Trobe University. — When posing for an emotional portrait, people favour the left cheek. Consistently, viewers perceive left cheek images as more emotionally expressive, resulting in a left cheek bias. Both configural and featural information contribute to the evaluation of emotional expressions; whether they make equivalent contributions to the left cheek bias is undetermined. As configural processing is disrupted when faces are presented upside down, this study investigated the effects of stimulus inversion on the left cheek bias for emotion perception. Participants viewed pairs of left and right cheek images–half normal, half upside-down–of male and female models and indicated which image in each pair appeared happier (half were mirror-reversed to control for perceptual biases). Results indicated a left cheek bias for both upright and upside-down faces, irrespective of mirror reversal. These data indicate that differences between the left and right cheeks’ featural information are sufficient to prompt a left cheek preference.

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(4023) The Social-Cognitive Effects of Power. CIRO CIVILE and SUKHVINDER OBHI, McMaster University. — Power is a ubiquitous social force, and has been defined as the ability to influence the behaviour of others via control over their outcomes. In Experiment 1 we examined how power modulates the face-body congruence effect (FBCE), which is the finding that body posture influences judgments of facial emotion. We found that High-power participants did not show a FBCE. In contrast, a strong FCBE was found for the Low-power group. In Experiment 2 we investigated how power independently of the gender of the power holder, modulates the way individuals perceptually objectify sexualized images of the opposite gender. High-power women and men both failed to show an inversion effect (i.e. featural processing leading to more perceptual objectification). Finally, in Experiment 3 we provide the first evidence of the effects that fluctuation of power has in face recognition by modulating the use of configural and featural processes.

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Cross-Cultural Differences in Conceptual Scene Processing. AYSE EZGI MAMUS and AYSECAN BODUROGLU, Bogazici University, ANGELA GUTCHESS, Brandeis University (Sponsored by Aysecan Boduroglu).

— Conceptual STM research demonstrated that gist can be identified in scenes processed as briefly as 50ms and conceptual consistency is known to impact object and background identification (Davenport & Potter, 2004). Culture and cognition research has also shown that Easterners have a greater tendency to attend to objects along with their surrounding context compared to Westerners, and the former are impacted more by contextual changes in object recognition tasks (e.g. Nisbett & Masuda, 2003). The goal of the current project was to examine whether such cultural differences would emerge in very early phases of scene processing. Turkish and American participants, matched for working memory capacity, viewed natural scenes including objects on either conceptually consistent or inconsistent backgrounds. Participants identified both objects and backgrounds and reported confidence regarding each answer. While both groups had similar performance in the consistent trials, Turks were negatively impacted by conceptual inconsistency in scenes.

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No Need of a Social Cue! A Masked Magician Can Also Trick the Audience in the Vanishing Ball Illusion. ANDRE DIDIERJEAN, and CYRIL THOMAS, University of Franche-Comte. — In the Vanishing Ball Illusion (VBI), observers perceive an imaginary ball disappearing into the air. According to Kuhn and Land (2006), the VBI is mediated by the gaze direction (also called a "social cue") of the magician toward the imaginary ball during the last fake throw. The aim of our study is to show that the magician's social cues are not so central in the VBI. In the present experiment, we compare the number of participants experiencing the VBI when the magician's social cue is visible and when it is occluded behind a mask. Results show that the number of participants experiencing the VBI when the magician's social cue is visible and when it is occluded behind a mask. Results show that the number of participants experiencing the VBI when the magician's social cue is visible and or not significant better predictors of performance than A. B-level students however were therefore processing than the poorest performers but not students showed significantly more acceleration and questions requiring no rotation. Furthermore, B-level more heart rate acceleration and therefore processing than results suggest items involving rotation in depth, in plane, and a combination of depth and plane showed significantly more heart rate acceleration and therefore processing than questions requiring no rotation. Furthermore, B-level students showed significantly more acceleration and therefore processing than the poorest performers but not those at the "A" or "C" level. B-level students however were not significantly better predictors of performance than A. They may simply be working harder. A feedback condition which they heard the sound of a bell signaling every hour.

We assessed how listening to the sound of the bell influenced participants' feelings of community membership and whether viewing particular scenes and the sound increased these feelings and participants' sense of belonging. Results showed that for scenes involving an overhead view of the bell, participants reported an increased immersive experience as a result of the shared sense of time with their neighbors.

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Prefrontal and Parieto-Occipital Cerebral Volume Asymmetries and Spatial Neglect Severity. MEGHAN DAVIS CAULFIELD, Kessler Foundation, ANNE L. FOUNDAS, University of Missouri Kansas City School of Medicine, NEAL JOSHI and AM BARRETT, Kessler Foundation. — Reduced or reversed hemispheric asymmetry may be associated with recovery in post-stroke aphasia. Given the asymmetric organization of neuronal systems that mediate attention, we examined hemispheric laterality in spatial neglect, a post-stroke visuospatial dysfunction highlighted by a failure to report or respond to contralesional stimuli. MRIs of 45 right-hemispheric stroke survivors (23 female, M=66.9 years) with neglect were measured for prefrontal and parieto-occipital volumes of the left and right hemispheres. Catherine Bergego Scale was used to assess severity of spatial neglect. Generally, a consistent left<right prefrontal and left<right parieto-occipital asymmetry is observed. Comparisons of mild (n=16) and moderate/severe (n=29) neglect indicated atypical (left<right) parieto-occipital asymmetry in moderate/severe neglect, p=.041, not accounted for by lesion volume. In light of the importance of the parieto-occipital cortex in spatial attention, these results suggest that greater cell numbers in this region may be a factor in the development and severity of ipsilesional spatial bias.

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Using Heart Rate Measures of Attention to Explore Students' Predicted and Actual Performance in a Mental Rotation Task. KEITH GORA and AARON MYERS, Bemidji State University. — Students are famously poor predictors of exam performance. The current project used heart rate measures of attention to assess encoding and processing in forty students engaged in a mental rotation task and compared those measures to students' own perceived measures of performance. Students made performance predictions before, during and after task. Preliminary results suggest items involving rotation in depth, in plane, and a combination of depth and plane showed significantly more heart rate acceleration and therefore processing than questions requiring no rotation. Furthermore, B-level students showed significantly more acceleration and therefore processing than the poorest performers but not those at the "A" or "C" level. B-level students however were not significantly better predictors of performance than A. They may simply be working harder. A feedback condition
is being added. Feedback should decrease acceleration in B-level students and increase acceleration in C and D.
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• RECALL II •

(4029)
Effects of Motion Perception on Language Processing and Long-Term Memory. ANTONIO MANUEL DIEZ, Universidad de Salamanca, MARIA ANGELES ALONSO, Universidad de La Laguna, EMILIANO DIEZ and ANGEL FERNANDEZ, Universidad de Salamanca. — An experiment studied the relations between movement perception, language processing and long-term memory. The experiment included two separate phases. Phase I was a replication of Kaschak et al’s (2005) experimental paradigm, which studied the effect of perceiving a visual moving stimulus on concurrent processing of a set of movement-relevant sentences which were auditorily presented. Phase II consisted of a subsequent unexpected memory test, either a recognition task, a free recall task or a cued recall task (for each third of the sample) aimed at analyzing potential effects of movement-affected comprehension on long-term memory for the sentences. It was predicted that the processing of sentences that implied movement could be disrupted by a simultaneous visual stimulus matching the direction of the movement described in the sentence, in comparison to a mismatch condition. Parallel results were expected for the memory tests. Results are discussed from the Embodiment Theory perspective.
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(4030)
The Role of Motor Simulations in Long-Term Memory for Object Pictures and Words. RENE ZEELENBERG and DIANE PECHER Erasmus University Rotterdam. — It has been suggested that action is central to cognition. Recent studies suggest that actions may be automatically activated by objects and words (e.g., Tucker & Ellis, 2001), but little is known about the role of the motor system in memory. Shebani and Pulvermüller (2013) recently reported evidence supporting a role for motor simulations in working memory for words. In their study movements with the hands impaired working memory for arm-related action words (e.g., grab, stir) and movements with the feet impaired working memory for leg-related action words (e.g., kick, skate). We report two experiments that investigated whether similar effects are present in long-term memory tasks.
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(4031)
Remembering a Positive Experience Can Inhibit Subsequent Behavior. ALAN BROWN, AUSTIN S. BALDWIN, and LINDY M. FIELDS, Southern Methodist University. — We found that remembering a positive personal experience decreases the amount of time spent on that behavior in the subsequent week, and replicated this for two behavioral domains. In Session 1, all participants estimated time spent on a) exercising and b) studying in the past week. Participants were then randomly assigned to an Exercise Memory Group (participants recalled a positive personal exercise experience) or a Study Memory Group (participants recalled a positive personal study experience). One week later, all participants again estimated the amount of time spent exercising and studying during the prior week. In both groups, time spent on the behavior related to the recalled experience dropped significantly, whereas no change occurred for the behavior unrelated to their personal recollection. This outcome was unexpected, given that we were attempting to replicate a study that found a facilitative behavioral effect following recall of a positive experience in that domain.
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(4032)
Target Location in Visual Search Is Retained Over Long Periods. MARC SEBRECHTS and ANNA M. FREEDMAN, The Catholic University of America. — Two experiments examined retention of search target location over time, as well as the impact of individual differences on search performance. In Experiment 1, after a four- to six-month delay, twelve participants repeated tasks from a previous study in which they performed multiple rounds of visual search for a specific target in eighteen different distractor-rich images, either with or without an auditory alarm. Initial search times after the long delay were somewhat faster than initial search times in the previous study, but substantially slower than final search times of the previous study, suggesting limited retention of target location over several months. In Experiment 2, thirty-five participants performed the same search task with an intermediate delay of either 30 or 60 minutes between training and testing, and completed a series of individual difference measures. There was no search time difference between the two delay conditions. While individual differences in working memory (OSPAN) did not reliably predict performance on visual search, individual differences in spatial abilities did predict both search times and rate of learning of target location.
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(4033)
Frequent Phrases Are Easier to Recall, but not Easier to Recognize. CASSANDRA JACOBS, University of Illinois at Urbana-Champaign, GARY DELL, Beckman Institute, COLIN BANNARD, University of Liverpool, AARON BENJAMIN, University of Illinois (Sponsored by Gary Dell). — Common words (e.g., pizza) and combinations of words (e.g., pepperoni pizza) are easier to acquire, understand, and produce. Famously, frequency effects work differently in recognition memory. Frequent single words, when studied, get fewer hits, and when not studied, more false alarms than infrequent words. Frequent phrases, however, show no recognition advantage or disadvantage (Jacobs et al., submitted). Here we examined frequency effects in phrase recall. Using the same stimuli as in the recognition study, we tested immediate free recall of 2 lists of 26 phrases varying in phrase frequency. Even when accounting for imageability, concreteness, compositionality, and familiarity effects, phrase frequency independently contributed to recall, such that more frequent phrases were better recalled.
(4034)  
**Time Estimation and Memory for Text Following Mental Time Travel.** JACQUELYN PALMER and KERRI A. GOODWIN, Towson University (Sponsored by Kerri A. Goodwin). — Past research indicates that temporal context change between encoding and retrieval of word lists facilitates forgetting of information and increases retrospective time estimates (Sahakyan & Smith, 2014). We investigated the effects of temporal context change on retrospective time estimation and memory for narrative information. We also explored working memory in relation to time estimation and recall. We found slightly longer retrospective time estimates for participants who engaged in a temporally far context change compared those who engaged in a temporally near context change or no context change. Recall of inference questions was more accurate for near-context change Ss than for far- or no-context change Ss. Working memory was unrelated to all measures in each context change condition. In the no-context condition, time estimation was positively correlated with all recall measures, suggesting that overestimates of time are related to better memory when no temporal context is present to aid in recall.
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(4035)  
**Hebb Repetition Learning for Non-Verbal Visual Sequences: Determinants of Sequence Acquisition.** ANDREW JAMES JOHNSON, ARTUR DYGA CZ, ANDREW MOSS, and CHRISTOPHER MILES, Bournemouth University. — Four experiments explored the conditions under which the Hebb repetition effect is found for sequences of unfamiliar faces. Consistent with verbal stimuli (Page, Cumming, Norris, McNeil, & Hitch, 2013), repetition learning is found when there is no overlap between the items comprising the repeated (Hebb) and non-repeated (filler) sequences. However, learning is abolished under conditions of full overlap (Experiment 1). There is no diminution in learning rate when separation of Hebb sequence repetitions is increased from two to five intervening lists (Experiment 2). Learning for the repeated sequence is accentuated when the output motor response at test is also repeated for the Hebb sequence (Experiment 3). Finally, the rate of sequence learning is unaffected by randomising the order in which the sequence is recalled (Experiment 4), questioning the exact output conditions which determine the effect. These findings further support the universality of the Hebb repetition effect across memory.
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(4036)  
**The Word Length Effect: The Roles of List Learning, Omissions, and Articulation.** JOSHUA MAXWELL, Arizona State University; RANDALL ENGLE, Georgia Institute of Technology, ZACH SHIPSTEAD, Arizona State University (Sponsored by Keith A. Hutchison). — The word length effect refers to superior recall people show for lists of short words, relative to lists of long words. This effect is typically attributed to articulatory duration or interference. However, these explanations do not address the effects of learning that likely occur over the course of several trials. In Experiment 1 we show that the word length effect disappears when test-takers become familiarized with the words contained on a given list. Experiment 2 demonstrates that the need to articulate words may mask this learning by creating a disruptive memory trace. A third experiment replicates Experiment 1 using a different method that controls for beneficial effects of hand written abbreviated responses by requiring participants to respond via mouse click. We arrive at two conclusions. First, the word length effect disappears over the course of several trials, provided test-takers are required to not articulate words as they are presented. Second, when test takers are required to articulate words, errors of omission disappear in the first few trials but errors of transposition are longer lasting.
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(4037)  
**Positive and Negative Schizotypy Are Associated With Differential Patterns of Episodic Memory Impairment.** LILI SAHAKYAN and THOMAS R. KWAPIL, University of North Carolina at Greensboro (Sponsored by Lili Sahakyan). — Cognitive impairment is a hallmark of schizophrenia. However, studies have not comprehensively examined such impairments in non-clinically ascertained schizotypic young adults. The present study employed multiple measures to assess episodic memory in high positive schizotypy, high negative schizotypy, and comparison groups (each group n = 25). Participants received free recall, recognition, source memory, cued-recall, and associative cuing tests. Consistent with diminished cognitive functioning seen in negative symptom schizophrenia, the negative schizotypy group exhibited episodic memory deficits on free recall, recognition, and source memory tasks. The positive schizotypy group did not demonstrate episodic memory deficits. However, in contrast to the other groups, the positive schizotypy group showed an unexpected set-size effect on the cued recall task—consistent with heightened spreading activation suggested to underlie psychotic symptoms. The findings support a multidimensional model of schizotypy and schizophrenia, and suggest that positive and negative schizotypy involve differential patterns of cognitive impairment.
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(4038) Instability of Access to Stored Knowledge. ALLISON CANTOR and ELIZABETH MARSH, Duke University. — How does access to one’s basic knowledge change over time? After a period of initial forgetting, scores on general knowledge tests are surprisingly consistent over time (permastore; Bahrick, Baker, & Hall, 2013). However, access to specific information can be unstable; the same score on a retest does not mean the same knowledge was used at both times. Two retrievals of the same knowledge can be inconsistent, even when the information is overlearned (e.g., US states; Brown, 1923). We hypothesized that one of the factors driving instability would be delay to the second test. Participants took the same general knowledge tests twice, but critically the second test occurred either 10 minutes or one week after the original recall attempt. People were more likely to access different knowledge when the two tests were separated in time, even though their basic knowledge was unlikely to have changed over the course of a week. Email: Elizabeth Marsh, emarsh@psych.duke.edu

(4039) Serial Position Functions in General Knowledge. MATTHEW KELLEY, Lake Forest College; IAN NEATH and AIMEE SURPRENANT, Memorial University of Newfoundland. — Serial position functions with marked primacy and recency effects are ubiquitous in episodic memory tasks. The demonstrations reported here explored whether bow-shaped serial position functions would be observed when people ordered exemplars from various categories along a specified dimension—specifically, actors and age; animals and weight; basketball players and height; countries and area; and planets and diameter. In all cases, a serial position function was observed. The results support an explanation of serial position functions based on relative distinctiveness, which predicts that serial position functions will be observed whenever a set of items can be sensibly ordered along a particular dimension. The serial position function arises because the first and last items enjoy a benefit of having no competitors on one side and therefore have enhanced distinctiveness relative to mid-dimension items, which suffer by having many competitors on both sides. Email: Matthew Kelley, kelley@lakeforest.edu

(4040) Working Memory Discrepancy and Collaborative Remembering. NIKOLAS S. WILLIAMS, CELIA HARRIS, and AMANDA BARNIER, Macquarie University (Sponsored by Max Coltheart). — Collaborative inhibition is a robust finding whereby groups recalling together remember less than individuals recalling alone. Although attributed to retrieval disruption, little research has examined how individual abilities of group members impact both group and subsequent individual recall. In two studies, we examined whether the discrepancy between collaborating dyads’ working memory capacities (WMC) influenced group and individual recall performance across three tests (Individual-Group-Individual). In Experiment 1, WMC discrepancy was assessed via Operation Span difference scores within dyads. While no relationship was found between dyads’ WMC discrepancy and group recall, WMC discrepancy predicted post-collaborative losses in the form of items forgotten. In Experiment 2, we assembled dyads that were either symmetrical (two high WMC individuals, two low WMC individuals) or asymmetrical (one high and one low WMC individual). Findings are discussed in terms of how the individual profiles within groups influence both immediate and ongoing effects of collaborative recall. Email: Nikolas S. Williams, nikolas.williams@students.mq.edu.au

(4041) Auditory Input Changes Visual Memory. SCOTT R. SCHROEDER and VIORICA MARIAN, Northwestern University. — Can input in one sensory modality impact memory encoding in another sensory modality? To address this question, we examined whether hearing a sound (e.g., a dog barking) can cross-modally improve memory encoding of visual information (e.g., the location of a depicted dog). Participants encoded a series of visual objects presented in various spatial locations while hearing task-irrelevant, spatially uninformative environmental sounds—some of these sounds matched the visual image while others mismatched. In a subsequent memory test, participants were better at remembering the spatial locations of visual objects that were encoded with their matching sound, even though the sounds were spatially uninformative. Because the sounds did not provide location information, better spatial memory performance cannot be attributed to auditory memory; rather, the effect is attributed to a change in a visual memory that occurred from hearing the auditory input. These findings provide evidence for multi-sensory interactivity in memory processes. Email: Scott R Schroeder, schroeder@u.northwestern.edu

(4042) It’s the Journey, not the Destination: Observer Action Between Multiple Viewpoints Enhances Spatial Learning. CORINNE A. HOLMES, Temple University; STEVEN MARCHETTE, University of Pennsylvania, NORA NEWCOMBE, Temple University. — In the real world, seeing an array from multiple viewpoints (MVPs) requires action—either array rotation (AR) or self-movement (perspective taking, PT). Controlled settings, however, can eliminate active viewpoint changes by presenting MVPs sequentially (static views, SV). When the quantity and quality of MVPs are identical, does the nature of the viewpoint change differentially affect spatial learning? In Experiment 1, participants viewed four orientations of an object array in one of three conditions (AR, PT, SV). Compared to SV, both types of action equally improved spatial performance. Experiment 2 repeated the AR and SV conditions and added a new condition (visual transitions, VT) to examine the effect of seeing the viewpoint change versus creating it. AR outperformed SV, as before. In addition, when the tested viewpoint was misaligned with the first viewpoint experienced, VT provided no advantage over SV. Thus, MVPs generated from observer action are key to spatial learning. Email: Nora Newcombe, newcombe@temple.edu
Resource Scarcity Enhances Memory Encoding. JIAYING ZHAO, BRANDON TOMM, and DESMOND FUNG, University of British Columbia. — Resource scarcity poses a significant challenge to the cognitive system. Budgeting with limited resources induces an attentional focus on the task at hand, prioritizing task-relevant information for processing. We propose that such prioritization also facilitates memory encoding. In two experiments, participants viewed a menu containing food items with price and calorie information. In Study 1, participants were asked to make an order with either $20 (money-poor condition) or $100 (money-rich condition). Afterwards, participants performed a surprise memory task where they recalled items from the menu with the corresponding prices and calories. The money-poor participants recalled the prices more accurately than the money-rich participants, but they were equally accurate in calorie recall. In Study 2, participants made an order with either 500 calories (calorie-poor condition) or 2000 calories (calorie-rich condition). The calorie-poor participants recalled the calories more accurately than the calorie-rich participants, but they were equally accurate in price recall. Both studies suggest that scarcity tunes attention to information on the task-relevant dimension, enhancing the encoding of information into memory. Email: Jiaying Zhao, jalincarter@gmail.com

Detection of Spontaneous Reminding With Verbal Protocols. COLLEEN KELLEY, JANE KOMSKY, and JACOB NEGLEY, Florida State University. — When people encounter events that are similar to earlier events, they are sometimes reminded of the earlier event. Such reminding has been inferred as the basis for a number of memory phenomena, including spacing effects, frequency judgments, and recency judgments, but the reminding is not typically measured. Here, we evaluate whether verbal protocol analysis is a useful tool for detecting spontaneous reminding. We used verbal protocols to detect reminding in two paradigms: Presentation of changed word pairs across lists (A-B, A-D interference), and presentation of category exemplars across short versus longer lags. Protocols reveal reminding that affect later memory performance. Email: Colleen Kelley, kelley@psy.fsu.edu

TESTING EFFECTS

Discovery and Adoption of the Testing Benefit in STEM Education. ADAM P. YOUNG, ALICE HEALY, MATT JONES, and TIM CURRAN, University of Colorado. — Engaging in self-testing is often a more effective strategy for retaining information than is restudying the target material. This testing benefit has been found in numerous studies and across a wide variety of manipulations and materials. Despite these common results, students remain largely unaware of the benefits of self-testing. We conducted two experiments using ecologically valid STEM materials (statistics concepts and chemical elements) to determine whether students could be made aware of the benefits of self-testing and consequently engage in voluntary self-testing. A within-subjects testing benefit was successfully replicated in both experiments, and subjects who experienced a testing benefit exhibited some trends indicating subsequent voluntary, covert self-testing behavior. These results offer a first step toward developing teaching methods that can effectively communicate the testing benefit to students and thereby improve learning performance. Email: Alice Healy, alice.healy@colorado.edu

Interpolated Testing Improves Integration of Information in Online Learning. HELEN JING and DANIEL L. SCHACTER, Harvard University, KARL SZPUNAR, University of Illinois at Chicago (Sponsored by Daniel L. Schacter). — Although learning through a computer interface has become increasingly common, little is known about how to best structure video-recorded lectures in order to optimize learning. We focus on the ability for students to integrate knowledge that they learn across a 40-minute video-recorded lecture, and demonstrate that interpolating a lecture with memory tests, compared to studying the lecture material for the same amount of time, improves the level of integration of information across the entire lecture. Interpolated testing during the lecture also helps to boost the amount of information that is recalled during a final cumulative test. Implications for the use of interpolated testing in online lectures are discussed. Email: Helen Jing, hjing@fas.harvard.edu

Testing Produces Potent, but Piecewise Learning of Multi-Term Facts. STEVEN PAN, ARPITA GOPAL, and TIMOTHY RICKARD, University of California, San Diego (Sponsored by Timothy Rickard). — Does correctly answering a test question about a multi-term fact enhance memory for the entire fact? We explored that issue in four experiments. Subjects first studied AP History or Biology facts. Half of those facts were then restudied, while the remainder were tested. Each test question assessed a critical term of the fact. In Exps 1-3, one test question was posed per tested fact; in Exp 4, up to three different test questions were posed per tested fact. After at least a 24 hr delay, a final test assessed terms that were tested. Each test question assessed a critical term of the fact. In Exps 1-3, one test question was posed per tested fact; in Exp 4, up to three different test questions were posed per tested fact. After at least a 24 hr delay, a final test assessed terms that were tested during training, as well as other terms that were not previously tested. Testing produced piecewise fact learning: tested terms benefited relative to restudy, but untested terms did not. That pattern held when fill-in-the-blank or multiple-choice questions were used during training, when one or two test trials were used during training, for both history and biology facts, and when more than one term from each fact was tested during training. Thus, a fundamental property of taking tests on multi-term facts is a selective memory benefit for tested terms. In applied settings, testing on multiple response terms should promote more comprehensive retention. Email: Steven Pan, stevencpan@gmail.com
Testing Enhances Learning Across a Range of Episodic Memory Abilities. STEVEN PAN, HAL PASHLER, and TIMOTHY RICKARD, University of California, San Diego.—Brewer and Unsworth (2012) reported that individuals with low episodic memory ability exhibit a larger testing effect, a finding which has potentially important educational implications. We conducted two replication attempts of that study. Exp 1 (n = 120) was conducted online with a broad demographic sample, while Exp 2 (n = 122) was done in the laboratory with undergraduate students. In both experiments, a large testing effect was found across the sampled range of episodic ability, and with no trend suggesting larger testing effects for lower ability subjects. Follow-up analysis of differences between the sampled distributions of episodic ability in the current study vs. that of Brewer and Unsworth account for the contrasting correlation results, and suggest that sampling from restricted ability ranges can yield positive, negative, or no correlation even if there is no direct relationship between episodic ability and testing’s effectiveness in the broader population. Overall, our results indicate that testing need not be restricted to low ability students, and that sampling considerations are critical when investigating individual differences in memory ability. Email: Timothy Rickard, trickard@ucsd.edu

Stress Moderates the Testing Effect for Cued but not Free Recall. PAULA WADDILL and SARAH LEE, Murray State University.—Taking repeated tests over material generally enhances performance on a final test more than repeatedly studying the material, especially when the test is delayed or difficult. One mechanism proposed for this testing effect is that the repeated retrieval required by repeated testing increases the retrieval strength of the target material and thus increases the probability of activating the information on a later test. However, stress may impair the recall of previously learned material via neurochemical processes that suppress activation. We investigated if the repeated testing advantage holds when stress is induced at the final test and if similar patterns occur when the final test is free recall vs. cued recall of a long text. Participants read a 980-word expository passage and either restudied or recalled the passage after 5 min and 2 days. After 1 week everyone completed free-recall and cued-recall tests either under stress (time pressure) or no stress. Repeated testing produced significantly better final free recall for both conditions but enhanced cued recall only in the no stress condition. The results are discussed in terms of the interaction of activation with differential retrieval processes. Email: Paula Waddill, pwaddill@murraystate.edu

The Critical Importance of Retrieval—and Spacing—for Learning. NICHOLAS SODERSTROM, GAYAN SENEVIRATNA, TYSON KERR, and ROBERT ALLEN BJORK, University of California, Los Angeles.—We examined the impact of repeated testing and repeated studying on long-term learning. In Experiment 1, we replicated Karpicke and Roediger’s (2008) influential results showing that once information can be recalled, repeatedly testing that information enhances learning, whereas restudying that information does not. We then examined whether the apparent ineffectiveness of restudying might be attributable to the spacing differences between items that was inherent in the between-participants design employed by Karpicke and Roediger. When we controlled for these spacing differences by manipulating the various learning conditions within-participants in Experiment 2, we found that both repeated testing and restudying improved learning, and that learners’ awareness of the relative mnemonic benefits of these strategies was enhanced. These findings contribute to our understanding of how two important factors in learning—test-induced retrieval processes and spacing—can interact, and they illustrate that such interactions can play out differently in between-participant and within-participant experimental designs. Email: Nicholas Soderstrom, nsoderstrom@psych.ucla.edu

Test Spacing and Transfer of Learning. JOSEPH PIROZZOLO and DONALD FOSS, University of Houston (Sponsored by Donald Foss).—Testing and its spacing have been shown to affect learning. This raises an important question: to what extent do tests facilitate transfer of learning? Some testing-effect experiments find a narrow range of transfer (e.g., Wooldridge, Bugg, McDaniel, & Liu, 2014). To further address this question, the final exam in two large undergraduate lecture classes contained short-answer items that were (1) identical, (2) related to questions from a previous exam, or (3) were new items. The classes differed in the frequency and spacing of the previous exams. We hypothesized that students in the frequent testing class would perform better on all types of questions, and further predicted that students would perform better on identical and related items than on new items. Preliminary results
indicate that students performed as well on related as on identical items, and better on both of those than on new items.
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(4053)
The Benefits of Testing and Guessing on Recognition Memory. MARK JORDAN HUFF, Washington University in St. Louis, KEITH A. HUTCHISON, Montana State University, DAVID BALOTA, Washington University in St. Louis. — We examined whether two types of testing (i.e., recall or critical item guessing) improved final recognition for related and unrelated word lists relative to restudying or completing a filler task. Both testing conditions improved correct recognition relative to restudy and filler conditions, particularly when study lists were semantically related. However, both testing conditions also inflated false recognition for the non-presented critical words. These patterns were found when final recognition was completed during a short delay within the same experimental session (Experiment 1) and following a 24-hr delay (Experiment 2). In Experiment 3, task instructions were presented after each list to determine whether recall and guessing effects were due task expectancy. In contrast to Experiments 1 and 2, final recognition following recall and guessing tasks was equivalent to restudy, suggesting that the observed recall and guessing effects were due to differential task-based processing during study.
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(4054)
The Testing Effect and Memory for Context. SARAH STANLEY, AARON BENJAMIN, University of Illinois Urbana-Champaign. — Recalling information from memory results in better long-term retention than restudy does but it is unclear if this testing effect extends to untested contextual details. In three experiments, participants studied word pairs that appeared in different locations on the screen. Some of these pairs were then tested and some restudied. On a final test, subjects were asked to produce the second word in response to the first, and to make a forced-choice guess of the location in which a pair appeared. The benefits of testing appeared for memory for both the item and the associated context. This effect persisted even when the review context was deliberately designed to interfere with the original context (Experiment 3). The effect was even apparent when examining context memory only for the subset of items that elicited successful recall on the final test (Experiments 2 and 3), a result that implies that improved memory for context in the testing condition was not merely a consequence of superior memory for the word-pair cue. These results indicate that memory tests enhance memory for more than the experimental memoranda; they also enhance memory for the association between the material and the surrounding context.
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(4055)
The Influence of Phonological Similarity at Recognition Test on the Testing Effect: Comparison Between Immediate Test and Delayed Test. DAISUKE CHO, Hosei University (Sponsored by Tetsuya Fujita). — Many studies have demonstrated that testing has a more powerful effect on retention than restudying. This phenomenon is called the testing effect (e.g., Roediger & Karpicke, 2005). Testing effect occurs when participants spend great effort to retrieve studied items. The present study focused on retrieval effort by manipulating phonological similarity between target and distractor and investigated its effect on testing effect. In initial test after studying the target, participants received two types of two-alternative forced-choice test. In one test, the target and distractor shared the same phonological feature. The other test was the same except that the items did not share any phonological feature. Finally, participants took either an immediate test that occurred after a 5min retention interval or a delayed test that occurred after a 1 week retention interval. On the basis of obtained results, whether phonological similarity has an effect on testing effect will be discussed.
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(4056)
The Testing Effect in Memory: More Benefit for Better Learned Material. W. TRAMMELL NEILL and ABIGAIL L. KLEINSMITH, SUNY-Albany. — Memory for studied material often benefits more from subsequent testing than simple restudy, especially over longer retention intervals. Halamish and Bjork (2011) proposed that testing “bifurcates” the memory strength distribution: Successful retrieval boosts average strength above restudied items, while unretrieved items remain weaker. A “testing effect” then depends on the relative proportions exceeding the final test criterion. Our subjects initially studied Swahili-English pairs once (1x) or twice (2x). The Test group then recalled translations for half the pairs, while the Restudy group studied them again. Restudy outperformed Test on immediate final recall. However, Test outperformed Restudy in 48-hour delayed recall, more for 2x pairs than 1x pairs. Test also outperformed Restudy on items not tested or restudied. Moreover, tested items yielded minimal forgetting over time, in contrast to drastic forgetting of restudied items. The results support the bifurcation theory, but also imply that retrieval enhancement contributes to the testing effect.
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(4057)
Forgetting Versus Facilitation: The Fate of Nontested Information in the Testing Effect. LAUREN ELIZABETH BATES and EDWARD L. DELOSH, Colorado State University (Sponsored by Carol Seger). — The testing effect is an established memory phenomenon that demonstrates that retrieval enhances memory relative to restudying. Testing effects can be both direct and indirect. One example of an indirect effect of testing is retrieval-induced forgetting (RIFO), in which taking a test on a subset of information can actually impair recall of related, but nontested information. Recent research has also demonstrated retrieval-induced facilitation (RIFA), the opposite pattern, in which testing on a
subset of information enhances memory for related but non-tested information. The present study sought to determine the key factors that determine whether the indirect testing effects on non-tested information takes the form of forgetting versus facilitation. Results showed that final test type (i.e., cued or free recall) affected whether RIFO or RIFA was observed when using semantically related cue-target word pairs. Future research should seek to better understand under which conditions RIFO or RIFA is elicited over the other. Email: Lauren Elizabeth Bates, laurenbates@colostate.edu

(4058) Further Evidence That Testing Enhances Retrieval Monitoring. BENTON PIERCE, MELISSA HAWTHORNE, and JASON MCCAIN, Texas A&M University-Commerce, DAVID GALLO, University of Chicago. — In the present study, we provide further evidence that testing reduces the buildup of proactive interference (PI) in part by enhancing retrieval monitoring. Participants studied five lists of unrelated words. Those in the study-only condition performed a distractor task following lists 1-4, whereas those in the test group recalled each list following study. Following a short distractor task, both groups recalled list 5 over two consecutive phases. As in prior studies, the test group recalled more items and had fewer prior-list intrusions than the study-only group on the first list 5 test. On the second test, however, prior-list intrusions were equivalent across the two groups, presumably because having already been recalled, list 5 was no longer distinctive. These results are inconsistent with a constrained retrieval account, but do support the notion that intermediate testing acts to make items more distinctive and easier to monitor on a later test.
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(4059) When and Why Multiple-Choice Testing Triggers Productive Retrieval Processes. ERIN SPARCK, ELIZABETH LIGON BJORK, and ROBERT ALLEN BJORK, University of California, Los Angeles (Sponsored by Elizabeth Ligon Bjork). — When appropriately constructed, multiple-choice tests have two important virtues as practice tests: They enhance later recall when the same questions are asked in a cued-recall format; and they also increase the later cued recall of answers to new questions for which incorrect alternatives on the practice test are now correct answers (Little, Bjork, Bjork, & Angello, 2012). The second of these benefits is dependent on the incorrect alternatives being competitive enough to prompt learners to retrieve why those alternatives are incorrect. In prior research we found that the confidence-weighted multiple-choice format can enhance this benefit relative to standard multiple-choice tests (Sparck, Bjork, & Bjork, 2014). In the present research, we tested whether simply requiring confidence judgments when answering standard multiple-choice questions would produce the same enhancement, or if the confidence-weighted multiple-choice format invokes metacognitive strategies that are uniquely beneficial. Email: Erin Sparck, emsparck@ucla.edu

(4060) Examining the Relationship Between Testing Effects and Output Interference in Recognition Memory. WILLIAM R. AUE, Purdue University; AMY H. CRISS and SEAN A. SPANGLER, Syracuse University; JEFFREY D. KARPICKE, Purdue University, IIHANA MEHANOVIC, Syracuse University. — The benefits of testing are well known (e.g., retrieval practice effects), however the encoding that occurs during testing can also harm memory on subsequent test trials. This phenomenon, termed output interference, manifests as a decline in episodic memory performance across a single testing session. No study has, as yet, examined the relationship between retrieval practice and output interference. In a series of experiments we examined the relationship between retrieval practice effects and output interference. Based on the results we suggest that the effects could be independent. Specifically, we suggest that encoding of additional context information at test affords a memory benefit during a later test, whereas output interference is driven by item noise added during test. Potential future directions and implications for theories of retrieval practice and models of memory are discussed.
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• IMPLICIT MEMORY •

(4061) True Inference Without Deliberation or Stimulus Weighting: A Direct Comparison Across Methodologies. SARA HELD, MARIANA V.C. COUTINHO, JOSHUA HOELTER, and ANTHONY J. GREENE, University of Wisconsin, Milwaukee (Sponsored by Anthony J. Greene). — The Transitive Inference (TI) task is a relational task that does not depend upon awareness, but various laboratories have heretofore demonstrated mixed results. It is likely that differences in task demands result in variable outcomes. To test this, we conducted three versions of the TI task following methods known to yield distinct outcomes using a single stimulus set, population, laboratory and research team. Different methods, previously assumed to be unimportant, affect task demands by varying difficulty. Awareness is a consequence of the number of stimulus presentations required at study but unrelated to successful inference. Additionally, performance on the inner pairs, B>C and C>D, at study predicts inference across training methods, which is inconsistent with value-weighting explanations. Taken together with prior findings (e.g., Greene et al., 2001), task awareness is not necessary for inference or evidence of requisite deliberation, but an artifact of mere exposure.
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(4062) The Implicit Information Modifies the Gazing Bias in a 2-AFC. KENGO TANE and CHIKASHI MICHIMATA, Sophia University (Sponsored by Chikashi Michimata). — We recorded the eye movements during a paired-associates task, and compared the implicit learning condition, the explicit learning condition and the non-learning condition.
During the learning phase, participants should learn the association between color (red or green) and abstract figures. In half of the trials, the stimulus pairs were presented implicitly using Continuous Flash Suppression paradigm. During the test phase, correct pair and incorrect pair were presented side by side. In non-learning condition, the pairs which did not present during the learning phase was used. Results showed that participant's gaze was gradually biased toward the choosing stimulus in all conditions. The gaze bias has started first in the Implicit learning condition, followed by the non-learning condition, and the explicit learning condition. This result suggests that the gazing bias have the implicit information to induce the conscious decision.

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(4063)
Procedural Learning of Attentional Dynamics in a Rapid Serial Visual Presentation Task. JACQUELINE SHIN, Indiana State University. — Environmental information often becomes available to us in a predictable temporal pattern. In order to optimally process this information, it would be advantageous to focus attention at points in time when useful information is highly likely to occur. We investigated whether temporal information could be learned implicitly to change the dynamics of attention. In a rapid serial visual presentation (RSVP) task a blue target letter was displayed among a series of black distractor letters at the rate of 10/sec. In training blocks, the target was randomly presented at one of two serial positions in the RSVP stream. Then, in transfer blocks, the target was presented at one of two other serial positions. The training and transfer target positions were counterbalanced across participant groups. Learning effects will be discussed with respect to the temporal modulation and distribution of attention as a result of skill development.

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(4064)
Predictors and Characteristics of Word Stem Completion. RYAN JAMES HUBBARD and KARA D. FEDERMEIER, University of Illinois, Urbana-Champaign (Sponsored by Kara D. Federmeier). — Word stem completion has been used for decades to examine implicit memory processes; however, little is currently known about what factors influence subjects’ completions in the absence of specific task demands. Here, 102 subjects completed 330 3-letter stems as quickly as possible through Amazon Turk. We characterized the distribution of responses for each stem and examined which variables contribute to the probability of a word being chosen. Results show that certain lexical variables, such as frequency and familiarity, are particular important compared to others. Additionally, while most items elicit responses of moderate variability across subjects, some show more stereotypical responses, while a select few are highly variable. These data not only afford insight into word generation processes, but also provide a database for future word stem completion studies.

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(4065)
Visual Summary and the Mere Exposure Effect. YOSHIYUKI UEDA, Kyoto University. — Visual information is summarized and represented when we perceive the external world. People preferred merely presented objects (called the mere-exposure effect) and it is caused by an increment in perceptual fluency (ease of processing). Therefore, does preference for summarized information, which is not actually presented but just processed in the mind, increase? In the present experiment, participants were asked to calculate the average size of 12 circles and judged which average was larger in the current trial or the immediately preceding trial. Four average sizes were repeatedly presented. In the subsequent session, participants judged which of two circles was more preferred: one was the averaged size presented before and the other was not. The results showed that the circle with the averaged size was more preferred regardless of a novel stimulus, suggesting that summarized visual information is memorized and contributes to the forming of generalized preferences across exemplars.

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(4066)
Acquisition and Long-Term Retention of the Categorization Rule in Case of Naturalistic Stimuli. ANETT RAGÓ, University of Eotvos Lodana, MÁRTON CZET, University of Eotvos Lorand, ESZTER SOMOS, University of Hull, MÁTÉ VARGA, Budapest University of Technology and Economics. — Our aim was to investigate the emergence and stability of prototype abstraction in an implicit information-integration task using complex Gestalt-like stimuli consist of individually identifiable exemplars following a family resemblance structure. In a supervised category-learning paradigm far-from-prototype (FP) exemplars were presented for adults. In the immediate test phase prototypes, close-to-prototype (CP) exemplars, and transfer FPs were shown. We also presented training FPs to test exemplar effect. Hit rates, reaction times were recorded, and event related brain activity was registered from 32 electrode sites. Test 1 was repeated a week later. Hit rates and reaction time results show that participants were able to learn the complex categorization rule. Moreover, this general knowledge was still stable a week later. Hit rates for individual exemplars in the immediate test were as weak as a week later. Behavioral data didn't show progress during learning. However, the increase of error-related negativity ERP components' amplitude indicated the emergence of rule abstraction. Our results confirm that specific information is overwritten by the generalized knowledge of category structure which remains stable in time.

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• RECOGNITION III •

(4067)
Long-Term Consequences of Correct and False Recognition. MATTHEW SABIA and ALMUT HUPBACH, Lehigh University (Sponsored by Almut Hupbach). — In visual recognition tasks, people often falsely identify foils that are similar to previously encoded targets, especially when the targets are not presented at test. A series of studies explored the long-term consequences of both false recognitions and correct rejections by testing recognition memory twice, immediately after subjects had encoded a series of visual images, and again after a 48-hour delay. A consistent pattern emerged: When subjects falsely identified target-related foils at Test 1, they often selected these foils again at Test 2, but correctly identified the targets if Test 1 foils were omitted at Test 2. Surprisingly, when subjects correctly rejected the foils at Test 1, they often missed the targets at Test 2. These findings are discussed with respect to source monitoring, transfer-appropriate processing and intentional forgetting. Email: Matthew Sabia, sabian3@gmail.com

(4068)
Retrieval of Relational Information During Associative Recognition. VENCISLAV POPOV and PENKA HRISTOVA, New Bulgarian University, ROYCE ANDERS, Aix Marseille Université, CNRS (Sponsored by Lynne Reder). — An associative recognition experiment demonstrated that implicit relational information is encoded when studying word pairs and that it is spontaneously retrieved by relationally similar lures during recognition. Participant studied word pairs presented individually on a computer screen. During test they saw intact and recombined pairs of words and they had to respond whether they had studied that word pair or if it is a pair constructed of words that were studied apart (lures). Participants made more errors on lures that were relationally similar (“donkey hoof”) to studied pairs (“cat pow”), compared to dissimilar lures (“painter brush”), and they also responded more slowly. Thus implicit relational information can be a false source of familiarity during recognition and participants have to inhibit it in order to recognize relationally similar lures as not studied. The data can inform models of episodic memory and analogy since it cannot be readily explained by existing mechanisms. Email: Vencislav Popov, vencislav.popov@gmail.com

(4069)
Costs and Benefits of Context Effects in Recognition Memory. MARIANNE LLOYD, Seton Hall University, CHI T. NGO, Temple University. — Previous demonstrations of a context effect in recognition memory have been interpreted as a positive consequence of recognition memory processes. However, these demonstrations have often confounded episodic and semantic sources of familiarity. In the present study, objects were studied on meaningful backgrounds, on colorful but meaningless backgrounds, and by themselves. At test, the objects were presented on a mix of these background types. Context effects for targets were observed in all three encoding conditions. When objects were studied on meaningful encoding backgrounds, higher false alarm rates occurred for changed exemplars in reinstated contexts. This pattern did not occur when objects were studied alone or on meaningless backgrounds. The results of the experiment demonstrate a cost of context when items are encoded in natural scenes as well as a contribution of semantic sources of familiarity to memory decisions. Email: Marianne Lloyd, lloydmar@shu.edu

(4070)
Visual Memory Is Superior to Auditory Memory Despite Extensive Auditory Training. MICHELE GLOEDE, EMILY PAULAUSKAS, and MELISSA GREGG, University of Wisconsin-Parkside — Recent studies show that recognition memory for sounds is inferior to memory for pictures. One potential reason for this difference is that observers have more experience attentively viewing visual objects. Three experiments were conducted to evaluate the role of experience in auditory and visual memory. Participants received a study phase with pictures/sounds, followed by a recognition memory test. Participants then completed auditory training with each of the sounds, followed by a second memory test. Despite auditory training in Experiments 1 and 2, visual memory was superior to auditory memory. In Experiment 3, we found that it is possible to equate auditory and visual memory, but only after 3 days of auditory training and 3 days of visual memory decay. The results suggest that extensive practice with auditory information can increase the capacity of auditory memory, but this may only be the case under conditions of decreased exposure to visual information. Email: Melissa Gregg, greggm@uwp.edu

(4071)
Semantic Congruency not Temporal Synchrony Enhances Long-Term Memory Performance for Audio-Visual Dynamic Scenes. HAUKE MEYERHOFF, Knowledge Media Research Center, MARKUS HUFF, University of Tuebingen. — Human long-term memory for visual objects and scenes is tremendous. Here, we explore how auditory information contributes to long-term memory performance for realistic scenes. In a total of six experiments, we manipulated the presentation modality (auditory, visual, audio-visual) as well as semantic congruency and temporal synchrony during auditory and visual information of brief filmic clips. Our results show that audio-visual scenes generally elicit more accurate memory performance than unimodal scenes. This advantage even increases when visual and auditory information was congruent. However, violations of audio-visual synchrony hardly have any influence on memory performance. Memory performance remained intact even with a sequential presentation of auditory and visual information, but finally declined when the separate tracks of one scene were randomly intermixed among the other tracks during learning. Our results demonstrate that audio-visual integration is sensitive to semantic congruency but remarkably robust against temporal asynchrony of auditory and visual information. Email: Hauke Meyerhoff, h.meyerhoff@iwm-kmrc.de
I Studied Write, Right? Homophones and the Production Effect. ANGELA C. JONES, John Carroll University, MARY PYC, Dart Neuroscience. — In a series of experiments, we investigated the influence of various types of production on memory for homophones (e.g., flour/flour). Participants studied words (one at a time), a subset of which included homophones. Participants read 1/3 of items aloud, 1/3 silently, and wrote 1/3 of the items. Following study, they completed recognition tests either immediately or after one day. Critical test items included the studied homophones or the unstudied, alternate spellings. Hit rates indicated that memory was best for homophones studied aloud and written ones were better remembered than those read silently. However, false alarm rates indicated a general “yes” bias for items studied aloud; false alarms on alternate spellings of homophones read aloud occurred more often than for written or silently read items. Results are discussed in terms of the distinctiveness and memory-strength accounts of the production effect. Email: Mary Pyc, mpyc@dartneuroscience.com

Item Learning Versus High-Level Categorization in Consistent-Mapping Memory Search. RUI CAO, RICHARD SHIFFRIN and ROBERT NOSOFSKY, Indiana University (Sponsored by Robert Nosofsky). — A fundamental contrast in memory search is whether targets and distractors receive consistent mappings (CM) or varied mappings (VM). In CM, targets are always “old” and distractors are always “new”; whereas in VM, targets and distractors switch roles across trials. CM training yields “automatic” responding, whereas VM performance is highly capacity limited even after extensive practice. Recent theorizing suggests that CM performance entails both familiarity- and categorization-based processes. Here, we unpack the detailed categorization mechanism that is involved: Do subjects learn a high-level category distinction between the target vs. distractor sets, or is the decision made at the individual item-response level? We tested subjects in a categorized varied-mapping (CV) condition: there were two categories of items, but the old-new assignments for each set were randomly decided on each trial. Performance in the CV condition was virtually identical to the VM condition, providing strong evidence in favor of the item-learning hypothesis. Email: Rui Cao, caoru.beili@gmail.com

Event Segmentation and Associative Recognition for Narrative Details. JOEL R. QUAMME, Grand Valley State University, LINNEA R. MARKS, University of Texas at Austin, CHRISTOPHER A. KURBY, Grand Valley State University. — Prior work in event cognition suggests people form mental models of ongoing experience, which they segment into discrete events at spatiotemporal shifts. Further evidence suggests these models organize information in memory such that their structure influences the retrieval of event details. In two experiments, we examined how event boundaries in narrative text influence associative recognition for details embedded in the text. Subjects read stories about characters participating in everyday sequences of events, in which some sentences described arbitrary or coincidental co-occurrences (e.g., While talking on the phone, Suzy stifles a sneeze). Boundaries between event segments were created by periodically introducing relatively-large changes of place and time. After reading the stories, participants distinguished intact old sentences from recombinant foil sentences describing two details that occurred previously, but not at the same moment. Effects of event structure on recognition errors were found in which false alarms were greater for foil sentences recombinated within the same event than between different events. The results suggest the process of event segmentation may guide associative binding. Email: Joel R. Quamme, quammej@gvsu.edu

Interfering With Episodic Memory for Words and Pictures: Semantic and Visual Similarity in Dual-Tasks. MELISSA MEADE and MYRA FERNANDES, University of Waterloo (Sponsored by Myra Fernandes). — We used the divided attention technique to infer the cognitive resources and code used to represent words and pictures in long-term episodic memory. Participants were asked to retrieve a target set of categorized words or pictures while simultaneously making size judgments to another set of words (Experiment 1) or pictures (Experiment 2) presented concurrently. We manipulated semantic relatedness of distractor to target item. Recognition accuracy for words, but not pictures, was poor when distractor words were semantically related to targets. Recognition accuracy for pictures was, however, poorer when distractors were pictures that were both semantically and visually related to the target item. Findings indicate that memory for words is highly susceptible to interference from semantic distractors whereas memory for pictures is disrupted only by distractors that are both semantically and perceptually related. Our study thus indicates that pictures, unlike words, benefit from having both semantic and visuo-perceptual features to protect them from interference from distracting information. Email: Melissa Meade, mmmeade@uwaterloo.ca

The List-Length and the List-Strength Effects in Recognition Memory. ASLI KILIC, Middle East Technical University. — Strengthening items in a list increases hit rates and decreases false alarm rates in recognition memory, known as the strength based mirror effect (SBME). The SBME has also been observed when study lists were mixed in strength but the test list consisted of only strong targets or only weak targets. However, the size of the SBME observed in the mixed list paradigm depends on the task employed to strengthen the items (e.g., spaced repetitions or levels of processing) and the length of the study list. The current study explores the role of the strengthening task and list length on the SBME observed in a mixed list paradigm. Participants studied a mixed list in which items were strengthened either via spaced repetitions or a levels of processing manipulation in varying list length conditions. The theoretical implications of the moderating effect of list length on the SBME will be discussed. Email: Asli Kilic, klicash@gmail.com
(4077) The Production Effect: Testing the Boundaries of the Translation Account. NOAH FORRIN and COLIN M. MACLEOD, University of Waterloo (Sponsored by Jason Ozubko). — The translation account (Conway & Gathercole, 1990) presumes that there is a memorial benefit to encoding words in a modality other than their presentation modality. For example, it is more memory-enhancing to write words presented auditorily than to write words presented visually. We tested the boundaries of the translation account in the context of the production effect. First, we extended the translation account by showing that typing benefits memory more when words are presented auditorily rather than visually. Second, we demonstrated that the benefit of typing auditorily presented words is eliminated when the words are simultaneously presented visually. Finally, we showed that the translation account does not apply to verbal production: Reading aloud visually presented words does not enhance memory relative to reading aloud auditorily presented words. We conclude that the translation account does not adequately explain the production effect. Email: Noah Forrin, nforrin@uwaterloo.ca

(4078) Characterizing the Relationship Between Semantically Similar and Dissimilar Items in Recognition Memory. RYAN A. CURL, JENNIFER SLOANE, and COREY N. WHITE, Syracuse University (Sponsored by Lael Schooler). — It is well established that semantic similarity plays a role in recognition memory, whereby targets and lures that are semantically similar to the studied words are more likely to be considered targets. There is less work addressing the role of semantic similarity on the response rate of semantically dissimilar words. To address this, we varied the proportion and type of semantically similar words being tested, which lead to a change in the amount of semantically similar words that were considered targets. Here we have shown that as the amount of semantically similar words considered targets increases, the amount of dissimilar words considered targets decreases. Further, we show that if participants are tested on the semantically similar and dissimilar words separately, the amount of semantically similar words that are considered targets decreases. These results suggest that the perceived contrast between semantically similar and dissimilar words is a critical aspect of the semantically similar word response bias. An initial characterization of this phenomena is depicted and possible explanations are discussed which attempt to lay the groundwork for future exploration into the role of semantic similarity in memory. Email: Ryan A. Curl, rcurl@syr.edu

(4079) Bivariate Recollection in Recognition. CARLOS GOMES and CHARLES BRAINERD, Cornell University (Sponsored by Charles Brainerd). — Recollection has traditionally been assumed to be a univariate process that retrieves contextual details from an item's prior occurrence. However, we tested a new dual-recollection hypothesis, which assumes that recollection is bivariate, consisting of its traditional form (context recollection) and a second form that retrieves studied items per se (target recollection). We used a novel procedure—conjoint source recognition (CSR)—that separates context from target recollection for true and false items. Subjects study lists of semantically related words presented in at least two distinct contexts and then receive a recognition test composed of targets, related distractors, and unrelated distractors that are factorially crossed with five types of instructional conditions. The data generated by this procedure was analyzed with mathematical models that assumed either univariate or bivariate recollection. Models that implemented bivariate recollection provided better fits to CSR data, and target and context recollection parameters were dissociated over conditions. Email: Carlos Gomes, cf365@cornell.edu

(4080) An Encoding Variability Interpretation of the Unequal Variance Signal Detection Model. JOEL R. KUHN, University of California, San Diego, LAURA MICKES, Royal Holloway, University of London, JOHN WIXTED, University of California, San Diego (Sponsored by John Wixted). — The unequal variance signal detection (UVSD) model of recognition memory holds that the Gaussian distribution of memory strength for targets has a larger mean and larger variance than the distribution for lures. The larger variance of the target distribution theoretically implies that some target items, by virtue of having appeared on a list, should exhibit a decrease in the strength of the memory signal compared to the signal that would have been generated had the target been used as a lure instead. Using a lures-to-target paradigm, we show that the confidence ratings of a small proportion of target items do in fact decrease relative to the ratings they earlier received as a lure. More generally, we analyze the different sources of variability contributing to the target and lure memory signals in an effort to test the encoding variability account of the unequal-variance signal-detection model. Email: Joel R. Kuhn, jkuhn@ucsd.edu

**MEMORY & REWARD, MOTIVATION & EMOTION**

(4081) Effects of Affective Arousal on Prediction Errors in Reinforcement Learning: Evidence From Feedback-Related Negativity. YIN-DIR HWANG, HONG-HSIANG LIU, WEN-SUNG LAI, and YUNG-FONG HSU, National Taiwan University. — Equality and fairness in social interaction often elicit affective arousal and show a great impact on decision making. The present study aims to uncover the mechanism behind such daily-life experiences using the behavioral, model-fitting, and electrophysiological approaches. In the first session of the experiment, subjects were randomly assigned to one of the “Neutral,” “Harsh,” and “Kind” groups to undertake a different level of conceived fairness. Then a probabilistic learning task with varied probabilities of negative-reward assignments was applied to each subject to examine the impact of emotional experience on her/his choice behavior.
Trial-by-trial data were fitted with a reinforcement learning (RL) model using the Bayesian approach. Brain activities were analyzed via ERPs. Our analyses revealed that, compared with other two groups, subjects in the “Harsh” group retained more task scores, exhibited distinct parameter values of the RL model, and demonstrated a higher degree of feedback-related negativity, suggesting a tendency to loss aversion. Email: Yung-Fong Hsu, yfhsu@ntu.edu.tw

(4082)
The Effects of Outcome Valence and Motivational Salience on Face Learning and Memory. ZIYONG LIN and PATRICIA REUTER-LORENZ, University of Michigan (Sponsored by David Meyer). — Reinforcement learning enables agents to make optimal decisions (maximize gains, minimize losses). We examined the role of outcome valence and motivational salience in learning and memory using a two-alternative forced choice task, followed by a recognition task. Three pairs of faces were used as stimuli and designated as a win, loss, or no change pair. Faces in win/loss pairs predicted the designated outcome on either 80% or 20% of the trials (motivational salience). A win outcome earned 5 points while a loss outcome lost 5 points. Participants selected a face on each trial to maximize accumulated points. Win pair learning was significantly better than learning of loss and no-change pairs. Further, subsequent recognition memory was superior for win faces and for faces with higher motivational salience. Our results indicate that compared to losses, rewards can lead to better learning and greater memory retention. Implications for reinforcement learning theory are discussed. Email: Ziyong Lin, ziyonglin@gmail.com

(4083)
The Effect of Emotional Facial Expressions on Item and Associative Memory in Younger and Older Adults. SANCHITA GARGYA, MOSHE NAVEH-BENJAMIN, University of Missouri (Sponsored by Moshe Naveh-Benjamin). — Research suggests that emotional stimuli can modulate item and associative memory performance. Previous aging research shows consistent item memory improvement, with either no effect of emotional stimuli on associative memory performance or a pattern of decline. The current study attempted to elucidate the specific benefits of valence and arousal by using powerful emotional stimuli - faces with positive and negative emotional expressions, on item and associative memory for face-name pairs among younger and older adults. In Experiment 1, item and associative recognition memory were tested for faces, names and face-name pairs. In Experiment 2, the effect of emotion was strengthened by repeating face-name pairs at study. The results indicated age-related declines in associative but not in item memory. Furthermore, relative to neutral condition, overall emotional arousal hurt associative memory performance in both age groups, while not showing a benefit for the emotional faces themselves. Finally, comparing the two valences, positive valence improved performance on both tests. Email: Sanchita Gargya, sg755@mail.missouri.edu

(4084)
Instructing Implicit Processes: The Impact of Instructions to Approach or Avoid on Implicit Evaluation Is Not Fully Mediated by Changes in Explicit Evaluation. PIETER VAN DESSEL and JAN DE HOUWER, Ghent University, ANNE GAST, University of Cologne, COLIN TUCKER SMITH, University of Florida, MAARTEN DE SCHRYVER, Ghent University (Sponsored by Baptist Liefooghe). — Previous research has shown that linking approach or avoidance (AA) actions to novel stimuli through mere instructions causes changes in the implicit evaluation of these stimuli even when the actions are never performed. We investigated whether AA instructions influence implicit evaluations through a mediating influence on explicit evaluations. In Experiment 1, mediation analyses indicated that both participants who merely received instructions to approach or avoid fictitious social groups and participants who additionally performed actual AA behavior exhibited changes in the implicit evaluation of these groups that were not fully mediated by changes in explicit evaluation. Moreover, when participants received information about the evaluative properties of the two groups, AA instructions caused changes in implicit evaluations in the absence of changes in explicit evaluations. Experiment 2 replicated the latter finding and extended it by demonstrating that AA instructions that were incompatible with the previously obtained evaluative information influenced implicit, but not explicit evaluations. We discuss implications for current theories of implicit evaluation. Email: Pieter Van Dessel, Pieter.VanDessel@UGent.be

(4085)
Reward Outcome, and not Reward Uncertainty, Drives Reward-Related Enhancements of Long-Term Memory. ALICE MASON and CASIMIR LUDWIG, University of Bristol, SIMON FARRELL, University of Western Australia (Sponsored by Simon Farrell). — Declarative memory has been found to be sensitive to reward related changes in the environment. The reward signal can be broken down into information regarding the expected value of the reward, reward uncertainty (entropy) and the prediction error. Research has established that high as opposed to low reward values enhance declarative memory. Research in neuroscience suggests that high uncertainty activates the reward system, which could lead to enhanced learning and memory. We tested this hypothesis in a motivated word learning task in which the probability of receiving a fixed reward varied from 0.1 to 0.9 in increments of 0.2. Rewards were dependent upon memory performance in a delayed recognition test. Uncertainty did not predict memory performance, along with other predictors including prediction error and expected value. The critical factor in determining memory performance was found to be reward outcome value. This adds to other findings from our lab that provide consistent evidence against an effect of reward uncertainty on declarative memory. Email: Alice Mason, am8302@bristol.ac.uk
(4086) Emotional Memory: Signal-Detection and Dual-Process Accounts of Remember-Know Judgments. DENNIS BOYWITT, University of Mannheim. — Emotional memories are more often experienced as vivid recollections than memories of neutral events. But applications of the remember-know procedure to the study of emotional memories have raised the concern that increased rates of remember responses to emotional as compared with neutral stimuli might be due to a confound of response bias and measures of subjective retrieval experience. With two experiments the present study examined some underlying assumptions of this response bias account by means of model-based analyses using a signal detection and a dual-process model. Extending the empirical basis to intentional and incidental study conditions with strongly arousing stimuli, the present study suggests that response bias is a non-negligible factor but genuine differences in the subjective retrieval experience remain under some conditions even after controlling for response bias. Further, the results hint at some model-inherent problems of the signal detection account in explaining remember-know judgments. Email: Dennis Boywitt, boywitt@uni-mannheim.de

(4087) Recollection Enhances Contextual Detail Recall. JOSEPH P. HENNESSEE, ALAN CASTEL, and BARBARA KNOWLTON, University of California, Los Angeles (Sponsored by Barbara Knowlton). — Recollection and familiarity constitute two important processes behind recognition memory. This study was devised to validate the use of remember responses to measure conscious recollection, and to contrast this with familiarity-based memory. Forty-six undergraduate participants learned a long series of individual words paired with different point-values and shown in one of five colors. After a ten-minute retention-interval, they were able to give a remembering response or a familiarity rating. As in our previous studies, value enhanced recognition performance and led to more conscious recollection. Results also indicated that remember responses were much more likely to result in correct recall of the color or point-value than any familiarity-based response. Furthermore, only contextual detail recall after remember responses was more accurate than chance guessing. These findings validate the use of self-reported remembering as a measure of conscious recollection, and further supports that recollection and familiarity are qualitatively distinct processes. Email: Joseph P. Hennessee, jhennessee006@yahoo.com

(4088) Reward Context Modulates Associative Learning. MICHAEL FREEDBERG, ELIOT HAZELTINE, and KENNY CARLSON II, The University of Iowa (Sponsored by Eliot Hazeltine). — Recently, Freedberg and colleagues (in review) demonstrated that incidental learning of rewarded associations bolsters learning. However, it is unclear whether this effect was driven by an appetitive (reward-driven), or aversive (punishment-driven) mechanism. To address this question, we used a chord-learning task and divided participants into three groups. All groups received a reward of equal magnitude for correct performance of half of the chords (e.g. +1 point), but differed in the alternative reward presented for the remaining chords; the Reward group received +4 points (greater value), the Punishment group received +0 points (lesser value), and the Neutral group received +1 point (equal value). Although the Reward and Punishment groups performed +1 chords similarly, only the Reward group experienced significantly stronger encoding of the higher reward value at transfer ((t(31) = 2.27, p < 0.05, D’ = 0.52). These data support an appetitive rather than aversive mechanism for this effect. Email: Michael Freedberg, michael-freedberg@uiowa.edu

(4089) Mindfulness Increases Memory for Anxiety-Provoking Stimuli in High-Anxious People. LISA EMERY, KAITLYN PECHANEC, CHRISTINA FALCETO, LUKE LIPPARD, and PATRICK LONG, Appalachian State University. — Previous research has found that employing emotion regulation strategies during encoding can impact later memory for emotional events. Much of this research has focused on the strategies of suppression and reappraisal, and primarily included stimuli with heterogenous negative content. In the current study, we investigated the impact of another popular emotion regulation strategy — mindful attention—on memory for anxiety-provoking stimuli. We also measured participants’ state anxiety to determine if the impact of the mindfulness strategy varied by anxiety level. Undergraduate students viewed pictures of anxiety-provoking and pleasant photographs from the International Affective Picture System. During viewing, participants were asked to engage in either mindfulness or suppression strategies, or to simply watch the photographs. After an approximately 10 minute delay, participants were asked to describe the pictures they could remember. Relative to the watch condition, mindfulness instructions decreased memory for the anxiety-provoking photographs, but only in people who had low levels of state anxiety. The mindfulness instructions increased memory for anxiety-provoking photographs in people who had high levels of state anxiety. Email: Lisa Emery, emerlyj@appstate.edu

(4090) Effects of Encoding on Ratings of Arousal and Emotional Valence. TETSUYA FUJITA and MIZUKI KATO, Hosei University. — Through two experiments, we investigated not only arousal and emotional valence as attributes of emotional stimuli but also the effects of encoding, if any, on ratings of arousal and emotional valence. When obtaining the ratings, we discriminated participants’ emotions aroused by the presentation of stimulus (evoked condition) from emotions included in the content of the stimulus (inherent condition), and required participants to rate arousal and emotional valence in order to compare the effects of encoding on emotional stimuli. Results showed that in ratings of both arousal and emotional valence, there was higher memory for recall after the evoked condition only when the inherent condition preceded it. Moreover, we found that evoked and inherent ratings had different effects on memory performance and that the rating relevant to the emotion shows the effect of encoding. Email: Tetsuya Fujita, fujita009@nifty.ne.jp
(4091)

Establishing a Trivia Question Database to Examine How Curiosity and Interest Influence Memory. GRETA FASTRICH, University of Reading, TYSON KERR and ALAN CASTEL, University of California, Los Angeles, KOU MURAYAMA, University of Reading. — Curiosity is a state that involves feeling accompanying the desire to learn what is unknown. There has been increased attention to how curiosity (or interest) influences memory performance. One common way to induce curiosity in experiments is to use trivia questions. Previous studies, however, used only a limited number of trivia questions that differ substantially across studies, making it difficult for comparability and generalizability of the findings. To address these issues, the current study aimed to establish a normative database for 303 trivia questions with a large sample (N = 1897). Participants were presented with trivia questions and indicated their curiosity to learn the answer. Following the presentation of the answer, participants indicated their post-answer interest. One week later, participants were given a surprise memory test on the questions. Our analysis showed that these epistemic states, especially post-answer interest, are positively (albeit not so strongly) related to memory performance. Email: Kou Murayama, murakou@orion.ocn.ne.jp

(4092)

Valence Related Recapitulation During Memory Retrieval: An fMRI Study. HOLLY J. BOWEN and ELIZABETH KENSINGER, Boston College. — Memory is best when the processes engaged during encoding overlap with those engaged at retrieval. One marker of such overlap is neural recapitulation. There is reason to expect that negative events, which are associated with particularly vivid memories, may be associated with more recapitulation than positive. The current fMRI study examines valence related recapitulation during retrieval of neutral memoranda previously encoded in an emotional context. Participants intentionally encoded neutral words paired with a positive, negative or neutral image. They then completed a recognition judgment for the words; the emotional context was not re-presented at retrieval. Conjunction analyses of encoding-retrieval overlap revealed activation in prefrontal regions for positive valence and more widespread overlap within not only frontal but also sensory regions. The results demonstrate that even when memory retrieval cues are neutral, there is valence related recapitulation. These findings may provide insight into why negative memories are often subjectively vivid. Email: Holly J Bowen, holly.bowen@bc.edu

(4093)

Broadening in Negative Emotion Words, Too. WILLIAM STURGILL, Rockhurst University. — Positive affect has become associated with a broadening of cognitive resources, at the cost of distractibility (Domachowska, Bolte, Gosche, 2014), while negative affect has become associated with a narrowing of cognitive resources. Does affective state similarly affect immediate memory for emotion words? Participants encoded, by block, emotion words (positive or negative), using either rhyme or associate encoding of cue-target pairs. At immediate recall, one of three possible cues was presented for each target word: the original encoding cue, a new cue of the same encoding type, or a new cue of the other encoding type. Results showed broadening in recall of positive words that were rhyme encoded, but narrowing of positive words associatively encoded—low, equivalent performance of new cue types. Conversely, results showed broadening of recall of negative words that were associatively encoded, where the new rhyme cue was more effective than it was for associatively encoded positive words. Email: William Sturgill, william.sturgill@rockhurst.edu

• CONSCIOUSNESS •

(4094)

Mind-Wandering Experiences Triggered by Stereotype Threat. MEGAN JORDANO and DAYNA TOURON, University of North Carolina, Greensboro. — Two experiments examined the relation between stereotype threat and mind-wandering. In each, groups of sixty female undergraduates were divided into two groups: a group primed for math-related stereotype threat and an unprimed control group. Participants completed a math-gender Implicit Association Task (IAT) followed by an operation span task (OSPAN) containing probes regarding thought content. Women primed for stereotype threat were slower to pair concepts of “female” and “mathematics” together on the IAT and reported more task-related interference (TRI; mind-wandering about task performance) than women in the control group. Experiment 1 included OSPAN set sizes of 2 and 3 equations, whereas Experiment 2 was more difficult, with sets of 3–5 equations. In Experiment 2 only, women under stereotype threat also had lower accuracy on the math verification portion of the OSPAN. The results were consistent with our hypothesis that stereotype threat affects a mind-wandering trigger by priming cognitive concerns. Email: Dayna Touron, d_touron@uncg.edu

(4095)

Quick but Not Present: Using Reading Times to Predict Mind Wandering. JAMIE NAYLOR and CHRISTOPHER SANCHEZ, Oregon State University. — Research on the mind wandering has so far relied on retrospective questionnaires or explicit probes to identify Task- Unrelated Thoughts (TUTs). The goal of the current study is to identify whether other less explicit metrics can be used to identify when participants’ minds have wandered. Participants’ reading times (in milliseconds) were collected while they read a text during which they were periodically probed for TUTs. A post-task mind wandering questionnaire predicted the number of TUTs experienced while reading, and there was also a negative correlation between learning and frequency of TUTs. In addition, shorter reading times were also associated with an increase in the likelihood of off-task thought. These results suggest that post-task measures of mind wandering are valid measures of mind wandering, but also that implicit behavioral measures like reading times can potentially serve...
as another tool to indicate the presence of mind wandering. Email: Christopher Sanchez, christopher.sanchez@oregonstate.edu

(4096)
A Wandering Mind Leads to Attenuated Cognitive Processing When Learning. JUDY XU, JANET METCALFE, and DAVID FRIEDMAN, Columbia University (Sponsored by Lisa Son). — Our results are one of the first studies to investigate the neurocognitive consequences of mind wandering during learning. Using event-related potentials (ERPs), we show that people exhibit processing of basic sensory events around them when mind wandering, whereas late cognitive processing at parietal-occipital sites, required for successful learning, is attenuated. Further, we show that processing is no different from baseline when mind wandering. ERPs were recorded while subjects studied English-Spanish word pairs, during which they were intermittently probed for their attentional state (i.e. on task or mind wandering). Specifically, we found that sensory-evoked P1, indexing basic visual processing, did not differ based on attentional state, whereas late cognitive processing from 275-725ms was diminished when one's mind was offline during study. Email: Judy Xu, jxu@psych.columbia.edu

(4097)
On the Necessity of Reconceptualizing Mind Wandering. PAUL SELI, Harvard University, EVAN F. RIKO and DANIEL SMILEK, University of Waterloo. — In recent years there has been a tremendous influx in the number of studies examining mind-wandering. In accordance with the initial conceptualization of mind-wandering put forth by Smallwood and Schooler (2006), most research on the topic has assumed that mind-wandering reflects unintentional off-task thoughts. However, recent research has called into question this assumption, and has suggested that mind-wandering can occur either unintentionally or intentionally. Here we provide evidence that an experimental manipulation can have qualitatively different effects on intentional and unintentional mind-wandering. Furthermore, we demonstrate this fact in an experiment wherein overall mind-wandering (the combination of intentional and unintentional mind-wandering) was unaffected by the manipulation. This result raises serious concerns for the mind-wandering literature, suggesting that the vast majority of previous research on the topic needs to be reconsidered in light of the fact it has relied upon measures of mind-wandering that conflate unintentional and intentional types of this experience. Email: Paul Seli, paulseli@gmail.com

(4098)
Mind Wandering Self-Reports as a Decision Making Process. JAMES FARLEY and PETER DIXON, University of Alberta (Sponsored by Peter Dixon). — Given the covert nature of the phenomenon, mind wandering researchers rely heavily on self-report. It is typically assumed that the process of reporting involves a relatively straightforward retrieval of some easily accessible value. However, we present data demonstrating that self-reports of mind wandering systematically vary with factors that should be unrelated to changes in task focus if this view is correct. This suggests that a more complex evaluative process underlies these reports. We propose it may thus be useful to conceptualize these reports as the product of a decision-making process which draws on multiple sources of information to actively construct an appraisal of task focus. We propose it may thus be useful to conceptualize these reports as the product of a decision-making process which draws on multiple sources of information to actively construct an appraisal of task focus. Email: James Farley, jamesdfarley@gmail.com

(4099)
A New, Unified Approach for the Study of Unconscious Perception. GARY DALE FISK, Georgia Southwestern, STEVEN HAASE, Shippensburg University. — The traditional dissociation approach for studying unconscious perception is problematic in several regards—the separate measurements of prime awareness and stimulus influence, and the difficulty of demonstrating null awareness. The present study overcomes these limitations with a single task that indirectly assesses both stimulus awareness and subsequent influences. Unmasked color word or nonword prime stimuli were briefly displayed (14 to 93 ms) before a color target (XXXXXX) in a Stroop task. Longer duration primes were accompanied by longer response times, suggesting an increased awareness (e.g., distractibility) of the prime stimuli at longer durations. Stroop effects were also obtained, with the largest effects for primes of 40 ms or longer (likely to be consciously perceived, to some degree). The results lend credence to the simultaneous measurement of prime awareness and subsequent influences. The results also suggest that perceptual awareness is a continuous function rather than being an all or nothing phenomenon. Email: Gary Dale Fisk, gary.fisk@gsw.edu

(4100)
Bidirectional Interference in Time Estimation and Introspection. MICHAEL KLEIN and JENNIFER STOLZ, University of Waterloo. — Time estimation processes produce a particular pattern of interference in dual-task situations. They are disrupted by almost any concurrent task, but generally only disrupt performance on tasks that rely on executive functions. However, research on time estimation in dual-task situations has mainly focused on the timing of external events. We tested whether estimation of the duration of mental processes would produce the same pattern of interference. Participants verified whether briefly-presented mathematical equations were true, then estimated either the duration of the equation presentation, or their own response time. The pattern of interference between the timing and math tasks depended on which interval was being timed, suggesting that introspection on the duration of internal processing may differ from mental timing of external events. Email: Jennifer Stolz, jstolz@uwaterloo.ca
HIGHLY SUGGESTIBLE INDIVIDUALS CAN SWITCH TASKS MORE EFFICIENTLY. ALEKSANDRA SHERMAN and MARC GREENBERG, Occidental College. — Hypnosis is an altered state of consciousness characterized by focused attention. We investigated whether hypnotic suggestibility is associated with differences in attentional capacity during waking consciousness. Forty individuals were assessed for suggestibility, and then tested in their ability to maintain global or local attention. Individuals were presented with Navon-type hierarchical stimuli and asked to indicate which of two target letters was presented, irrespective of whether the target appeared at the local or global level. Trial-type varied such that one attentional level was sustained for one, three, five, or seven trials. We measured the reaction time (RT) associated with switching focus from one level to another (i.e. global to local, or vice versa) by computing the RT difference between switch and non-switch trials. We observed an interaction such that low-suggestibility individuals had significantly higher switch costs when attention to one level was sustained for longer (five or seven trials). We conclude that high suggestibility individuals are capable of excluding task-irrelevant stimuli while they maintain focus on task instructions, thus allowing for more rapid switches in attentional states. Email: Aleksandra Sherman, asherman@oxy.edu

CONSCIOUS ERROR PERCEPTION: THE IMPACT OF RESPONSE EFFICIENTLY. Highly Suggestible Individuals Can Switch Tasks More Efficiently. ALEKSANDRA SHERMAN and MARC GREENBERG, Occidental College. — Hypnosis is an altered state of consciousness characterized by focused attention. We investigated whether hypnotic suggestibility is associated with differences in attentional capacity during waking consciousness. Forty individuals were assessed for suggestibility, and then tested in their ability to maintain global or local attention. Individuals were presented with Navon-type hierarchical stimuli and asked to indicate which of two target letters was presented, irrespective of whether the target appeared at the local or global level. Trial-type varied such that one attentional level was sustained for one, three, five, or seven trials. We measured the reaction time (RT) associated with switching focus from one level to another (i.e. global to local, or vice versa) by computing the RT difference between switch and non-switch trials. We observed an interaction such that low-suggestibility individuals had significantly higher switch costs when attention to one level was sustained for longer (five or seven trials). We conclude that high suggestibility individuals are capable of excluding task-irrelevant stimuli while they maintain focus on task instructions, thus allowing for more rapid switches in attentional states. Email: Aleksandra Sherman, asherman@oxy.edu

HIGHLY SUGGESTIBLE INDIVIDUALS CAN SWITCH TASKS MORE EFFICIENTLY. ALEKSANDRA SHERMAN and MARC GREENBERG, Occidental College. — Hypnosis is an altered state of consciousness characterized by focused attention. We investigated whether hypnotic suggestibility is associated with differences in attentional capacity during waking consciousness. Forty individuals were assessed for suggestibility, and then tested in their ability to maintain global or local attention. Individuals were presented with Navon-type hierarchical stimuli and asked to indicate which of two target letters was presented, irrespective of whether the target appeared at the local or global level. Trial-type varied such that one attentional level was sustained for one, three, five, or seven trials. We measured the reaction time (RT) associated with switching focus from one level to another (i.e. global to local, or vice versa) by computing the RT difference between switch and non-switch trials. We observed an interaction such that low-suggestibility individuals had significantly higher switch costs when attention to one level was sustained for longer (five or seven trials). We conclude that high suggestibility individuals are capable of excluding task-irrelevant stimuli while they maintain focus on task instructions, thus allowing for more rapid switches in attentional states. Email: Aleksandra Sherman, asherman@oxy.edu

HABITUAL TECHNOLOGY USE IS RELATED TO A LACK OF IMPULSE CONTROL, BUT NOT REWARD SENSITIVITY. JASON CHEIN and HARRY WILMER, Temple University. — As our society becomes more dependent on portable electronic devices, it is increasingly important to determine the cognitive consequences of overusing these devices. We investigated the common perception that heavier use of smartphones and other e-devices is linked to impulsiveness and a need for instant gratification. In a sample of college students (N = 153) we found that greater habitual Technology Engagement was indeed correlated with more impatience in a delay discounting task (r = -.30, p = .004). We further sought to determine whether this relationship was driven by a difference in Impulse Control (false alarms on a Go/NoGo task; Barratt’s Impulsivity Scale) or to Reward Sensitivity (Zuckerman’s Sensation Seeking Scale; BAS). The results indicated a selective relationship wherein Technology Engagement was significantly related to Impulse Control (r = -.20, p = .013), but not Reward Sensitivity (r = .09, p = .376). Email: Jason Chein, jchein@temple.edu

THE IMPLICATIONS OF THE DISSOCIATION BETWEEN RESPONSE AND PROCESSING CONFLICT. YUKI ASHITAKA and HIROYUKI SHIMADA, Kobe University. — According to the prevailing accounts of conflict adaptation in the literature, conflict adaptation is caused by previous resolution of response conflict. However, because these accounts have never examined the trials without explicit response, it is still unclear whether response conflict actually causes conflict adaptation. In the current experiments, we created a task in which pairs of trials were organized into units (the revised Stroop task). While the...
second trials of the unit always required manual responses, the first trials did not require explicit responses. The first trials consisted of bivalent and univalent stimuli varied blockwise. This task allows us to manipulate both factors of task switching and explicit response. At the same time, we can examine whether there is conflict adaptation without explicit response (response conflict). We discuss the theoretical implications of the dissociation between response and processing conflict.

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(4106)
The ISPC Effect Changes as a Function of SOA When the Color Signals Congruency. NART BEDIN ATALAY, TOBB University of Economy and Technology, MINE MISIRLISOY, ODTU. — The item-specific proportion congruency (ISPC) effect is demonstrated by a smaller Stroop interference for mostly incongruent items compared to mostly congruent items. Atalay and Misirlisoy (2014) investigated the time course of the ISPC effect by manipulating the stimulus onset asynchrony (SOA) between the color (relevant) and the word (irrelevant) dimensions in a Stroop experiment. We observed an interaction between the SOA manipulation and the ISPC effect. Specifically, when the word followed the color with a 200 ms delay, the ISPC effect was smaller than the ISPC effects observed for other SOA conditions. The present study is a follow up on this previous work with an important difference in the experimental design. The stimulus organization in the current study promotes the use of the color dimension as the ISPC signal, in contrast to the design used by Atalay and Misirlisoy (2014) in which the word dimension acted as the ISPC signal. The results replicated the interaction between the SOA manipulation and ISPC effect. Taken together, the findings from the two studies suggest that the ISPC effect is not observed if the word comes too late, regardless of which dimension acts as the ISPC signal.

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(4107)
The Congruency Sequence and Proportion Congruency Effects Reflecting Different Control Mechanisms. RYEONG CHANG and YANG SEOK CHO, Korea University (Sponsored by Yang Seok Cho). — A series of experiments were conducted to understand the nature of cognitive control. The congruency proportion in color Simon trials was manipulated and participants were asked to perform the Simon task and another task alternatively: another color Simon task in Experiment 1, color flanker task in Experiment 2, spatial Stroop task in Experiment 3, and shape flanker task in Experiment 4. The critical manipulation was whether the task relevant and irrelevant dimensions were shared between two tasks. As results, the proportion congruency (PC) effect was significant except Experiment 4 in which both task relevant and irrelevant dimensions were different. The congruency sequence (CS) effect, however, was significant only when the task irrelevant dimension was shared (Experiments 1 & 3). These results indicate that CS and PC effects were due to different control mechanisms. The mechanisms of CS effect are sensitive to task irrelevant dimension, whereas PC effect is generated by more general mechanisms.

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(4108)
Attentional Blink and Control Processes: A tDCS Study. FABIO FERLAZZO, ANNA PECCHINENDA, and STEFANO SDOIA, University of Rome Sapienza. — Limitations in the rate at which our attention can sample visual events are reflected in the Attentional Blink (AB): the impairment of successfully report the second of two targets stimuli embedded among distractors when they are separated by a temporal interval shorter than 500 milliseconds. Recent accounts for the AB have shifted from limited resources processing to top-down attentional control processes. For the first time we show the role of control processes in generating the AB. Participants underwent 2 sessions (1 week apart) of tDCS stimulation (1.5 mA) over the left frontal cortex (F3) while performing an AB task (2 target digits, 20 distractors letters, 3 lags). Session order was counterbalanced (stimulation, sham). Results show polarity specific modulation of the AB with cathodal tDCS over F3 increasing and anodal tDCS reducing the AB. These results fit nicely with an account of the AB in terms of control processes.

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(4109)
Influences of Context Repetition on Sequential Congruency Dependence on Contingency. NART BEDIN ATALAY, TOBB University of Economy and Technology, ASLI BAHAR INAN, Atılım University. — Sequential congruency effect (SCE) is the decrease in the congruency effect following incongruent compared to congruent trials. In our study, the effect of context repetition on SCE was investigated by using dynamic visual white noise as the contextual feature in two-item (Experiment 1) and four-item (Experiment 2) vocal Flanker tasks with equal number of congruent and incongruent trials. In Experiment 1, all trials consisted of stimulus- and response- feature repetitions. SCE was only observed in the context repetition condition, but not in the context alternation condition, replicating the results of Spapé and Hommel (2008). In Experiment 2, SCE was observed in both context repetition and alternation conditions irrespective of the stimulus- and response- feature repetitions. These results suggest that stimulus- and response-feature repetitions are necessary, but not sufficient to observe differential effects of context on SCE. In the absence of contingency, SCE is driven by stimulus, response and contextual feature bindings. When contingency between stimulus and response is introduced, SCE is driven by the contingency.

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(4110)
Estimating One’s Own Reaction Times. HYE JOO HAN, Purdue University, CHARLES VIAU-QUESNEL, Université du Québec à Trois-Rivières, ZHUANGZHUANG XI, Bank of America, RICHARD SCHWEICKERT, Purdue University, CLAUDETTE FORTIN, Université Laval. — We investigated people’s ability to estimate their reaction times in a memory search task and a visual search task. After each trial of a task, the participant produced a time interval as an estimate of the reaction time (RT) for the trial. Ability for self-timing varied enormously. For some participants,
correlation between RT and Time Production was near 0. But participants whose correlation was above the median were reasonably accurate; their mean correlations were .64 for memory search and .72 for visual search. Factors with significant effects on reaction times had significant effects on Time Production. Set size, in particular, had significant effects on both RT and Time Production, in both memory and visual search. Results support a classic theory that when a subject processes information, an estimate of the processing time is obtained as a byproduct. We propose that people use such estimates for scheduling in daily life. Email: Richard Schweickert, swike@psych.purdue.edu

(4111)
Is the Vigilance Decrement Obligatory? DAVID THOMSON, DEREK BESNER, and DANIEL SMILEK, University of Waterloo. — It is well known that when human observers must monitor for rare but critical events, probability of detection tends to wane over time, a phenomenon known as the “vigilance decrement”. Over 60 years of empirical study on this topic has culminated in the general consensus that performance suffers due to a loss in observers’ ability to distinguish Signal from Noise (a loss in sensitivity) provided that the task loads memory and stimuli are presented at a relatively high rate. We challenge this assertion on two fronts: First, we contend on a theoretical level that the metrics employed to measure observer sensitivity in modern vigilance tasks (derived from Signal Detection Theory) are inappropriate and largely un-interpretable. This contention is supported by an evaluation of recent empirical work in the vigilance domain. Second, we present the results of empirical work that demonstrates that shifts in response bias (the observer’s “willingness to respond”) over time can masquerade as a loss in sensitivity. Consequently, the basic underlying cause of the vigilance decrement is actually unclear, and likely involves a shift in response criterion rather than sensitivity. Email: David Thomson, d5thomso@uwaterloo.ca

(4112)
Working Memory Capacity and Dynamic Cognitive Control. ELIZABETH A. WIEMERS and THOMAS S. REDICK, Purdue University (Sponsored by Thomas S. Redick). — Two datasets totaling 110 participants were used to investigate the relationship between individual differences in WMC and dynamic cognitive control by introducing analyses not previously examined with AX-CPT. The results delve into the specific differences between high and low WMC individuals’ ability to enact and maintain cognitive control. Compared to high-WMC individuals, low-WMC individuals: (a) made more errors, specifically to AX targets; (b) exhibited a shift to proactive control with more time-on-task; (c) had more lapses of attention; and (d) were equally likely to adjust control after conflict. These results fit with the dual mechanisms of cognitive control theory and mind-wandering accounts for low-WMC individuals discussed in the literature. The present study suggests that future work with populations that have difficulties with cognitive control may benefit from examining performance consistency and maintenance. Email: Elizabeth A. Wiemers, ewiemers@purdue.edu

(4113)
Concussion Symptom Categorization and Neuropsychological Performance. KYLE BERNHARDT, KATIE SALOMON, KATHARINE LINDBERG, TAYLOR BAUMLER, MARK POOLMAN, and F. RICHARD FERRARO, University of North Dakota. — The purpose of this study was to characterize concussive symptoms in a sample of collegiate ice hockey players (N = 122) after sustaining multiple concussions and corresponding relationships with neuropsychological functioning. Archival neuropsychological data were obtained via the Immediate Post-Concussion Assessment and Cognitive Test (ImPACT) from a large Midwestern men’s ice hockey team. Four symptoms categories (sleep, cognitive, physical, emotional) were created. After experiencing two concussions, athletes with higher cognitive symptoms showed worse performance on measures of reaction time (r = .68, p < .05). Higher sleep and physical symptoms resulted in decreased performance on measures of impulse control (r = .76 and r = .74 respectively, p < .05). Of the four symptom categories, cognitive and physical symptoms showed the greatest increase relative to other categories after sustaining a concussion. This study highlights the importance of symptom recognition related to symptom categories and associated neuropsychological functioning. Email: F. Richard Ferraro, frichard.ferraroe@email.und.edu

(4114)
Short-Term Effects of Mental Training: Does Mindfulness Meditation Deplete Resources? HIDEYA KOSHINO, JOHN CLAPPER, ANTHONY SIERRA, ERIN ALDERSON, DAVID BUITRON, and ZACKARY HARMONY, California State University. — This experiment tests the prediction of certain resource models (e.g., Baumeister et al., 2007) that, for novices, mindfulness meditation practice should produce short-term depletion effects, temporarily reducing effortful performance on subsequent tasks. Participants engaged in meditation, guided relaxation, an operation span task for 20 minutes, or served as no-task controls. They were then given a 5 minute anagram task, including unsolvable anagrams, and a questionnaire assessing their motivational state. The three mental training groups (meditation, relaxation, and operation span) spend significantly less time per problem in the anagram task relative to the controls, suggesting depletion of motivational resources. These results suggest that mindfulness meditation, like other cognitive tasks, involves attentional effort and hence produces short-term depletion of cognitive and/or motivational resources, at least for novice meditators. Future studies will investigate the specificity of these depletion effects and their relation to long-term training effects. Email: Hideya Koshino, hkoshino@csusb.edu

(4115)
Mind Wandering During Film Comprehension: The Role of Prior Knowledge and Situational Interest. SIDNEY DMELLO, KRIS KOPP, and CAITLIN MILLS, University of Notre Dame. — This study assessed the occurrence of mind wandering (MW) in the relatively unexplored domain of film comprehension. The hypothesis was that prior-knowledge would aid in the construction of a situation model of the film,
which would suppress MW by directing attention towards task-related thoughts, and that interest would moderate this effect. This hypothesis was tested in an experiment where 108 students either read a short story that depicted the plot (i.e., prior-knowledge condition) or read an unrelated story of equal length (control condition) prior to viewing the 32.5 minute film The Red Balloon. Participants self-reported their interest in viewing the film immediately before the film presentation and reported self-caught instances of MW while viewing the film. The results indicated that the prior-knowledge condition reported less MW compared to the control condition. MW also decreased over the course of the film, but only for the prior-knowledge condition, thereby suggesting a suppression effect. Finally, interest in viewing the film moderated the effect of condition in that prior-knowledge effects on MW were only observed when interest was average or high, but not when interest was low. Email: Sidney DMello, sidney.dmello@gmail.com

(4116)
Functioning Under Stress: Does Stress Impact Executive Functioning of Older Adults? LIXIA YANG, MERIDIS LEONITHAS, and LINDA TRUONG, Ryerson University. — It has been documented that experimentally induced psychosocial stress impairs executive functioning in young adults (Schoofs, Preuss & Wolf, 2008) and memory performance in older adults (Lupien et al., 1997). The current study examined the effects of psychosocial stress on older adults’ executive functioning, an ability that shows the most robust and consistent decline with aging (Hasher et al., 2007). Older participants were randomly assigned to either the stress (i.e., completing the Trier Social Stress Test) or the non-stress condition (i.e., completing a casual conversation task), and completed some typical executive functioning tasks before and after the stress manipulation. Stress responses were measured through salivary cortisol level, psychophysiological measures, and self-ratings. The results suggested that the stress induction manipulation was successful. The data also provided some evidence for the negative impact of psychosocial stress on executive functioning of older adults. These results are discussed in the context of stress, aging, and cognitive functions. Email: Lixia Yang, lixiay@ryerson.ca

(4117)
Semantic Overlap in Dual-Task Performance: Evidence for a Specific Deficit in Old Age. FRANCOIS MAQUESTIAUX, Université de Franche-Comté, ELISE GEMONET, Université Paris-Sud, MORGAN LABOUREAU, Université de Franche-Comté, ELIOT HAZELTINE, University of Iowa. — What is the nature of age deficits in dual-task performance? In particular, are the deficits caused by a processing limitation that is generic or, in contrast, by a processing limitation that depends upon the amount of semantic overlap between the tasks? Throughout 10 sessions, 12 younger adults and 15 older performed an auditory-vocal task and a visual-manual task in different block types (dual-task, mixed single-task, or single-task) and in varying conditions of semantic overlap between the tasks (no, weak, or strong overlap). Younger adults were more able than older adults to reach perfect-time sharing (comparable RTs in dual-task and single-task blocks). Also, dual-task performance on the visual-manual task was particularly slowed for older adults assigned to the strong semantic overlap condition. Therefore, age deficits may partly be aggravated when both tasks involve resembling (and potentially confusing) semantic processing. Email: Francois Maquestiaux, francois.maquestiaux@univ-fcomte.fr

• WORKING MEMORY III •

(4118)
Executive Control Training and Transfer: Individual Differences in Young Healthy Adults. M. JESUS MARAYER ROMERO, Universidad de Granada, NOELIA OLIVENCIA, Universidad de Jaen, M. TERESA BAJO and M. ROSARIO RUEDA, Universidad de Granada, CARLOS GOMEZ-ARIZA, Universidad de Jaén (Sponsored by Carlos Gomez-Ariz). — Cognitive control training implies the systematic practice of activities involving executive functions, while adapting the difficulty level to individual’s performance. Whereas several interventions have demonstrated the plasticity of executive control, their results regarding transfer effects are inconclusive. Here, we used a battery of computer-based activities (PEC-UGR) to train and evaluate executive-control functions. The activities were designed on the logical basis of well-known experimental tasks requiring either maintenance/updating in working memory or conflict resolution/inhibitory control. A group of healthy college students received 120 minutes of training with each activity and were evaluated with measures of direct, near and far transfer before and after the training program. Hierarchical regression analysis revealed that participants with larger improvement in working memory activities through training, also showed better performance on independent measures of working memory (near transfer), and fluid reasoning (far transfer) after training. These results suggest that the effectiveness of training depends at least partially on individual’s variability in performance during training. Email: M. Jesus Marayer Romero, mjmaraver@ugr.es

(4119)
Practice Based Malleability of Verbal Working Memory Performance. KATHERINE A. COOKE, BENJAMIN KATZ, and KYLE D. MOORED, University of Michigan, MARTIN BUSCHKUEHL and SUSANNE M. JAEGGI, University of California, Irvine, SCOTT J. PELTIER, THAD A. POLK, JOHN JONIDES, and PATRICIA REUTER-LORENZ, University of Michigan. — Working memory (WM) involves the active maintenance and manipulation of limited amounts of information for brief periods of time. Previous research has shown that relatively short, adaptive WM training interventions can improve performance on related WM tasks. In the present study, we investigated the malleability of verbal working memory. Participants performed a verbal item recognition task with memory loads that increased adaptively according to performance over a 10-day practice
period. In addition to neuropsychological measures, verbal WM performance on a similar criterion task was assessed before and after the period of extended practice. Participants displayed improved performance on the training task and significant improvement on higher loads of the criterion task, supporting the malleability of working memory with training. Additionally, predictors of individual differences in working memory improvement will be discussed. Email: Patricia Reuter-Lorenz, patti.rlorenz@gmail.com

(4120)
What Cognitive Changes Occur During Working Memory Training? J. ISAIAH HARBISON, MICHAEL DOUGHERTY, and GREGORY J. H. COLFLESH, University of Maryland. — Working memory (WM) training has become an active and controversial area of research. However, little work has examined what might be changing over the course of this training. One notable exception is the work by Gibson et al (2012; 2013). They analyzed immediate free recall data for evidence of the contribution of primary and secondary memory. They found evidence for increases in primary memory as the result of training. We applied a model of memory retrieval to their results and found that, as in the case of n-back training (Harbison, Atkins, & Dougherty, submitted), it is unnecessary to assume changes in primary memory. Instead, a change in retrieval from secondary memory was able to account for their results. This is important as improvements in retrieval from secondary memory have been found not to generalize, possibly explaining the lack of transfer from WM training. Email: J. Isaiah Harbison, isaiah.harbison@gmail.com

(4121)
A Test of the Specialized Load Account: An Individual Differences Approach. MATTHEW HITCHINS, George Washington University, RICHARD CARLSON, Pennsylvania State University, MYEONG-HO SOHN, George Washington University (Sponsored by Richard Carlson). — The specialized load account predicts that when concurrent working memory load type shares processing with distractors, interference decreases. This would indicate that individual differences are the result of capacity differences in load specific stores. However the controlled attention view of working memory suggests that individual differences arise primarily out of differences in a domain-free, limited capacity attentional control system. To test these two theories, we used an individual differences approach and a version of a Stroop paradigm consisting of a verbal target and spatial distractor. Experiment 1 used a verbal load, and Experiment 2 used a spatial load. It was found that while high-span participants were faster overall in the load conditions than low-span individuals in the load conditions, there were no load type effects for either group. These findings indicate that individual differences arise from an individual's capacity to control attention in the face of distraction. Email: Matthew Hitchins, matthitchins@gmail.com

(4122)
Music Helps Me Do My Homework: A Student’s Conundrum. JILL TALLEY SHELTON and EDDIE CHRISTOPHER, University of Tennessee at Chattanooga. — Past research has demonstrated that music often negatively impacts performance on a variety of cognitive tasks, including tasks relevant to academia. Intriguingly, there are discrepancies in the literature, including a handful of instances where no effect of music is observed. We tested the novel hypothesis that working memory capacity moderates the effect of music on the performance of academic tasks. University students worked on reading comprehension and math tasks under both music and silence conditions, before completing a battery of working memory assessments. While music led to a significant decline in performance overall, working memory capacity moderated this effect in the reading comprehension tasks. These findings suggest that individuals who are better able to control their attention (as indexed by working memory performance) may be protected from music-related distraction when studying certain kinds of material. Email: Jill Talley Shelton, Jill-Shelton@utc.edu

(4123)
Age-Related Differences in the Effects of Directed Forgetting (DF) on Working and Long-Term Memory (LTM). TIFFANY K. JANTZ, University of Michigan, SARA B. FESTINI, University of Texas at Dallas, PATRICIA REUTER-LORENZ, University of Michigan (Sponsored by Patricia Reuter-Lorenz). — Voluntary forgetting is presumably accomplished by exercising top-down control over the contents of memory. Given that aging is associated with declines in top-down, cognitive control mechanisms, voluntary forgetting may be diminished in older adults. Employing a working memory (WM) variant of the DF paradigm, we examined age-related differences in voluntary forgetting of semantically associated lists, and the subsequent effects on veridical and false memory in the short- and long-term. The WM effects of DF were reduced in older adults as reflected in lower accuracy for to-be-remembered items and fewer correct rejections of to-be-forgotten items. Nevertheless, DF reduced false WM for semantic associates of to-be-forgotten lists in both age groups. In LTM, the DF effect was virtually eliminated in older adults. These results demonstrate age-related declines in voluntary control of WM. This decrement has implications for false memory, long-term memory, and understanding the underlying cognitive mechanisms of directed forgetting. Email: Tiffany K. Jantz, tkjantz@umich.edu

(4124)
The Structure of Working Memory: Does it Differ for Children and Adults? KERRY ANN CHALMERS, EMILY FREEMAN, and LEISA-MARIE PRITCHARD, University of Newcastle. — There is little consensus regarding the structure of working memory and whether the structure differs for children and adults. This study compared five models of working memory in both children and adults. The relationship between these models of working memory and academic achievement was also examined. Children aged 8 to 11 years and adults completed a series of tests designed to assess working
memory and academic achievement in reading, numeracy, and spelling. Confirmatory factor analysis indicated that the best fitting models differed for children and adults. Structural equation modeling and regression analyses were used to predict academic achievement in children and adults. The results support previous research suggesting that working memory is more differentiated and specialized in adults than in children. Email: Kirsten Adam, kadam1@uchicago.edu

**4125**

Metaknowledge of Working Memory Performance.

KIRSTEN ADAM, University of Chicago, EDWARD VOGEL, University of Oregon (Sponsored by Edward Vogel). — Working memory (WM) performance fluctuates dramatically from trial to trial. On many trials, performance is no better than chance. Here, we assessed subjects' awareness of these failures. We used a whole-report visual WM task to quantify both trial-by-trial WM performance and trial-by-trial subjective ratings. In Experiment 1 (N=44), subjects reported confidence of each response using a simple mouse-click judgment. In Experiment 2 (N=40), subjects were given a measure of Task Unrelated Thoughts immediately following 20% of trials. Finally, in Experiment 3 (N=30), subjects gave a rating of their attentional state preceding 20% of trials. Attentional state ratings and task-unrelated thoughts related to the number of items correctly identified on each trial, confirming previous findings that subjective measures predict WM performance. However, subjects correctly reported failures on only around 25% of failure trials. Across experiments, subjective ratings related to WM performance but consistently underestimated the extent of WM failures. Email: Kirsten Adam, kadam1@uchicago.edu

**4126**

Do Working Memory Capacity and Fluid Intelligence Predict Divergent Thinking? BRIDGET SMEEKENS, University of North Carolina at Greensboro, MATT MEIER, Western Carolina University, MICHAEL KANE, University of North Carolina at Greensboro. — Although measures of general fluid intelligence (Gf) positively correlate with divergent thinking, measures of working memory capacity (WMC) do not—a perplexing result considering: (1) how many other complex abilities WMC predicts, and (2) that Gf and WMC share at least half their variance. To test whether the shared Gf-WMC variance or the Gf-unique variance influences individual differences in creativity, we used multiple measures of Gf, WMC, and divergent thinking to create latent variables and test structural models (N = 239). Further, to assess the influence of different executive demands on its correlations with cognitive ability, we measured divergent thinking in two ways: with 2 versions of the traditional Alternative Uses task (generate many creative uses of a hanger and tire; 3 min each), and 10 versions of an abbreviated “one-and-done” measure (1 most creative use; 45 s each: CD, umbrella, blanket, cane, bottle, folder, mug, belt, scissors, bag). Email: Michael Kane, mkane@une.edu
(4129) Does Brainstem Categorize Speech? Study of ABR to Voiced and Unvoiced Consonants. HITOMI KONDO, SHUJI MORI, and TAKAKO MITSUDO, Kyushu University. — Previous studies have shown that human auditory cortex respond differently to speech stimuli perceived categorically. We argue that such findings do not necessarily imply that categorization happens at the cortical level, and that it may occur in lower in the auditory pathway. In the present study, we measured auditory brainstem responses (ABRs) to voiced and unvoiced consonants, /d/ and /t/, to see if there are differences in the ABR corresponding to the perception of these consonants. We synthesized /da/ and /ta/ sounds by manipulating voice onset time and estimated their categorical boundaries for individual participants from identification and discrimination tasks. ABRs were then measured from the same participants in the vicinity of each participants’ boundary. While ABR shows frequency following for vowels, the differences corresponding to /d/ and /t/ are less significant. Email: Shuji Mori, mori@inf.kyushu-u.ac.jp

(4130) Overcoming Talker Variability When Learning Speech Sound Categories: A Computational Approach. TAYLOR M. CURLEY (Graduate Travel Award Recipient) and JOSEPH C. TOSCANO, Villanova University (Sponsored by Joseph C. Toscano). — As infants develop phonetic categories, they must overcome immense contextual variability in speech. A notoriously difficult challenge occurs for the acquisition of vowels, where differences in women’s and men’s voices cause overlap between categories. We propose a solution that is both developmentally plausible and computationally tractable. Our approach builds on previous models of speech development that use unsupervised statistical learning. We extend this work to incorporate a context compensation mechanism that allows the model to first factor out variability attributable to talker gender differences, and then learn gender-specific vowel spaces, while making minimal assumptions about what infants know. We show that the model is able to learn vowel categories for English and that its classification accuracy improves when it is able to take talker variability into account, achieving performance equivalent to what we observe when it is trained on each group of talkers separately. Email: Taylor M. Curley, tcurley3@villanova.edu

(4131) Phonetic Category Retuning in Accented Speech. ILIANA MEZA-GONZALEZ and EMILY MYERS, University of Connecticut. — Listeners adapt to digitally-altered phonemes in native-accented speech, leading researchers to investigate whether the same mechanism helps listeners adapt to non-native accented speech. Studies that have assessed phonetic boundary shifts in accented speech have exclusively used phonologically similar languages (e.g. English and Dutch-accented English). Of interest is whether non-native talkers whose native language is phonologically more distant from the target language will elicit the same, or larger adaptation. The present study measured phonetic category shifts in listeners hearing two talkers: a native-accented English speaker and a non-native accented (Brazilian Portuguese) speaker. We hypothesized that the highly different phonology of the Brazilian Portuguese speaker would widen the acceptable phonetic category range of the target phonemes, eliciting a larger phonetic retuning effect. Contrary to our hypothesis, the size of phonetic retuning did not differ across groups. Future research will increase the number of accents to observe the effect of phonological similarity on perceptual adaptation. Email: Emily Myers, emilymbmyers@gmail.com

(4132) Effect of Foreign Accent on Lexical Retrieval, Veridical, and False Memory. KIT YING CHAN, DAROON JALIL, BRADY ALEXANDER DAILEY, and CATHERINE ELIZABETH MATHERS, James Madison University. — This study examined how foreign accents affect lexical retrieval, verbal and false memory using the Deese-Roediger-McDermott paradigm with lists of phonologically related words. In Experiment 1, similar pattern of false recognition was found in groups presented with native and Spanish-accented words respectively. The only difference was the lower veridical recognition accuracy for the accented group, which could be due to accent-induced misperceptions. This implies that accented speech restricts its activation to similar sounding words during lexical retrieval, rather than spreading among additional words that are less similar. Experiment 2 presented participants with lists of native and lists of accented words. Participants identified the accent for items that they called “old”. Participants were less accurate in recognizing accented studied words as “old”. Correct accent identification was less likely for accented studied items. This suggests that representations of voice (accent) information in memory tend to be poor for foreign-accented words. Email: Kit Ying Chan, chanky@jmu.edu

(4133) Perceptual Adaptation to Foreign-Accented Speech Reshapes the Internal Structure of Phonetic Categories. XIN XIE (Graduate Travel Award Recipient), RACHEL M. THEODORE, and EMILY MYERS, University of Connecticut (Sponsored by Carol A. Fowler). — A literature on perceptual learning for speech shows that listeners use lexical information to disambiguate a phonetically ambiguous speech stimulus, and maintain this new mapping for later recognition of similar sounds for a given talker. Evidence for this kind of perceptual adjustment has exclusively focused on phonetic boundary shifts. We asked whether listeners adjust both category boundaries and internal category structure in adaptation to foreign accents. We investigated the perceptual learning of Mandarin-accented productions of word-final /d/ in English. After exposure to a Mandarin speaker’s productions, native-English listeners’ adaptation to the talker was tested in three ways: a cross-modal priming task to assess spoken word recognition (Experiment 1), a category identification task to assess phonetic boundary (Experiment 2), and a goodness rating task to assess internal category structure (Experiment 3). Results were that following exposure, both category boundary and internal category structure were adjusted; these adjustments

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founded subsequent word recognition. We suggest that an examination of internal category structure is important for a complete account of the mechanisms of perceptual learning. Email: Xin Xie, jslabelx.xie@gmail.com

(4134) Perceptual Adaptation to Foreign-Accented Speech in the Presence of Native Speech. JESSICA ALEXANDER, Centenary College of Louisiana. — Previous research has shown that listeners perceptually adapt to accented speech when listening to both words and sentences, and become better at producing accurate transcriptions. In most studies, listeners are exposed only to accented speech during the learning phase. However, in most listening contexts, accented speakers would be encountered in a rich linguistic environment, containing native speakers as well as accented speakers. The current study assessed perceptual adaptation to accented speech in the presence of tokens from native speakers. Listeners heard words from six Spanish-accented speakers randomly presented with words from six native English speakers. Trained listeners showed more accurate transcription performance than untrained controls, even though training stimuli included stimuli that would have facilitated learning of the properties of the foreign-accent as well as stimuli that would have provided little useful information for perceptual adaptation to foreign-accented speech. The results of the current study indicate that listeners may be able to easily categorize and use speech tokens based on the types of systematic variation present. Email: Jessica Alexander, alexander.jed@gmail.com

(4135) Perceptual Grouping in Artificial Language Learning Across Native Language Backgrounds. TUULI MORRILL and ZHIYAN GAO, George Mason University, J. DEVIN MCAULEY, Michigan State University. — Prosodic context in an artificial language affects segmentation and word learning, even without local word boundary cues (Morrill et al., Psychonomic Bulletin and Review, 2014). This effect is driven by the perceptual grouping of syllables, which influences expectations about upcoming word boundaries. Until now, this effect has only been demonstrated with native speakers of English, where lexical stress affects segmentation. We test whether speakers of tone languages also exhibit perceptual grouping in artificial language learning. Native Mandarin and Cantonese speakers (n=26) heard an artificial language in which word candidates were congruent or incongruent with prosodic context, then rated words on likelihood of belonging to the language. We find effects of prosodic context, with higher ratings for congruent than incongruent words; however, the effect appears weaker than in English speakers. This suggests that perceptual grouping effects on speech segmentation generalize across native language backgrounds but vary in strength. Email: Tuuli Morrill, tmorrill@gmu.edu

(4136) Linguistically-Guided Perceptual Adaptation to Foreign-Accented Speech. ANGELA COOPER and ANN BRADLOW, Northwestern University (Sponsored by Ann Bradlow). — Adaptation to accented sentences can be guided by knowledge of the identity of those sentences, which, being an exact match for the target, provides feedback on all linguistic levels. We examined the extent to which this feedback needs to match the accented sentence by manipulating the degree of match on different linguistic dimensions, including sub-lexical, lexical, and syntactic levels. Listeners transcribed Mandarin-accented English sentences in noise. After each transcription, feedback sentences by a native talker were presented that either matched the target at 1) all linguistic levels, 2) syntactic and sub-lexical levels with real words or 3) syntactic and sub-lexical levels with non-words (Jabberwocky) and compared them to non-English “feedback” (Korean controls). Both complete and incomplete linguistic matches with real words generated greater transcription improvement over non-English speech feedback, indicating listeners can draw upon sources of linguistic information beyond matching lexical items, such as syntactic and sub-lexical information, during adaptation. Email: Angela Cooper, akcooper@u.northwestern.edu

(4137) Learning Grammatical Gender in a New Language: The Impact of Prior Language Learning Experience at First Exposure. CARRIE N. JACKSON and JULIA HOTCHNER, Pennsylvania State University, JOSIEN GREIDANUS and MARIANNE GULLBERG, Lunds Universitet. — Grammatical gender is notoriously difficult for second language (L2) learners, although having grammatical gender in the L1 facilitates L2 gender acquisition, at least among highly-proficient speakers (e.g., Sabourin et al., 2006). Little is known about whether this advantage extends to the initial stages of language learning and whether having grammatical gender in a previously acquired L2 also facilitates gender learning in a new language. To investigate this, L1 English monolinguals, L1 Swedish speakers, and L1 English-L2 Spanish speakers with no prior German exposure learned 36 German nouns and their gender. On subsequent recognition and production tasks, L1 Swedish speakers were significantly more accurate in gender assignment than L1 English monolinguals; L1 English-L2 Spanish speakers’ accuracy lay halfway between the other two groups. Thus, even in the earliest stages, prior experience acquiring grammatical gender facilitates learning gender assignment in another language, but such experience can come from either L1 or L2 acquisition. Email: Carrie N. Jackson, c naj1@psu.edu
(4138) The Role of Salience in L2 Cue Acquisition. IAN S. COMEAUX and JANET MCDONALD, Louisiana State University. — Cues to the actor role such as word order, noun animacy, case inflection and verb agreement vary in strength across languages. The competition model (MacWhinney, 2005) notes that transfer of cue strength from L1 to L2 is a primary source of difficulty in adult L2 syntax acquisition. The present experiment examines if salience plays a role in facilitating adjustments of cue strength during L2 learning. Native English speaking participants were exposed via an actor-assignment task to an artificial language in which the strongest English cue (word order) was the weakest, requiring a shift in cue interpretation strategies. Salience was manipulated between subjects by presenting the two strongest morphological cues with 1) no color contrast, 2) both marked with the same color contrast, or 3) each marked with a different color contrast. Results showed that the salience manipulation was beneficial, but that these benefits were qualified by cue difficulty. Email: Janet McDonald, psmcdo@lsu.edu

(4139) Regulating the L1 Across Contexts to Investigate L2 Acquisition. KINSEY BICE, Pennsylvania State University, BRENDAN STUART WEEKES, University of Hong Kong, MEGAN ZIRNSTEIN and JUDITH KROLL, Pennsylvania State University. — Converging evidence across tasks and levels of language processing suggests that proficient bilinguals differ from monolinguals in the native language (L1). Language competition arising from parallel activation of the languages is resolved through inhibition of the L1 relative to L2 activation (Green, 1998). Therefore, L1 inhibition should be more difficult early in L2 learning, but necessary for successful acquisition. Here, we present data from two experiments testing the idea that changes in L1 processing early during L2 learning are necessary to facilitate the development of L2 proficiency. The first experiment tests classroom learners in an L1 context, demonstrating that beginning and intermediate learners show neural sensitivity to L2 cognate words in the L1 earlier than previously reported. The second experiment reports preliminary data from English speakers living in Hong Kong who are exposed to Cantonese but not required to use it, to investigate how this immersion context affects Cantonese acquisition and L1 processing. Email: Megan Zirstein, mkz2@psu.edu

(4140) Idiom Processing in Bilinguals as a Function of Idiom Decomposability and Language Brokering Experience. JYOTNSA VAID, Texas A&M University, BELEM G. LOPEZ, University of Texas at Austin. — Several studies suggest that early informal translation experience (“language brokering”) may result in a closer coupling of translation equivalents in bilinguals with this experience as compared to those without it. The present study extends investigation of the impact of brokering experience to the domain of idiom processing. A semantic relatedness task was used across two experiments with Spanish-English bilingual adults who were presented with English (Experiment 1) or Spanish idioms (Experiment 2) that did not have idiomatic equivalents in the other language. Participants were to decide if a target word presented in the same or different language as the idiom was or was not related to the idiom meaning. The findings reveal different patterns of interactions of target-idiom language and idiom decomposability for bilinguals with brokering experience and those without it. The findings are discussed in relation to models of figurative language processing and the potential role of brokering experience. Email: Jyotsna Vaid, jvaid@tamu.edu

(4141) Making Causal Inferences in L2 Sentence Comprehension: An ERP Study. ALICE FOUCART and CARLOS ROMERO RIVAS, Universitat Pompeu Fabra, LOTTIE GORT, University of Groningen, ALBERT COSTA, Universitat Pompeu Fabra/ICREA, Institució Catalana de Recerca i Estudis Avançats. — When reading “Joey’s brother became furiously angry with him. The next day his body was covered in bruises,” one has to infer that Joey’s brother hit him to establish coherence in the discourse. We investigated whether late bilinguals make causal inferences during second language (L2) sentence comprehension, like native speakers. Using event-related brain potentials we tested English native speakers and Spanish-English late bilinguals while reading scenarios in which the final sentence was highly causally related, immediately related, or causally unrelated to its context. Both groups showed a reduced N400 component in the highly related condition compared to the other conditions. In addition, the L2 group revealed an early and a late positivity in immediately related and unrelated conditions. These results suggest that inferences influence semantic processing in L2, like in L1. However, it seems that extra processing is involved when inferring meaning from a situation in L2 discourse comprehension. Email: Alice Foucart, alfoucart@email.com

(4142) Psycholinguistic Units in Chinese-English Bilingual Spoken Word Recognition. YU-CHENG LIN and ANA SCHWARTZ, University of Texas at El Paso. — In this study, we used the eye-tracking technique and growth curve analysis to examine how individual differences in language proficiency affect cross-language phonological unit size transfer in Chinese-English bilinguals. Participants heard a spoken word and were asked to identify its corresponding picture from an array that included a target picture, a within-language phonological competitor picture, and two phonologically unrelated control pictures. We found that Chinese-English bilinguals with increased English proficiency showed higher fixation proportions to smaller Chinese phonological units (i.e., onset and rime units), even though these units are not major processing units for Chinese spoken word recognition. This result suggested that the variation of the second language (L2) English proficiency modulated the first language (L1) Chinese phonological sensitivity to finer-grained unit sizes. Moreover, Chinese-English bilinguals demonstrated higher fixation proportions to the L1 phonological unit (i.e., the consonant-vowel unit, CV unit) when they recognized L2 spoken
words, reflecting the idea that the CV unit was transferable across language boundaries, from Chinese to English. Email: Yu-Cheng Lin, yclinpsy@gmail.com

(4143) Does Being Bilingual Entail Advantages in Executive Functions? A Meta-Analysis. CLAUDIA C. VON BASTIAN, University of Colorado at Boulder, CARLA DE SIMONI, University of Zurich, MICHAEL KANE, University of North Carolina at Greensboro, NICHOLAS P. CARRUTH and AKIRA MIYAKE, University of Colorado at Boulder. — The question of whether being bilingual yields non-linguistic cognitive benefits is highly controversial. Even though a large body of literature suggests such bilingual advantages in executive functions, a growing number of more recent studies reported contradictory findings. We therefore conducted a meta-analysis on potential bilingual benefits for executive functions (i.e., inhibition, shifting, and updating) and for reasoning ability. The literature search yielded more than 150 studies matching our inclusion criteria, allowing for the analyses of several potential moderators of the bilingual advantage such as sample characteristics (e.g., age, specific language combinations) and methodological features (e.g., discrete vs. continuous measurement of bilingualism, verbal vs. non-verbal task material). The main results of our meta-analysis as well as some analyses of potential publication biases will be presented. Email: Claudia C. von Bastian, claudia.vonbastian@colorado.edu

(4144) Dissociable Indices of Language Control in Bilingual Speech. ZOFIA WODNIECKA, Jagiellonian University in Krakow, SUSAN BOBB, Gordon College, JAKUB SZEWCZYZK, Jagiellonian University, RENE ZEELENBERG, Erasmus University Rotterdam, KALINKA TIMMER, York University, ANNA MARZECOVÁ, Jagiellonian University, MARCUS TAFT, University of New South Wales, DAVID GREEN, University College London, JUDITH KROLL, Pennsylvania State University. — To speak even a single word, bilinguals must select among competing alternatives. According to an early hypothesis, this problem characterized the performance of second language (L2) learners, for whom the native or dominant language (L1) is far more available than the weaker L2. More recent studies suggest that the problem of language control does not disappear with increasing proficiency but that it may take on different forms for different types of speakers. In the present study, we examined L1-dominant and balanced bilinguals performing a picture naming task under conditions when a competitor was primed, when a language switch was required, and when the two languages were mixed or blocked. The results dissociate three indices of language control that reflect competitive processes at the item-level, task-level and intention-level. We discuss the implications for models of speech production and for the more general cognitive consequences of bilingualism. Email: Zofia Wodniecka, zwodniecka@gmail.com

(4145) Online Processing of Lexical Tone by Second Language Learners of Mandarin. AMRITHA MALLIKARJUN, ROCHELLE NEWMAN and JARED NOVICK, University of Maryland (Sponsored by Jared Novick). — Research suggests that second-language (L2) learners struggle to exploit novel cues that help native (L1) speakers identify referents in real-time. For example, Spanish learners whose L1 does not mark grammatical gender cannot use el/la to anticipate nouns. Similarly, English learners whose L1 (Korean) does not use stress contrastively cannot distinguish real English words from non-words by stress. Why such difficulty? One possibility is unfamiliarity with the cues—not that learners cannot exploit novel cues whatsoever. We tested if English-speaking learners of Mandarin could use lexical tone to rapidly recognize words. While English does not use tone, it does use intonation contrastively, which could facilitate learners’ ability to exploit tone predictively. Twenty (of 40 planned) subjects looked at referents corresponding to spoken Mandarin words while eye-fixations were monitored; distractors had overlapping syllable onsets but different tone onsets. Data collection/analysis will be complete by November; we will discuss implications for L2 processing. Email: Amritha Mallkarjun, amritham@umd.edu

(4146) Bilingual Word Selection: From Both Languages or the Response Language Only? JULIE W. HUGHES and TATIANA SCHNUR, Rice University (Sponsored by Tatiana Schnur). — When bilinguals speak, do words from both languages compete for selection? Naming takes longer for pictures with multiple names (sofa/couch; low name agreement (NA)) versus one dominant name (apple; high NA). Spanish-English bilinguals and English monolinguals named high and low English NA pictures in English. High English NA pictures had either low Spanish NA (ear; oreja/oido) or high Spanish NA (apple; manzana). If bilinguals select from words in both languages, then naming in the response language (English) should slow down with more non-response language alternatives (low vs. high Spanish NA). While both groups showed a significant effect of English NA, bilinguals only showed a Spanish NA effect when naming in Spanish, not when naming in English. This suggests that bilinguals select words from the response language only. However, bilinguals were overall marginally slower than monolinguals, indicating that they may recruit cognitive control to restrict word selection to the response language. Email: Julie W. Hughes, juliewhughes1@gmail.com

(4147) Effect of 3-day Language Switching Training on Cognitive Control Mechanisms. HAOYUN ZHANG, MICHELE DIAZ, and JUDITH KROLL, Pennsylvania State University (Sponsored by Judith Kroll). — We conducted a 3-day language switching training on two groups of matched Chinese-English bilinguals to explore its direct effect on non-language cognitive control mechanisms. The experimental group practiced a language switching picture naming task in which participants named pictures in each language, while
the active control group performed a picture naming task in their first language only. To measure proactive and reactive control, both groups were tested on the AX-CPT task (yes to X after A, no to all other trials) prior to and after training. We used ERPs to measure the components elicited by the cue and probe stimuli, as these have been interpreted in past electrophysiological studies to reflect proactive and reactive control, respectively. Preliminary data (11 participants in each group) showed that for the experimental group, the amplitude of N2 and P3 in both cue and probe were larger after training. But for the control group, the ERP component amplitude change after training is not significant. These results indicate that the language switching experience is a key factor that affects cognitive control mechanisms. Email: Haoyun Zhang, haoyunzhang89@gmail.com

**LETTER & WORD PROCESSING III**

(4148)

**Semantic Richness Effects in Lexical Decision: The Role of Feedback.** MELVIN YAP and GAIL LIM, National University of Singapore, PENNY PEMXAN, University of Calgary. — Across lexical processing tasks, it is well established that words with richer semantic representations are recognized faster. This suggests that the lexical system has access to meaning before a word is fully identified, and is consistent with a theoretical framework based on interactive and cascaded processing. Specifically, semantic richness effects are argued to be produced by feedback from semantic representations to lower-level representations. The present study explores the extent to which richness effects are mediated by feedback from lexical- to letter-level representations. In two lexical decision experiments, we examined the joint effects of stimulus quality and four semantic richness dimensions (imageability, number of features, semantic neighborhood density, semantic diversity) and observed robust additive effects of stimulus quality and all four targeted semantic richness dimensions. Our results suggest that semantic feedback does not reach earlier levels of representation in lexical decision, and further reinforces the idea that task context modulates the processing dynamics of early word recognition processes. Email: Melvin Yap, melvin@nus.edu.sg

The Mechanic Dropped her Wrench? The Impact of Stereotypes on the Missing Letter Effect. JUSTIN A. CHAMBERLAND, ANNIE ROY-CHARLAND, and JOEL DICKINSON, Laurentian University. — The current study sought to examine the attentional disengagement (AD) model of the missing letter effect, which is defined as more omissions for frequent function than less frequent content words. In order to do this, another reading phenomenon was used. When participants read a text that is against their stereotypical mental schemas (e.g. female mechanic), their attention is engaged for longer than when the subject coincides with their stereotypes (e.g. male mechanic). It was hypothesized that if attention is engaged for longer on a word, the target letter should have a better chance of getting detected. Results indicated that participants made more omissions with the target letter when the career was congruent with their stereotypes than when it was incongruent. In addition, more omissions were made for the congruent and incongruent male target words. These results will be discussed in relation to schema models and the AD model. Email: Joel Dickinson, jdickinson@laurentian.ca

(4150)

**The Influence of Phonological Feedback on Orthographic Learning.** LINDSAY N. HARRIS, Northern Illinois University, CHARLES A. PERFETTI, University of Pittsburgh. — Share (1995) has proposed phonological recoding (the translation of letters into sounds) as a self-teaching mechanism through which readers establish complete lexical representations of words. More recently, McKague et al. (2008) proposed a similar role for orthographic recoding (feedback from sounds to letters) in building and refining lexical representations. In the present study, the size of phonological feedback effects in lexical and spelling decision tasks was correlated with offline measures of participants’ spelling ability, and regressions were conducted to see whether feedback consistency predicted reading, spelling and vocabulary skill in more- and less-skilled participants. We found that reliance on phonological feedback information is linked to lower spelling ability, but to higher reading and vocabulary ability. This pattern of associations may be why feedback effects have been inconsistent in past research. Our finding of an association of feedback consistency effects with spelling skill is also consistent with the hypothesis that phonological feedback is used in orthographic learning, and will disappear when the orthographic representation for an item is fully specified. Email: Lindsay N. Harris, lharris3@niu.edu

(4149)

**The Contributions of Phonological and Orthographic Skills to English Word Identification in Speakers From Four L1s.** KATHERINE I. MARTIN, Southern Illinois University. — Literacy is supported by many skills, including knowledge of the spoken (phonological) system and the written (orthographic) system. The relative importance of these skills varies across first languages (L1s; Ziegler & Goswami, 2005), but few comparisons have been made regarding how these skills contribute to second language reading tasks across speakers from different L1s. This study investigated the contributions of phonological awareness and orthographic knowledge to English lexical decision and word naming in L1 speakers of English, French, Hebrew, and Chinese (N = 240). Phonological awareness was measured with oddity and deletion tasks; orthographic knowledge was measured with wordlikeness judgment and word-pseudohomophone choice tasks. Orthographic knowledge was a stronger predictor of lexical decision, while phonological awareness was a stronger predictor of naming, although both patterns were modulated by L1. The results contribute to our understanding of the relative importance of literacy skills to reading tasks in speakers from different L1s. Email: Katherine I. Martin, kim20@pitt.edu
(4152)

Regressive Saccades in Reading: The Cost Depends on the Cause. MICHAEL A. ESKENAZI and JOCelyn R. FOLK, Kent State University (Sponsored by Jocelyn R. Folk). — During reading the eyes occasionally make backwards eye movements (regressions) to reprocess information. Research has suggested that there is a cost associated with making a regression back to a word that has been previously fixated and concluded that this cost is the result of an inhibition of return effect (Rayner, Juhasz, Ashby, & Clifton, 2003). However, regressions can be made for a variety of reasons, including unintentional word skipping or comprehension problems. The current experiments investigated these two causes separately to determine whether they result in different costs. When a regression was made as a result of skipping a word, the typical 30ms cost was found. However, when the regression was made as a result of selecting the wrong meaning of an ambiguous word, there was no cost, suggesting that there is no cost associated with returning to process information that disrupts comprehension. Email: Michael A Eskenazi, meskenaz@kent.edu

(4153)

Dyslexic Adult Readers Show Transposed-Letter Effects in Reading. RHIANNON S. BARRINGTON, Bournemouth University, DENIS DRIEGHE and SIMON P. LIVERSEDGE, University of Southampton, JULIE A. KIRKBY, Bournemouth University. — Parafoveal processing in skilled adult readers is characterised by independent encoding of letter position and letter identity information (Johnson, Perea, & Rayner, 2007). If dyslexia is linked to under specification of letter position encoding (e.g., Whitney & Cornelissen, 2005; Vidyasagar, 2001; 2004) letter position information may not be extracted from the parafovea for dyslexic readers. Eye movements of skilled adult readers and adults with dyslexia were recorded in a boundary paradigm experiment. Parafoveal previews were either identical (e.g., school), a transposed-letter nonword (e.g., cshool), or a substituted-letter nonword (e.g., erhool). The results showed disruption in reading for previews with identical previews, with less disruption from transposed-letter previews. This pattern of effects held for both groups of readers, thus indicating that, similarly to skilled adult readers, dyslexic readers encode letter position and letter identity information independently. Email: Julie A Kirkby, jkirkby@bournemouth.ac.uk

(4154)

Phonological Congruency Mediates Orthographic Preview Benefits: Evidence From Eye Movements. Jane Ashby, Central Michigan University, ASCEN Pagan, University of Southampton, Holly Gagnon and Stephen Aagauas, Central Michigan University. — In order to examine how readers integrate phonological and orthographic information during silent reading, we monitored eye movements as readers processed target words in four parafoveal preview conditions: identity (BEAM), transposed-letter (BEMA), pseudohomophone (BEMO), and an orthographic control (BEMO). If initial word recognition processes are primarily orthographic, then BEMA should facilitate reading times more than BEMO. Analyses indicated longer fixation times in TL and control conditions than in the identity condition, but BEMA and BEMO did not differ from each other (t<1). The pseudohomophone condition did not differ from the identity condition. These patterns indicate that previews with all the correct letters do not facilitate word recognition if there is a syllabic mismatch between the TL preview and the target. The data suggest that phonological congruency mediates parafoveal orthographic processing during silent reading, which is consistent with models of word recognition that emphasize the cooperative activation of these two processes. Email: Jane Ashby, jane.ashby@cmich.edu

(4155)

Feedback Consistency Effects for Japanese Kanji Words in Auditory and Visual Tasks. Yasushi Hino and Yuu Kusunose, Waseda University, Stephen J. Lupker, University of Western Ontario. — In this examination of orthographic-phonological interactions in early word recognition processes, we investigated the impact of phonological-orthographic feedback consistency for Japanese Kanji words in both visual and auditory tasks. Although there was no feedback consistency effect in the standard visual lexical decision task, significant effects were obtained in a lexical decision task with auditory stimuli, a perceptual identification task using masked visual stimuli and a lexical decision task with degraded visual stimuli. These results suggest that 1) feedback consistency effects do arise, even in visual tasks, whenever visual target information is not readily available and, hence, 2) phonological-orthographic feedback likely does play a role in the reading/hearing of Kanji words. Email: Yasushi Hino, hino@waseda.jp

(4156)

Are You Laughing When You LOL? Examining Emotion in Texting Shortcuts Using Event-Related Potentials. David Kovaz, University of Memphis, Jamonté D. Wilson, James W. Rogers, Lauren A. Dahlike, Rachel K. Black, and Jeffrey J. Sable, Christian Brothers University, Roger Kreuz, University of Memphis (Sponsored by Roger Kreuz). — People commonly use shortcuts such as “lol” and “omg” when texting and communicating online. In this study we explored how the brain processes emotion in shortcuts compared to standard English words. We presented participants with sets of shortcuts and words and asked them to decide whether each stimulus conveyed emotion or not while brain activity was recorded via electroencephalogram. Previous research using event-related potentials (e.g., Naumann et al., 1992) has shown that emotional words elicit an enhanced amplitude at the late positive complex (LPC) compared to neutral words (i.e., an emotional LPC effect). We found a significant emotional LPC effect for words, but not for shortcuts. Additionally, participants were slower and less accurate at judging shortcuts (compared to words) in the emotion decision task. These results suggest that people may have difficulty processing emotion.
in shortcuts compared to words, underscoring the challenge of interpreting emotion in electronic communication. Email: David Kovaz, dmkovaz@memphis.edu

(4157)
Using Eye-Tracking to Investigate Faking on Personality Assessments. RUBY NADLER, University of Waterloo, ANA RUIZ PARDO and JOHN PAUL MINDA, University of Western Ontario (Sponsored by John Paul Minda). — Faking can be defined as the intentional distortion of responses on a personality assessment for the purpose of attaining a desired outcome, such as a job. Little research to date has examined the cognitive underpinnings of faking behaviour and the present research addresses this gap. In two experiments participants’ eye movements were recorded while they completed a single-stimulus or forced-choice personality assessment under counterbalanced straight-take honest and job applicant “faking” instruction conditions. Significant differences between honest and job applicant conditions were found for both single-stimulus and forced-choice assessment formats, indicating that participants enhanced their scores on desirable characteristics in the job applicant conditions. Analysis of eye movement patterns revealed differences in the amount and location of fixations between honest and faking conditions for both single-stimulus and forced-choice assessments. Implications for theories of faking as well as the use of eye-tracking in assessment research are discussed. Email: Ruby Nadler, madler2@uwo.ca

• LANGUAGE PRODUCTION/WRITING II •

(4158)
Syntactic Processing in Language Production Is Automatic. IVA IVANOVA and VICTOR FERREIRA, University of California, San Diego. — Three picture-naming experiments investigated the automaticity of syntactic processing in language production. Automaticity was operationalized as relative independence from domain-general processing resources in the form of verbal working memory. Experiments 1 and 2 contrasted the initiation latencies, utterance durations and errors for the production of syntactically simpler (noun phrases, e.g., the red car) and more complex picture descriptions (relative clauses, e.g., the car that is red) with or without concurrent memory load. In Experiment 3, the syntactically more complex descriptions were also lexically more complex (conjoined noun phrases, e.g., the car and the ball, relative to simple noun phrases, e.g., the car). Evidence for non-automaticity would come from an interaction of sentence complexity and working-memory load. Across experiments and measures, there was little evidence for any such interaction. We thus conclude that syntactic processing in language production is relatively automatic. Email: Iva Ivanova, iva.m.ivanova@gmail.com

(4159)
Cumulative and Immediate Structural Priming in Sentence Production. ALEXANDRA FRAZER, Muhlenberg College and Lehigh University, PADRAIG O’SEAGHDHA, Lehigh University. — To assess lexically-driven (Pickering & Branigan, 1998) and structurally-driven (Chang, Dell & Bock, 2006) contributions to sentence formulation, we used an active/passive sentence generation task (Ferreira, 1996) in conjunction with consecutive lexical (same or different verb) and structural (same, different, and control) repetition. Use of the less preferred passive increased over the course of the experiment, indicating a cumulative, perhaps learning-based effect of structural priming. However, there was no consistent effect of immediate structure priming unless the verb was also repeated, suggesting that long-term structurally-driven adaptations and local effects (structural and lexical) make distinct contributions to sentence formulation. One conclusion from our analysis of these factors is that the tendency to redeploy less preferred structures when they are promoted by recent use may be less tied to immediate consecutive choices than has been assumed. Email: Padraig O’Séaghdha, pat.oseaghdha@lehigh.edu

(4160)
Tip-of-the-Tongue States: The Error Repetition Effect in Older Adults. L. KATHLEEN OLIVER and KARIN R. HUMPHREYS, McMaster University (Sponsored by Karin R. Humphreys). — Older adults experience more tip-of-the-tongue (TOT) states than young adults (e.g. Burke, MacKay, Worthley, & Wade, 1991). We also know that TOT states in younger adults can be shown to reoccur for individual words, despite being told the correct answer (Warriner & Humphreys, 2008). This is referred to as an error learning effect. It is currently unclear as to what extent older adults with and without dementia exhibit error learning. This study elicited TOTs from older adults across retirement homes in the Hamilton, Ontario area, from the same definitions a week apart. Cognitive impairment was measured using the Montreal Cognitive Assessment (MoCA). We measured the tendency for TOT states to repeat; we also examined whether or not age and/or MoCA scores can predict error learning in our TOT task. This provides information about whether or not older and/or cognitively impaired adults can learn during a TOT state and how spoken-word production changes across the lifespan. Email: L. Kathleen Oliver, oliverlk@mcmaster.ca

(4161)
Effects of Stress on Measures of Young and Older Adults’ Speech Fluency. LORI E. JAMES and MARISSA J. METZ, University of Colorado, Colorado Springs. — Few studies have investigated how stress affects speech fluency, and none have compared effects in older adulthood. We analyzed the speech produced during the Trier Social Stress Task, with stress condition and age as between-subjects factors. Participants in the high stress condition spoke as if on a job interview and those in the low stress condition described a favorite vacation spot. Speech errors, speech fillers, and unfilled pauses were scored from the transcripts. We predicted that people in the high stress condition and older adults would produce more
speech errors, fillers, and pauses, and we also predicted interactions between stress condition and age group. There was a main effect of stress condition on speech fillers, qualified by an interaction between stress condition and age group, because older adults produced more fillers than young adults, but only in the high stress condition. We found main effects of stress condition and age group for pauses, as predicted, but no interaction, and no effects for speech errors, which were quite rare in this study. State and trait anxiety scores were also obtained for each participant and correlations with the dependent measures yielded some interesting patterns. Email: Lori E. James, ljames@uccs.edu

(4162) Word Retrieval Is Not Affected by Caffeine Dosage. SARA ANNE GORING and LORI E. JAMES, University of Colorado, Colorado Springs (Sponsored by Lori E. James). — In a study on the impact of caffeine and priming on word retrieval, Lesk and Womble (2004) reported negative effects of phonological priming when participants received a placebo instead of a caffeine dose, a surprising result. The current study reexamined the effects of these variables on the production of correct responses and occurrences of tip-of-the-tongue states (TOTs) in a definition-naming task using improved methodology. We tested 60 participants, assigned to either caffeinated or regular (placebo) water as a between-subjects factor. Each participant heard lists of phonologically related or unrelated primes, prior to seeing a definition, as a repeated-measures factor. Correct responses and TOT rates indicated no negative impact from phonological priming; the previous study’s result patterns were not replicated. Further analyses isolated participant variables (e.g., vocabulary, routine caffeine intake) that were related to more correct responses and less TOTs. Ultimately these variables drove any significant group differences regardless of other conditions. Email: Sara Anne Goring, sgoring@uccs.edu

(4163) Implicit Learning of Phonotactics: An Example of Pure Associative Learning? NATHANIEL D. ANDERSON and ERIC HOLMES, University of Illinois, Urbana-Champaign, GARY DELL, Beckman Institute. — In explicit discrimination and categorization tasks, learning a rule takes longer than learning a subsequent reversal of that rule. This savings is often attributed to nonassociative components of the task such as learning what dimensions to pay attention to. An experiment was carried out to investigate whether this pattern also appears in the implicit learning of phonotactic constraints in speech production. Subjects produced lists of nonsense syllables which followed novel phonotactic rules (for example, /f/ might occur only at word onset). Subjects implicitly learned these rules very quickly; within only a few trials, most accidental productions of the constrained phonemes followed the rules (i.e. if the subject produced /f/ at the wrong time, it showed up at the beginning of a syllable >80% of the time). When the rules were reversed (such that, e.g., /f/ now showed up only at the end of syllables), learning was significantly slower. The results support a purely associative account of this learning such that the initial bias (/f/ begins syllables) must be unlearned before the opposite bias (/f/ ends syllables) can be learned. These results are simulated with a connectionist model of syllable production. Email: Gary Dell, gdell@illinois.edu

(4164) Tracking Double-Object Naming Using the N2pc. JOOST ROMMERS, University of Illinois at Urbana-Champaign, ANTJE MEYER, Max Planck Institute for Psycholinguistics, PETER PRAAMSTRA, Radboud University Nijmegen (Sponsored by Antje Meyer). — EEG is beginning to shed light on the production of individual syllables and words. Here we used EEG to track the allocation of attention in double-object naming. 24 participants named objects pairs (dog and chair) presented left and right of a central fixation cross. Processing difficulty of the two objects was orthogonally varied by presenting them upright or upside-down. Participants fixated upon the cross throughout the trial. Increased difficulty led to more errors and longer naming latencies. The N2pc component of the ERP, known to index lateralized shifts of attention, showed an initial attention shift to Object 1 followed by a shift to Object 2. Object 1 difficulty delayed the shift to Object 2, suggesting extended attention to Object 1. More importantly, Object 2 difficulty attenuated the amplitude of the shift to Object 1 at ~200-500 ms, suggesting early allocation of attention to Object 2. Email: Peter Praamstra, peter.praamstra@radboudumc.nl

(4165) Two Types of Cognitive Control in Word Production. NAZBANOU NOZARI, MICHAEL FREUND, BONNIE BREINING, BRENDA RAPP, and BARRY GORDON, Johns Hopkins University. — Production of an intended word entails a two-stage process, in which first the lexical item and then its segments are selected among competitors, as well as monitoring processes that covertly or overtly repair dispreferred words. In two experiments, we studied the control processes involved in the two stages of production (selection control) as well as in intercepting errors (monitoring control). Selection control was studied by manipulating the overlap in either semantics or in segments when participants repeatedly produced words in blocks of two items (contextual similarity). Monitoring control was examined by asking participants to reverse the name of the two objects within each block, thus suppressing a potent response in favor of an alternative (reversal). Results showed robust costs for both contextual similarity and reversal. The former was stage-specific, the latter was shared between production stages, and the two did not interact, suggesting a dual control system in word production. Email: Nazbanou Nozari, nazbanou.nozari@gmail.com

(4166) Recursive Reminding and Cumulative Structural Priming. MICHAEL KASCHAK, TIMOTHY J. KUTTA, and ANGELA PORCELLINI, Florida State University. — It is generally held that structural priming is a long-lasting effect driven by implicit learning, with explicit memory mechanisms contributing a short-lived “boost” to the priming effects under certain conditions. Here, we consider the possibility that explicit...
memory (in the form of being reminded of prior episodes of language production) can have a longer-lasting influence on the strength of cumulative structural priming effects. During a stem-completion production experiment, participants were asked to look back over previous trials to indicate whether a given sentence stem had appeared earlier in the experiment (a method that produces reminings within an experiment). The act of looking back had effects on the cumulative structural priming effects that were observed, particularly in cases where participants looked back across the whole experiment (as compared to only looking back to the previous trial). Email: Michael Kaschak, kraschak@psy.fsu.edu

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*NEURAL MECHANISMS OF COGNITION II*

(4169)

**When Does Attention Need to be Retargeted? Recording an N2pc for the Second Target.** CHLOE CALLAHAN-FLINTOFT and BRAD WYBLE, Pennsylvania State University (Sponsored by Brad Wyble). — The N2pc ERP component occurs with changes in visual attention and a model by Tan & Wyble (2015) suggests that it reflects a lock-on state of attention within a topographic attention map. This research tests predictions of this computational model regarding the neural mechanisms supporting visual attention. Experiment 1 sought to find evidence in support of multiple attention maps for different kinds of target-defining features: orthography vs salience. Two RSVP streams (150ms SOA) presented distractors (black letters) and one or two targets (black digits and red letters) sequentially on the same side in all combinations. Presumably, separate attentional maps would each deploy attention to their respective target types, resulting in two N2pcs for the mixed T1/T2 type conditions and only one for like conditions. Experiment 2 varied T2’s lag to investigate when attention needs to be re-deployed to the same location. Both experiments yielded mixed support for the predictions. Email: Chloe Callahan-Flintoft, ccallahanflintoft@gmail.com

(4168)

**Opposite Effects of Semantically Related Naming Experience on Speech Production.** TAO WEI and TATIANA SCHNUR, Rice University (Sponsored by Randi Christine Martin). — How we name a picture (e.g., dog) changes depending on whether a picture named in the past is from the same semantic category (e.g., cat) or not (e.g., bus). Strikingly, whereas earlier studies find that naming semantically related pictures speeds up subsequent naming, recent studies report that it slows down future naming. Since these studies use different paradigms and materials to investigate how past naming influences future naming, it is unclear why the same experience results in opposite effects. Using the same picture naming paradigm and materials, we demonstrate how naming experience both facilitates and interferes with future naming. Specifically, we observed facilitation when semantically related pictures were presented adjacently. By contrast, when semantically related pictures were separated by two unrelated pictures, an interference effect was observed. These results establish the dynamic nature of the language system: changes are critically based on the interval between naming experiences. Email: Tao Wei, tw8@rice.edu

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(4167)

**Evidence for Pre-Trial Articulation During Form Preparation.** PETER KRAUSE and ALAN KAWAMOTO, University of California, Santa Cruz (Sponsored by Alan Kawamoto). — Historically, form preparation effects have been framed with respect to a serially-operating phonological encoding stage (e.g., Meyer, 1990; 1991). O’Seaghdha and Frazer (2014) recently counter-proposed that latency differences are driven by attentional processes acting outside the production pathway. A third possibility exists: that participants configure their lips congruently with the consistent onset, before target presentation. This effect would be undetectable via acoustic measures. Participants in the present study uttered words in a replication of O’Seaghdha and Frazer’s (2014) Experiment 2. Digital video recordings were used to assess participants’ vertical lip separations one frame before stimulus presentation. Vertical separations were wider when homogeneous, consistent items had alveolar onsets than when they had bilabial onsets. No comparable differences emerged for heterogeneous sets. Results suggest that participants speaking homogeneous sets make advance, behaviorally-implemented commitments to consistently-produced phonemes. Implications for models of speech production will be discussed. Email: Peter Krause, peakraus@ucasce.edu

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(4170)

**A Behavioral and Electrophysiological Examination of Representational and Response Conflict in Conflict Adaptation.** LEELAND L. ROGERS, ANNA DRUMMEY, and IRENE P. KAN, Villanova University. — According to the Conflict Monitoring Theory, conflict detection automatically triggers cognitive control mechanisms, which include a host of functions aimed to modulate cognitive processes and to optimize behavior in accordance with task demands. One behavioral consequence of cognitive control recruitment is that resolution of current conflict can also result in improved resolution of conflict that occurs immediately after. This behavioral enhancement has been termed “conflict adaptation” and has been demonstrated under various conditions. We investigated the behavioral (reaction times) and electrophysiological (event-related potential) correlates of conflict adaptation in a color-word Stroop task. Given that representational and response conflict are often conflated in the literature, we contrasted the behavioral and electrophysiological effects under two conditions: representational plus response conflict and representational conflict in the absence of response conflict. We found a larger behavioral conflict adaptation effect under the representational plus condition, and the two conditions yielded distinct electrophysiological signatures. Email: Anna Drummey, anna.drummey@villanova.edu
(4171)
EEG Oscillatory Modulations for Feeling of Boredom. MASAHIRO KAWASAKI and ERI MIYAUCHI, University of Tsukuba. — The mechanisms of boredom is difficult to be understood due to its various definition according to the context and cognitive factors associated with the experience. Many studies on boredom have been focused on defining, measuring, and finding cause and effect, but not much on neural mechanisms. The present study investigated changes of the brain activity during subjective feeling of boredom with electroencephalograph (EEG) measurements. In the experiment, participants were instructed to listen to a melody and change it whenever they feel bored of listening to a keyboard button. The participants were assured to concentrate on listening to the presented melody and not to change it for their preference. The time-frequency analysis for the EEG data showed the gradually-changed activities just before the onset of pressing keyboard to change the melody. The results suggest that the EEG oscillatory modulations reflect our feeling of boredom. Email: Masahiro Kawasaki, kawasaki@iit.tsukuba.ac.jp

(4172)
Alpha Oscillations Track the Content of Representations Retrieved From Long Term Memory. DAVID WILLIAM SUTTERER and JOSHUA JAMES FOSTER, University of Oregon, JOHN T. SERENCES, University of California, San Diego, EDWARD VOGLER, University of Oregon, EDWARD AWH, University of Chicago (Sponsored by Douglas Hintzman). — Recent work has demonstrated that it is possible to reconstruct spatially-specified channel tuning functions (CTFs) during the encoding and delay period of a working memory (WM) task using a forward encoding model and electroencephalography. These CTFs can be derived from the distribution of alpha-band (8-12Hz) activity across the scalp, providing a temporally resolved measure of the stored location. Here, we show that a similar approach can be used to track the content and timecourse of representations retrieved from long term memory (LTM). Subjects learned randomly assigned positions for 120 shapes, with the position selected from a continuous 360 degree space around a circle. The next day, subjects were presented with shape cues and asked to retrieve the associated position while EEG was recorded. We found robust spatially-selective CTFs could be obtained from the distribution of alpha-band power ~600ms after the onset of the retrieval cue. These results suggest that holding representations retrieved from LTM in mind relies upon a similar neural mechanism to that used to maintain information in spatial WM. Furthermore, these findings reveal a powerful approach for obtaining neural measures of LTM retrieval latency. Email: David William Sutterer, sutterer@gmail.com

(4173)
Factors Affecting the Amplitude of the Feedback-Related Negativity on the Balloon Analogue Risk Task. ANTHONY MCCOY and MICHAEL YOUNG, Kansas State University (Sponsored by Michael Young). — EEG research examining the feedback-related negativity (FRN) has indicated that the amplitude may predict subsequent behavioral change. The current study used a version of the Balloon Analogue Risk Task (BART) that involves outcomes that are dynamically changing over time. As the balloon grows, more points are available but the probability of the balloon popping (netting zero points) is higher; the participant decides when to stop to maximize points. In Experiment 1, error magnitude did not contribute to the amplitude of the FRN. In Experiment 2, the masked points possible condition was a replication of Experiment 1. In the unmasked points possible condition, the number of points that could have been earned for each balloon was presented before participants found out how many points were earned. In Experiment 2, the amplitude of the FRN was affected by the magnitude of the error on cashed-in trials in the unmasked condition, but not the masked condition. These results are seemingly at odds, and cannot be assimilated into any currently extant model of the FRN. Email: Anthony McCoy, awmccoy@k-state.edu

(4174)
Positional Priming of Pop-Out: A Failed Theoretical Construct? AHU GOKCE, Kadir Has University, THOMAS GEYER, KATHRIN FINKE, and HERMANN MÜLLER, Ludwig-Maximilians-Universität München; Birkbeck College, University of London, THOMAS TÖLLNER, Ludwig-Maximilians-Universität München. — In visual pop-out search, reaction time (RT) performance is influenced by cross-trial repetitions vs. changes of target-defining attributes. Visual processing differs, for instance, for targets presented at previously occupied target, distractor, and neutral positions. This effect—known as positional priming of pop-out—may integrate processes of both target facilitation and distractor inhibition. By combining RT data with event-related lateralizations, the current study investigated at which processing level(s) positional priming processes arise. Our results revealed slowed PCN waves—reflecting delayed focal-attentional selection—when the target occurred at previous distractor positions, with no difference between previous target and neutral positions. In contrast, sLRP waves—reflecting response decisions—were fastest when the target occurred at previous target positions. These findings support the idea that distractor, but not target, location priming modulates (i.e., attenuates) target saliency coding at repeated locations. Target location priming, by contrast, originates from processing levels subsequent to focal-attentional selection. Email: Ahu Gokce, ahugokce@gmail.com

(4175)
Statistical Learning Ability Ameliorates the Negative Impact of Low Socioeconomic Status on Language Development. LEYLA EGBHALZAD, JOANNE A. DEOCAMPO, and CHRISTOPHER CONWAY, Georgia State University. — Statistical learning (SL) abilities appear to enable successful language acquisition. Although it is known that language acquisition is influenced by environmental factors such as socioeconomic status (SES), it is unknown whether SL interacts with SES in affecting language outcomes. We measured event-related potentials (ERPs) in 38 children aged 7-12 while performing a visual SL task consisting of sequences of stimuli containing covert statistical probabilities. Language
was assessed with the PPVT. A regression with SES and SL (ERPs) and their interaction indicated that SES predicted PPVT scores ($β = -.641, p < .001$). In addition, the interaction between SES and SL was significant ($β = -.346, p = .008$): for children with low SL, SES had a strong impact on PPVT, while for children with high SL, the relationship between SES and PPVT was weak. These results suggest that high SL abilities may help ameliorate the disadvantages associated with low SES.

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(4176)
Mixed Signals From the Feedback-Related Negativity: Effects of Both Expectancy Violations and Negative Events. PABLO JAVIER MORALES, JASON HUBBARD, ATSUSHI KIKUMOTO, and ULRICH MAYR, University of Oregon (Sponsored by Ulrich Mayr). — Previous research has interpreted electrophysiological indices related to unexpected negative outcomes such as the feedback-related negativity (FRN) as a reflection of a midbrain-generated prediction error, not necessarily of a negative event per se. However, inconsistent with this explanation, even conditions in which outcomes should not be associated with strong prediction errors (i.e. outcome probabilities are at chance) elicit an FRN. To better understand the role of expectancies in generating these electrophysiological signals, the current work employed a two-armed bandit task where probabilities of reward and punishment were manipulated and explicitly cued on a trial-by-trial basis between 30% and 70%. Probability modulated the magnitude of the FRN for both rewards and punishments (albeit more strongly so for rewards), but the FRN was also stronger for negative events overall. These results suggest that the FRN is a mixed signal that reflects both general violations of expectancies (whether good or bad) but also the occurrence of negative events, even when these are expected.

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(4177)
Exploring the Association Between Auditory Sequential Learning and Receptive Vocabulary: An Event-Related Potential Study. KIMBERLY M. ROSS, JEROME DALTROZZO, and CHRISTOPHER M. CONWAY, Georgia State University (Sponsored by David A. Washburn). — Sequential learning (SL) is thought to support language acquisition by enabling the learning of statistical regularities within temporal patterns of speech. We investigated the relationship between event-related potential (ERP) correlates of SL and language performance. Seventeen adults completed a test of receptive vocabulary (the Peabody Picture Vocabulary Test, PPVT) and an auditory SL task. Participants were presented sequences of complex tones of varying pitch and were instructed to press a button when they heard a “target” tone. Unknown to the participants, the target was preceded by one of three “predictor” tones that was followed by the target with varying degrees of probability (20, 50, or 80%). Results indicated that ERPs to the predictors were modulated by these probabilities, with greater ERP amplitudes (750-850ms post-predictor onset) associated with higher PPVT scores ($r = .77, p < .001$). These findings provide evidence for a link between the neurocognitive mechanisms underlying SL and language performance.

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(4178)
Investigating the Cognitive and Neural Effects of Computerized Training of Structured Sequence Processing. GRETCHEN N. L. SMITH and CHRISTOPHER CONWAY, Georgia State University (Sponsored by Christopher Conway). — Structured sequence processing (SSP) is a general-purpose mechanism used to learn patterns of stimuli that unfold over time, such as spoken language. We have recently demonstrated that it may be possible to improve SSP (Smith, Conway, Bauernschmidt, & Pisoni, 2015). To further explore the cognitive and neural consequences of SSP training, typically-developing adults (N=34) were quasi-randomly assigned to computerized SSP training, active control, or passive control. SSP training involved a visual-spatial sequence reproduction task with underlying statistical patterns in the sequences. Following 10 days of training or control, participants were reassessed on non-trained baseline measures. We used event-related potentials to examine neural changes to SSP resulting from training. Findings indicated that the training modulated P3a and P3b components in frontal regions. Behavioral results revealed improvement to accuracy on SSP following training [t(110)=4.87, p=.001]. These findings demonstrate the feasibility of improving SSP, possibly mediated by changes to attention or working memory.

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(4179)
Searching for Modality General Representations of Valence in fMRI Data. JONGWAN KIM, SVETLANA V. SHINKAREVA, and DOUGLAS WEDELL, University of South Carolina (Sponsored by Douglas Wedell). — Do positive and negative affective reactions elicited by widely differing types of the stimuli share a common basis? To answer this question, we conducted an fMRI study in which twenty participants evaluated either affective or semantic aspects of silent video clips and short music samples drawn from negative, neutral, or positive valence categories matched in arousal. Cross-modal multivoxel pattern analyses from whole brain activation revealed statistically significant classification accuracies for 19 out of 20 participants supporting modality general processing. A searchlight analysis identified clusters in the right transverse temporal gyrus, left superior temporal gyrus, and right middle temporal gyrus as producing similar patterns of valence responses across video and music stimuli. Validation of these clusters was reflected by 1) statistically significant cross-modal classification in all three regions for the majority of participants and 2) multidimensional scaling of the group data revealing a general valence dimension across modalities.

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Variation in Inhibition: Neural Underpinnings of NoGo and Incongruency Effects. DONALD BOLGER, BRANDEE FEOLA, TOBY HAMOVITZ, and SHARONA ATKINS, University of Maryland, AMBER SPRENGER, MITRE Corp, MICHAEL DOUGHERTY, University of Maryland. — Behaviorally, the “no-go” response and the Simon effect are two constructs associated with response inhibition, yet the specific neural networks underlying these functions may be quite distinct. The current study examined the neural underpinnings of inhibition across task design and period using “no-go” and incongruency contrasts. Seventy-eight adult participants (ages 22-50 years) completed a delayed match-to-sample task (with no-go trials) and a modified Simon task in a 3T Functional Magnetic Resonance Imaging (fMRI) scanner. The neural networks of the “no-go” components in the two different tasks and the incongruency effect of the Simon Task were compared. Although the neural networks supporting the “no-go” response in the two tasks were similar, the response to incongruency revealed a differential pattern of activation. These findings suggest that despite these measures of response inhibition being used interchangeably at the behavioral level, these constructs may be more distinct at the neural network level. Email: Donald Bolger, djbolger@umd.edu

Neuroimaging and Neuropsychological Evidence for Different States of Representation in Working Memory. EMMA E. MEYERING and NATHAN ROSE, University of Wisconsin-Madison, CHRISTA DANG and BRADLEY R. BUCHSBAUM, Rotman Research Institute, STEVENSON BAKER, York University, R. SHAYNA ROSENBAUM, York University and Rotman Research Institute, BRADLEY R. POSTLE, University of Wisconsin-Madison (Sponsored by Nathan Rose). — Theories suggest that items held in working memory (WM) exist in varying representational states. To test this hypothesis we conducted an fMRI study in which we first scanned healthy young adults performing a 1-item WM task (delayed recognition of a word, face, or direction of motion), and trained multivariate pattern classifiers to decode WM maintenance for these three categories. In phase 2 we scanned the participants performing a 2-item WM task (using the same categories) with retrocues that manipulated how long items were held in focal attention (FA). Items held in FA (but not items held outside of FA) could be decoded from a classifier using data from the whole brain, but not the hippocampus. Subsequent long-term memory (LTM) tests showed that word-stem completion priming was insensitive to the amount of time an item was held in FA; however, subsequent cued recall and delayed recognition was better for items held longer in FA. These results are both consistent with the representational states hypothesis and inconsistent with the idea that unattended memory items are preferentially represented in LTM. To further test the LTM account, these results will be compared to a developmental amnesic (patient NC) with LTM impairment. Email: Emma E. Meyering, meyering@wisc.edu

Context-Dependent Improvement of Inhibitory Control Through Transcranial Direct Current Stimulation. JEREMY HOGEVEEN and JORDAN GRAFMAN, Rehabilitation Institute of Chicago, ALEXANDER DAVID and MAROM BIKSON, The City College of New York, KATHERINA K. HAUNER, Rehabilitation Institute of Chicago. — Prefrontal transcranial Direct Current Stimulation (tDCS) has shown promised as a method for improving inhibitory control, yet results from this work have been mixed. One potential source of this ambiguity is a high level of inconsistency in tDCS treatment design. Here, we manipulated two tDCS design parameters [namely, stimulation focality (i.e. conventional versus high-definition electrode montages), and peristimulation context (i.e. congruent versus incongruent task context during stimulation)] to optimize the use of this technique to improve inhibitory control. Using a pre-posttest design, inhibitory control gains were demonstrated after both conventional and high-definition tDCS, but only if stimulation was applied during the performance of an inhibitory control task (the stop-signal task). Our results identify a context-dependent effect of prefrontal tDCS on inhibitory control: It is far more effective when the stopping network is engaged during stimulation. Furthermore, this study provides an evidence-based standard for designing tDCS treatments to improve cognitive performance. Email: Jeremy Hogeveen, jeremy.hogeveen@northwestern.edu

Support for a Dual-Systems Model of Speech Sound Category Learning From Goodness Judgments. CHRISTOPHER CULLEN HEFFNER, WILLIAM JAMES IDSARDI, and ROCHELLE NEWMAN, University of Maryland, College Park (Sponsored by Rochelle Newman). — Listeners must learn categories to navigate the world around them, and speech is no exception to this trend. How might listeners learn speech sound categories? Although previous theories have been advanced that only require the use of a single exemplar-based category learning system (e.g., Pierrehumbert, 2003), recent proposals have instead advanced a dual-system approach to phonetic category learning, which employs both rules and exemplars (e.g., Chandrasekaran, Yi, & Maddox, 2014). Here, we test these single- and dual-system models by training native English speakers using a continuum of speech sounds taken from German, and teaching the participants to pair sounds along that continuum with one of three colored squares. What we find is that our participants deviated systematically from some of the predictions of single-system theories in rejecting discontinuous categories. These findings also extend to category goodness judgments, modeled on the work of Miller (1994) and colleagues. Email: Christopher Cullen Heffner, heffner@umd.edu

CONCEPTS AND CATEGORIES II

Support for a Dual-Systems Model of Speech Sound Category Learning From Goodness Judgments. CHRISTOPHER CULLEN HEFFNER, WILLIAM JAMES IDSARDI, and ROCHELLE NEWMAN, University of Maryland, College Park (Sponsored by Rochelle Newman). — Listeners must learn categories to navigate the world around them, and speech is no exception to this trend. How might listeners learn speech sound categories? Although previous theories have been advanced that only require the use of a single exemplar-based category learning system (e.g., Pierrehumbert, 2003), recent proposals have instead advanced a dual-system approach to phonetic category learning, which employs both rules and exemplars (e.g., Chandrasekaran, Yi, & Maddox, 2014). Here, we test these single- and dual-system models by training native English speakers using a continuum of speech sounds taken from German, and teaching the participants to pair sounds along that continuum with one of three colored squares. What we find is that our participants deviated systematically from some of the predictions of single-system theories in rejecting discontinuous categories. These findings also extend to category goodness judgments, modeled on the work of Miller (1994) and colleagues. Email: Christopher Cullen Heffner, heffner@umd.edu
The Effects of Testing the Relationships of Relational Concepts. DANIEL CORRAL, University of Colorado, Boulder, ALICE HEALY and MATT JONES, University of Colorado (Sponsored by Matt Jones). — Many concepts are defined by their relationships to one another. However, instructors often teach these concepts individually, neglecting their interconnections. For instance, students learning about statistical power might learn to define alpha and beta, but not how they are related. Consequently, students may fail to learn many important relationships within a conceptual system. The current study examines whether there is a benefit to training subjects on relations among concepts. Subjects studied material on hypothesis testing, a topic comprising many interconnected concepts. Half of the subjects were subsequently quizzed on relationships among these concepts, and the other half were quizzed on their individual definitions. Quiz questions were followed by corrective feedback. All subjects were then tested on both types of questions. Subjects trained on relations performed better on relational test items than did subjects trained on definitions, whereas definitional test items showed the reverse pattern. These results suggest that relational and definitional knowledge are psychologically distinct, and that training on each yields a corresponding selective advantage. Email: Daniel Corral, daniel.corral@colorado.edu

Developmental Differences Between Children’s and Adults’ Conjunctive Categorizations. NIGEL NOLL, HALEY VLACH, and CHARLES W. KALISH, University of Wisconsin-Madison (Sponsored by Haley Vlach). — Previous research has revealed that both children and adults can categorize objects by overall similarity and by single perceptual features (e.g., shape, color, motion). What about conjunctions? Less is known about how children categorize conjunctively based upon multiple perceptual features, and whether there are developmental differences between childhood and adulthood. We investigated developmental differences in conjunctive categorizations with perceptual features. In a learning task, preschool-aged children and adult participants were presented with multiple novel objects. Each novel object contained a paired combination of perceptual defining features (i.e., color, shape, and motion path). A forced choice test required participants to categorize objects conjunctively using two features (e.g., shape and motion path). The results revealed several differences in performance between children and adults. These findings suggest that, while early on children readily categorize objects by a single feature, the ability to conjunctively categorize information may have a more protracted course of development. Email: Nigel Noll, mnoll@wisc.edu

Providing Larger Rewards for Less Typical Exemplars Facilitates Rule-Based Category-Learning. KAILEIGH BYRNE, Texas A&M University, TYLER DAVIS, Texas Tech University, DARRELL WORTHY, Texas A&M University (Sponsored by Tyler Davis). — Previous research demonstrates that feedback differentially influences rule-based and information-integration category learning systems, yet the interaction between categorization difficulty and reward feedback on category learning performance is unclear. To address this issue, we varied reward values of feedback for high (easy) and low (difficult) typicality category members. Participants classified lines that varied in length and orientation and were given a point goal to reach. Points toward that goal were based on the stimulus categorization typicality and correct responses. Results revealed that receiving larger rewards for correctly categorizing low typicality (more difficult) stimuli compared to high typicality stimuli improved conjunctive rule-based learning, but not information-integration learning. These findings suggest that providing larger rewards for successfully classifying low-typicality items enhances attention for stimuli around the boundary that distinguishes each category, and thus facilitates rule-based learning. Implications for models of category learning are discussed. Email: Kaileigh Byrne, kbyrne21@tamu.edu

Memory Representations of Abstract and Concrete Causal Item Pairs. JANE NEAL, KATJA WIEMER, and LILLIAN K.E. ASIALA, Northern Illinois University (Sponsored by Katja Wiemer). — Judgments of causal relatedness are made faster in predictive (cause before effect) than in diagnostic order (Fenker et al., 2005), suggesting that causal relations are stored in memory. However, concrete causes (e.g., vehicle–emission) are more likely observed as they happen than abstract causes (e.g., motivation–dedication), thus, the effect may be more pronounced for concrete item pairs. This was tested experimentally through a replication with abstractness as an added factor. Forty-six abstract and 48 concrete causal pairs normed for bidirectional associative strength were presented across counterbalanced versions in either predictive or diagnostic order. Participants decided whether the presented words were causally related. The results replicate a processing advantage for predictive order; as predicted, this difference was more pronounced for concrete (d=0.17; t(83)=3.74, p<0.001) than for abstract pairs (d=0.09; t(83)=1.711, p=0.09). Implications for semantic organization of abstract and concrete concepts and relations are discussed. Email: Jane Neal, janeneal233@gmail.com

Feature to Feature Inference Following Learning of Correlated and Uncorrelated Category Structures. MATTHEW E. LANCASTER and DONALD HOMA, Arizona State University. — A key aspect of category usage is the ability to infer missing features of partial category exemplars. The present study explored feature-to-feature inference following the learning of category structures whose dimensions were correlated or uncorrelated. Following learning, participants completed a feature inference test where the number of cues was varied. (1-4 features available, sometimes including the category label). Results showed superior inference of a missing feature when the category structure was composed of correlated dimensions, with performance increasing with the number of cues. In contrast, feature inference with a single cue was at chance for the
uncorrelated condition; however, performance did improve with additional cues. No evidence was found that the category label functioned as a special feature, since performance did not improve more than adding another feature. These findings indicate that the internal correlational structure of a category is learned following classification training. Email: Matthew E Lancaster, lancaster.m.e@gmail.com

(4189)
Category Competition Endures Post Decision. MICHAEL DIECIUC, JONATHAN R. FOLSTEIN, and MICHAEL KASCHAK, Florida State University (Sponsored by Michael Kaschak). — Previous studies have shown that, under certain circumstances, categorizing can involve the parallel activation of competing representations. The aim of the current study was to determine whether this parallel activation which has been observed during categorization is preserved or resolved after that decision has been made. To assess this, the authors used a paradigm in which participants either categorized or did not categorize faces according to gender and then were probed with a gender stereotype selection task. Faces were computer generated morphs and varied in gender ambiguity. We show that selection of gender congruent semantic information was less efficient for faces with greater gender ambiguity even after correct categorization. This suggests that in certain contexts competing semantic representations linger after categorization. However, for a subset of participants categorization eliminated any effects of gender ambiguity on stereotype selection, suggesting there are also individual differences in whether competing categories linger. Email: Michael Dieciuc, MichaelD180@gmail.com

(4190)
Recovery From Misleading Featural and Relational Information. JOHN HUMMEL and MAUREEN GRAY, University of Illinois. — How does a salient, but ultimately unreliable, featural or relational cue affect one's ability to learn a category structure based on a subtler feature or relation? Subjects learned categories defined either by a subtle feature or relation in the presence of a salient feature or relation, or in the presence of no such distractor (baseline). During the first phase of learning, both the subtle property and the salient distractor were diagnostic of category membership. After subjects reached criterion, the salient distractor was rendered non-diagnostic. Subjects who had the featural distractor never learned to criterion in this second phase, whereas subjects with the relational distractor did. Patterns of learning suggest that the featural distractor put subjects in a “holistic” mindset that interfered with both featural and relational learning. Email: John Hummel, jehummel@illinois.edu

(4191)
A New Measure of Clustering and Switching Based on Bigrams. MARIA K. WOLTERS and SARAH E. MACPHERSON, University of Edinburgh, JINSEON YOU, RIZE JIN, SEUNG-CHEOL BAEK, JONG C. PARK, Korea Advanced Institute of Science and Technology, Daejeon. — The category fluency task (CFT) provides important information about executive abilities such as initiation, shifting and inhibition. CFT sequences are generated by retrieving groups of related words (“clusters”) from semantic memory. Manual annotation schemes have been developed for inferring these clusters from transcribed CFT sequences (Troyer 2006), but these are time-consuming and require training. We propose an automatic analysis technique that is based on a simple statistical model of CFT sequences. This model can be easily adapted to different languages and domains, given sufficient training data. CFT sequences (domain “animals”) were generated by 104 younger adults aged 18-34 years and 100 older adults aged 50-84 years who were native speakers of UK English. The sequences were categorised both manually and using our automated method with key measures such as the number of switches significantly correlating (rho=0.4, 95% CI [0.28-0.51]). Both methods also resulted in the significant age differences that are consistently reported in the cognitive aging literature. Email: Sarah E. MacPherson, sarah.macpherson@ed.ac.uk

(4192)
Effects of the Relatedness Between Pairs of Objects on Category Reconstruction: An Investigation Using a Commonality Discovery Task. MAYU YAMAKAWA and SACHIKO KIYOKAWA, Nagoya University (Sponsored by Kuninori Nakamura). — Generating creative ideas requires category reconstruction. The purpose of this study was to investigate the effect of relatedness between two objects on category reconstruction. We assumed that discovering a commonality between apparently unrelated objects leads to category reconstruction. In our experiments, 20 undergraduates were asked to rate the degree of relatedness within 18 pairs of objects: 9 related pairs (e.g., a strawberry and a melon) and 9 unrelated pairs (e.g., a banana and a motor bike). They were then asked to list commonalities between the same paired objects. Two independent raters scored commonalities in terms of validity, originality, and attractiveness. Unrelated pairs resulted in less commonalities and lower validity scores than did related pairs. In contrast, unrelated pairs evoked commonalities with higher originality and attractiveness scores. Our results indicate that though discovering commonalities between apparently unrelated objects is difficult, this process may generate more original, attractive ideas. Email: Mayu Yamakawa, mayu.y.music@gmail.com

(4193)
An Examination of the Modification Effect in Compound Words. KELLY NISBET, JENNA CHAMBERLAIN, CHRISTINA GAGNE, and THOMAS SPALDING, University of Alberta (Sponsored by Christina Gagne). — We investigated how people decide the likelihood of properties being true of unmodified and modified nouns in compounds. In Experiment 1, participants were presented with a statement regarding how often a property is true using the quantifiers “some,” “almost all,” or “almost no” of a modified noun (e.g., almost all birds require graminoids in their diet). They were then asked a follow up question about the likelihood of the statement, and answered on a scale from 1% to 100%. Experiment 2 used non-word compounds (e.g., flegbird).
Our results demonstrated that true properties were judged as less true of the modified nouns than the unmodified nouns, and the opposite was found for false properties. This suggests that the presence of the modifier (regardless of whether it is an actual word) causes participants to make a distinction between the head noun alone and the compound. Email: Kelly Nisbet, kanisbet@ualberta.ca

(4194)
Liking, Defining, and Thinking, Oh My!: Ways of Knowing and Appraisal of Intellectual Activities. KATHLEEN GALOTTI, MICHAEL J. SCHNEEKLOTH, CARL BOU MANSOUR, MICHAEL H. WHEATMAN, and ANNA SMITH, Carleton College. — This study explored implications of individual differences in epistemological approaches to knowledge and learning. We examine the relationship between “separate” (SK) and “connected” (CK) ways of knowing and assessments of how enjoyable and how central to one's identity different intellectual activities are. Undergraduates (n = 108) completed the ATTLS and a new instrument, the Intellectual Activities Ratings survey, listing 12 intellectual activities, including “writing a proof of a theorem” and “keeping a personal journal.” Controlling for gender, CK scores correlated significantly with enjoyment and centrality ratings for five of the six items intended to appeal to connected knowers. SK scores correlated with enjoyment ratings for three of the six items and with centrality ratings for two of the six items intended to appeal to separate knowers, again controlling for gender. Results provide further evidence that SK and CK scores represent epistemological styles rather than ability measures. Email: Kathleen Galotti, kgalotti@carleton.edu

• REWARD, MOTIVATION, AND DECISION MAKING •

(4195)
When to Cut Your Losses: The Psychological Value of Achieving Multiple Goals. TIMOTHY BALLARD and ANDREW NEAL, University of Queensland, SIMON FARRELL, University of Western Australia (Sponsored by Stephan Lewandowsky). — When pursuing competing goals, people often adopt a “putting out fires” strategy by prioritizing whichever goal is furthest from achievement. Although this strategy increases the likelihood of achieving more than one goal, it also increases the risk of failing to achieve any goals. We examined the robustness of this strategy using an experiment in which participants made repeated prioritization decisions whilst pursuing either two approach or two avoidance goals. Participants were rewarded $10 if they achieved both goals, and either $0, $2.50, $5, $7.50, or $10 if they achieved only one. Even when there was no additional incentive associated with achieving the second goal, people still prioritized the goal furthest from achievement almost half of the time. This effect was strongest when pursuing avoidance goals. These findings demonstrate the psychological value of achieving multiple goals, even when pursuing multiple goals reduces expected reward. Email: Timothy Ballard, t.ballard@uq.edu.au

(4196)
Post-Error Recklessness and the Hot Hand. PAUL G. WILLIAMS, KEITH NESBITT, ANDREW HEATHCOTE, and AMI EIDELS, University of Newcastle (Sponsored by Andrew Heathcote). — Although post-error slowing and the “hot hand” (streaks of good performance) are both types of sequential dependencies arising from the differential influence of success and failure, they have not previously been studied together. We bring together these two streams of research in a computer game where difficulty can be controlled by delaying decisions. In contrast to most previous results, in Experiment 1 we found post-error speeding rather than slowing. We also found a hot hand, even though the hot hand is typically considered a fallacy. In Experiment 2 we explored whether participant selection and motivation might account for these findings. Our results suggest that errors can sometimes cause unmotivated participants to become more reckless rather than more cautious after making an error. We discuss these results within the theoretical context of post-error slowing and belief in the hot hand. Email: Paul G. Williams, paul.williams@newcastle.edu.au

(4197)
Monetary and Liquid Incentives Combine to Modulate Cognitive Task Performance. DEBBIE YEE and TODD BRAVER, Washington University in St. Louis (Sponsored by Todd Braver). — It is unequivocal that a variety of incentives motivate behavior. However, few studies have examined how different incentive types are integrated regarding their motivational influence. This study examines the combined effects of monetary and liquid incentives on cognitive processing, and whether appetitive and aversive incentives have distinct influences. We introduce a novel task paradigm; subjects perform cued task-switching for varying monetary amounts across trials, with liquids serving as post-trial performance feedback. Critically, the symbolic meaning of the liquid was held constant (indicating successful reward attainment), but liquid valence was blocked. In experiment 1, task performance improved with greater monetary rewards, which additively combined with appetitive liquids. Aversive liquids counteracted monetary incentive effects, particularly during low monetary reward trials. In experiment 2, subjects received only appetitive liquids, and their performance was predicted by self-reported motivation ratings. These results indicate an integrative relationship of primary and secondary incentives that is potentially dissociated by motivational value. Email: Debbie Yee, debbiyee@wustl.edu
(4198) Transcranial Direct Current Stimulation Modulates Confirmation Bias in Instructed Reinforcement Learning.
NATHAN TARDIFF and SHARON THOMPSON-SCHILL, University of Pennsylvania (Sponsored by Sharon Thompson-Schill). — Successful decision-making requires a flexible balance between exploiting prior information and exploration that leads to new learning. One source of prior information is instruction from others. However, when instruction is inaccurate, it can lead to lasting decrements in performance despite feedback, suggesting a form of confirmation bias. Confirmation bias effects have been reported in a number of studies of instructed reinforcement learning, with prefrontal cortex (PFC) implicated in biasing striatally-mediated learning. This study used transcranial direct current stimulation over PFC to establish a causal relationship between prefrontal cortical mechanisms and confirmation bias in instructed reinforcement learning. Results indicate anodal stimulation leads to faster learning away from the instructions and cathodal stimulation leads to slower learning away. These findings are interpreted in light of the role of PFC in working memory for past reward and alternative hypotheses. Additional studies probe the roles of instruction and experience in confirmation bias effects.
Email: Nathan Tardiff, ntardiff@sas.upenn.edu

(4199) Motivational Salience Guides Attention in Natural Scene Viewing.
JUDITH SCHOMAKER, Justus Liebig University Giessen, WOLFGANG EINHÄUSER, Institut für Physik-TU Chemnitz, BIANCA C. WITTMANN, Justus Liebig University Giessen (Sponsored by Jan Theeuwes). — Stimuli associated with reward can capture attention, even when their visual salience equals that of other stimuli in the environment. In the real world, positive and negative stimulus-outcome associations exist for many complex objects, based on a life-long history of encountering and interacting with objects. Here the effects of motivational salience on overt attention (i.e., attention associated with shifts of gaze) were investigated. In experiment 1, objects of varying motivational salience (appetitive, neutral, or aversive, as verified in an independent rating experiment) were presented. Experiment 2 included these objects in naturalistic scenes. Results from both experiments showed that motivational compared to neutral objects reliably engaged attention. In experiment 1 appetitive and aversive objects reduced novelty preferences. In both experiments, the motivational objects were fixated more often, earlier in the trial, and longer than neutral objects. Together, our data show that motivational value contributes to attention guidance in natural scene viewing.
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YOUNGBIN KWAK, University of Massachusetts, Amherst, KYUNGSIK YUN, JAEHYUNG KWON, and JAESEUNG JEONG, KAIST; SCOTT HUETTEL, Duke University. — Economic decisions often involve social groups. Previous research shows that social identity alters economic decisions involving social groups, while cultural differences in social identity have been studied widely in cultural psychology. The current study determined cultural influences on sensitivity to rewards directed towards their ingroup and outgroup. 46 American and 55 Korean students performed the Group Social Gambling Task (gSGT), in which they earned money for their ingroup and outgroup by choosing amongst four card decks each associated with different reward outcomes for the two groups. gSGT performance showed a culture by reward recipient (ingroup vs. outgroup) interaction demonstrating greater reward learning for ingroup in Koreans than in Americans. Koreans also showed a greater tendency to switch choices after the chosen deck resulted in a losing outcome for ingroup and a winning outcome for outgroup. These results demonstrate significant cultural differences in processing of rewards towards different social groups.
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• AUDITION •

(5001)
Change Deafness Is Reduced but not Eliminated by Practice. VANESSA IRSIK and JOEL S. SNYDER, University of Nevada, Las Vegas (Sponsored by Melissa Gregg). — Previous research on change deafness, a failure to notice auditory changes, has suggested that errors frequently occur due to unsuccessful encoding. The current study aimed to improve encoding and reduce change deafness by training individuals to better individuate co-occurring sounds. Listeners were presented two auditory scenes, separated by a silent interval, after which they responded same or different. Training involved either receiving detailed feedback on performance, testing without feedback, or a control condition where listeners watched a documentary. During detailed feedback, listeners were told the correct response and reheard both the individual changed sound in isolation and the entire change detection trial. All groups showed significant improvement; however, receiving detailed feedback resulted in the greatest error reduction. In summary, change deafness was reduced, but not eliminated, as a result of training or testing. Future studies should address the benefit of additional training and the longevity of observed perceptual enhancements. Email: Vanessa Irsik, irsikv@unlv.nevada.edu

(5002)
Sound Identification of Small Arms From Weapon Functions Sounds Is Influenced by Contextual Similarity. KELLY DICKERSON and JEREMY GASTON, Army Research Laboratory, KRISTIN HARTMANN and STEPHANIE NAGEL, Towson University; TIMOTHY MERMAGEN, Army Research Laboratory. — Small arms weapon function sounds are the result of preparing a firearm to be fired, and these sounds can provide important information about the identity of the small arms weapon. The present study examined accuracy of judging weapon identity based on weapon “charging” sounds, both in isolation and in the context of a complex array of competing environmental sounds. Following brief training, listeners were given a 5AFC identification test where the charging sound from one of five weapons was presented in isolation or embedded in a background context. Listeners reached 85% accuracy across all weapons, however, when the target was presented with background sounds there was a significant (> 11%) reduction in average accuracy. There also was a significant effect of target-background similarity, with accuracy for similar sound context significantly worse than more dissimilar context. These results have implications for training and transferability of training across context. Email: Kelly Dickerson, dickersonkelly23@gmail.com

(5003)
Impact of Music Training on Dissociable Category Learning Systems. BHARATH CHANDRASEKARAN, KIRSTEN SMAYDA, and W. TODD MADDOX, University of Texas at Austin. — Music training’s influence on learning two dissociable category structures is reported. Amateur musicians and non-musicians learned continuous-valued rule-based (RB) or information-integration (II) category structures that varied on stimulus dimensions: auditory a) frequency and duration, b) spectral and temporal modulation, and c) visual line length and orientation. RB categories are optimally learned using verbalizable, reflective processes while II categories are optimally learned using non-verbalizable, reflexive processes. Computational models assessed category-learning strategies. Our results demonstrate a musician advantage in learning RB, but not II, auditory categories. No effect of music training was evidenced for RB or II visual categories. The musician's brain has been studied as a model of auditory experience-dependent plasticity. Our results suggest the effect of music training is modality and category structure specific: faster, more accurate learning of auditory category structures that require reflective reasoning. Mechanistically, this advantage is due to earlier, more frequent use of the optimal strategy. Email: Bharath Chandrasekaran, bchandra@utexas.edu

(5004)
Skull Resonances and Musical Listening Preferences. MICHAEL GORDON, William Paterson University, MICHAEL HALL, James Madison University, JITWIPAR SUWANGBUTRA, William Paterson University, JEREMY GASTON, US Department of the Army, RACHAEL BRYSON, James Madison University. — To examine the possible influence of the head’s resonance on listening preferences, a broadband noise was presented and recorded through the skulls of 25 participants. Those recordings were analyzed to create a complex filter function unique to each skull’s resonances. The resultant filters were applied to a set of baroque musical samples, altering their spectra to either reinforce (i.e., mirror) or attenuate (invert) the resonances for each of the participants. Participants rated preference for samples reflecting their own skull’s filtering, its inverse, and other people’s skull resonances. Those participants that were sensitive to differences between the acoustic qualities of the samples, tended to show a subtle preference for their own skulls and more substantial individual differences in the preference for other skull resonance patterns. The current findings are discussed in the context of previous research and the implications for real world listening situations. Email: Michael Gordon, gordonm10@wpunj.edu

(5005)
Sound Source Localization for Aided and Unaided Listening as a Function of Environmental Sound Context. JEREMY GASTON, US Department of the Army, ASHLEY FOOTS,
TIMOTHY MERMAGEN, and KELLY DICKERSON, Army Research Laboratory. — In real-world listening conditions, sounds rarely occur in isolation, but rather are embedded in varying degrees of sound context. The present study examines listener ability to localize environmental sound sources presented in isolation and when in sound context under unaided (bare-head) and aided (active electronics) hearing conditions. In single source conditions, environmental sounds were played at eight different locations around the listener in a hemi-anechoic chamber and azimuth responses were collected by instrumented chair turns to the perceived location. The context condition differed in that the identity of the target sound was cued, followed by presentation of 4 simultaneous competing sounds. Listeners made significantly larger error in context than in isolation. There were significantly more errors for aided listening in single source, but not in the context condition. This may indicate that when listening under complex conditions, the magnitude of perceptual interference may swamp any sensory-level effects of aided systems. Email: Jeremy Gaston, jgaston2@gmail.com

(5006) How Tall Do You Sound: Height Discrimination by Human Listeners. JOHN MORTON, Mount Allison University, MITCHELL SOMMERS, Washington University in St. Louis (Sponsored by Sandra Hale). — What do our voices say about us? Often speech is thought of in terms of the lexical (word meanings, etc.) information alone, but speech also provides indexical (e.g., age, gender, etc.) information about a talker. The current experiments investigated if humans are able to discriminate talker height using the acoustic speech signals alone. To extend previous research on height discrimination from acoustic signals we specifically asked for height discriminations across a large range of height differences. Furthermore, we tested height discrimination performance on full sentences, single words and vowels. Listeners participated in two tasks that required height discrimination in which the goal was to listen was two talkers’ sentences and report which talkers were taller. Results demonstrate that listeners can accurately discriminate the height of talkers significantly better than chance performance for full sentences, single words and vowels. Furthermore, by increasing the amount of acoustic information available (e.g., presenting full sentences compared to single vowels) performance increased. Data show that human listeners can accurately discriminate the height of talkers using speech signals alone. Email: John Morton, jrmhvc333@gmail.com

(5007) Perceiving Object Shape From the Friction Sounds of Motion. PATRICK A. CABLE, University of North Carolina at Pembroke, JOHN G. NEUHOFF, The College of Wooster. — Perception of object shape from acoustic information has been shown in several studies using impact-generated sounds. Work in vision shows that optical patterns associated with object motion can inform visual perception of object shape. However, apparently no studies document auditory perception of shape from motion in ways that parallel visual perception of shape from motion. We derived a physical analysis that supports the existence of information in the acoustic array to support 2-D shape judgments. In two experiments we then examined human listeners’ ability to make shape judgments of ellipses varying in shape (defined by minor-to-major axis length ratios), when presented with recordings of such ellipses rotating against a contactor. The frictional contact produced a rasping sound varying in modal frequency and intensity as a function of ellipse shape. Group average shape judgments correlated strongly (r = .95) with actual shape for ellipses. Individual correlations showed substantial variability across participants (judged vs. actual shape correlations ranged from near zero to > .9). The results indicate a novel means by which shape information is available to, and can be picked up by, human listeners. Email: John G. Neuhoff, jneuhoff@wooster.edu

(5008) Musical Structure and Cognitive Control. MATTSON OGG, BROOKE M. OKADA, and L. ROBERT SLEVC, University of Maryland, College Park. — A recent proposal claims that evidence for shared resources in language and music processing reflects a common reliance on cognitive control mechanisms. However it remains to be shown that music processing alone can engage domain-general cognitive control. If the processing of harmonically unexpected chords draws on cognitive control, then a limited resource account would predict that a structurally unexpected chord would impair concurrent performance on the Stroop task (a classic index of cognitive control). Surprisingly, harmonically unexpected chords facilitated response times overall and did not interact with Stroop interference. Musical experience, while unrelated to the magnitude of Stroop interference, was also associated with faster response times overall (similar to previous findings from harmonic priming tasks). However, this advantage was accompanied by reduced response accuracy. Taken together, these data do not support the view that cognitive control underlies the processing of musical structure. Email: L. Robert Sleve, slevc@umd.edu

(5009) The Time-Course of Responses to Modulation in Classical Music. W. JAY DOWLING, RACHNA RAMAN, and ASHWIN RAMESH, University of Texas-Dallas, BARBARA TILLMANN, Lyon Neuroscience Research Center. — Our theory (Music Perception, 2014) holds that early processing of a melody depends on binding contour to scale at a particular pitch level, which requires a representation of the scale. Here we used the continuous-probe-tone method to track the formation of this representation following a change of key. Listeners at three expertise levels heard two 2-min excerpts from Haydn string quartets, rating how well the 12 possible probe tones fit in relation to the music, for 12 trials with each quartet. We correlated these tonal-hierarchy profiles with baseline profiles for the keys for the 10 s before and after each shift of tonality. We also inspected the time course of
responses for 30 s following each modulation. Experienced musicians registered all the modulations; nonmusicians registered just the closely-related keys. Musicians responded within 10 s to shifts among the closely-related keys, but took up to 30 s to respond to distant modulations.

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(5010)
A Study of the Emotional Perception of Musical Harmony. JACLYN ELIZABETH MANDART, STEPHEN G. ROMERO, and CASSIDY D. MERKLEN, Union College (Sponsored by Stephen G. Romero). — Three experiments examined the mood differences associated with simple musical triads. In Experiment 1 participants rated pleasantness of either major triads or minor triads after the presentation of single tonic note. In Experiment 2, after a the presentation of a tonic note, participants rated either major triads in a major key, minor triads in a major key, major triads in a minor key, and minor triads in a minor key. In Experiment 3 participants rated triads after the presentation of a chord progression to root participants in a key. Participants’ mood was assessed prior to and after the chord task with the PANAS mood assessment questionnaire. Results across all experiments suggest that minor triads in both major and minor keys produce fleeting negative perceptions, but do not lead to lasting changes in mood.

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(5011)
Alignment in Shared Processing of Linguistic and Musical Structure: Behavioral and Electrophysiological Evidence. JORIS VAN DE CAVEY, ROBERT HARTSUiker, and DIMITRIOS KOURTIS, Ghent University. — In line with the hypothesis that structure processing resources might be shared across language and music (Patel, 2003), previous studies found interference in the simultaneous processing of structural unexpectancies. But can such interference be found during “default” processing? We provided syntactically sound stimuli and asked whether each pairing was related or unrelated. Results indicated a significant interaction between mode and word affect (F=23.0, p<.0001, η2=.56); participants indicated a stronger association between major melodies paired with happy words and minor melodies paired

expressive skills in performance than Caucasian musicians. In Experiment 1, when judgments were based on just auditory information, there were no differences between Asian and Caucasian pianists. In Experiment 2, when video information was included with the same stimuli, however, both Asian and Caucasian participants rated Caucasian pianists as superior, in both technique and expressivity. In Experiment 3, we also manipulated the degree of hand/body movement during performance. Even though the actual performance quality was controlled for, pianists showing high movement were judged as superior in both technique and expressivity. Further, this time, not only were Asian pianists judged as superior in technique, but there was also an interaction in expressivity such that although there were no differences between pianists showing low movement, Asian pianists showing high movement were judged to be superior than their Caucasian counterparts.

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(5013)
Intentional and Incidental Vocal Pitch Imitation During Speech and Song. TIM A. PRUITT and PETER PFORDRESHER, University at Buffalo, SUNY, JAMES MANTELL, St. Mary’s College of Maryland, MICHAEL D. WRIGHT, University at Buffalo, SUNY (Sponsored by Peter Pfordresher). — Pitch content is an important component of song and speech and its imitative production differs across domains. For example, spoken pitch is typically imitated incidentally (similar to phonetic convergence during conversation) whereas sung pitch is usually imitated intentionally (when a singer replicates a vocal model). We investigated the function of intention to imitate on the accuracy of produced pitch in each domain. For each trial, participants heard either a speech or song stimulus and were instructed either to “repeat the words” (incidental trials) or “imitate both words and their pitch” (intentional trials). Analyses showed that sung pitch was generally produced more accurately than spoken pitch, but there was a larger effect of intention to imitate for song than speech. These results suggest that it may be easier to separate text and tune for song imitation and that spoken pitch may be more closely integrated with verbal information overall.

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(5014)
The Emotional Semantics of Musical Mode: Listeners Associate Major and Minor Melodies With Happy and Sad Words. LAURA GABRIEL and TIMOTHY JUSTUS, Pitzer College (Sponsored by Timothy Justus). — Mode and timbre are two formal elements of music thought to convey extra-musical meaning, including the representation of emotion. The present study addressed whether mode (major or minor) and timbre (clarinet or flute) influence listeners’ associations with emotional words (happy or sad). Twenty participants (10 musicians and 10 non-musicians) were presented with 96 melody-word pairs, and asked whether each pairing was related or unrelated. Results indicated a significant interaction between mode and word affect (F=23.0, p<.0001, η2=.56); participants indicated a stronger association between major melodies paired with happy words and minor melodies paired
with sad words than for the reverse pairings. These effects were observed for both the clarinet and flute timbres, and for both the musician and non-musician groups. Only two of the twenty participants, both musicians, reported explicit awareness of the major-minor manipulation, suggesting that such associations between musical form and meaning are largely implicit. Email: Laura Gabriel, Laura_Gabriel15@pitzer.edu

**Syntactic Processing in Music: The Role of Cognitive Control and Prior Experience With Language and Music.**

CAITLIN Y. TING, RON J. BECK, and CARRIE N. JACKSON, Pennsylvania State University, JAMES MCQUEEN, Radboud University, Nijmegen, JANET G. VAN HELL, Pennsylvania State University/Radboud University, Nijmegen (Sponsored by Janet G. Van Hell). — The Shared Syntactic Integration Resource Hypothesis (SSIRH; Patel, 2003) states that syntactic processing in language and in music draws on shared resources. We examined whether cognitive control is such a shared resource (as proposed by Slevc & Okada, in press) and whether prior experience with language and music affects how cognitive control is engaged during syntactic processing in music. Bilingual and monolingual musicians and non-musicians completed a color-word Stroop task while listening to musical chord progressions ending with harmonically expected and unexpected chords. Results show no interaction between visual congruency and harmonic expectancy, and no effects of experience on response times. However, preliminary analyses suggest that bilingual musicians and non-musicians are overall faster than the monolingual musicians and non-musicians. These preliminary findings suggest that prior experience with language but not music affects how cognitive control is engaged during syntactic processing in music. Email: Caitlin Y. Ting, caitlin.y.ting@gmail.com

**Estimating Fractions on Number-Lines as Display-Based Reasoning.**

REALITY CANTY, University of Illinois at Chicago, JAMES PELLEGRINO, Learning Sciences Research Institute, SUSAN GOLDMAN, University of Illinois, LOUIS DIBELLO, Learning Sciences Research Institute. — Variability in fraction number-line estimation tasks has been attributed to mental representation of numeric magnitude (Siegl et al., 2013) and, alternatively, psychophysical judgments about a part to whole relation (Barth & Paladino, 2011). The proximity judgments (e.g., “Is 1/8 closer to 0 inches, 1/2 inch or 1 inch”) of 37 10-12 year-olds were used to assess knowledge of the cognitive reference points, 0 and 1whole. Variation in proximity judgments predicted patterns of estimation bias (Accuracy: number-line estimation task), ordinality (Accuracy: unit-fraction inference task), and proportionality (Curve-Fit: number-line estimation task) in accord with a model of display-based reasoning (Canham & Hegarty, 2010) from which we propose: (a) number-lines are diagrams that optimally display information for estimates; (b) optimal estimates on bounded number-lines are proportions best-fit by power functions and (c) bottom-up psychophysical estimates are constrained by unit-whole knowledge, a mental representation that constrains visual search and inference in number-line estimation tasks. Email: Reality Canty, rcanty1@uic.edu

**Influence of Time Limit and Gender on a Rediscovered Spatial Orientation Test.**

XING HUANG, DANIEL VOYER, University of New Brunswick (Sponsored by Daniel Voyer). — The present study explored the effect of time limit and gender on a newly rediscovered Spatial Orientation Test (SOT) used with US Air Force cadets during World War II. In addition, we examined the correlations between this test and measures of spatial abilities, anxiety, and confidence. Forty males and 60 females completed the SOT as well as the Landscape Perception Test, Perspective Taking / Spatial Orientation Test, the Santa Barbara Sense of Direction Scale, the Spatial Anxiety Scale, and the Spatial Self-Confidence Scale. Results showed a significant male advantage on the SOT as well as better performance on this test with a long rather than a short time limit. Finally, the SOT correlated with all measures except the self-confidence scale. These results suggest that this long lost measure might be useful in future research on spatial orientation. The discussion emphasizes the underlying cognitive components of the SOT. Email: Xing Huang, huangxingbj@gmail.com

**Tactile and Visual Enumeration.**

AVISHAI HENIK and ZAHIRA ZIVA COHEN, Ben-Gurion University of the Negev. — Our study explores tactile enumeration using both hands and compares, using as similar methodology as possible, the numerosity range’s (NR) influence on general enumeration. In Experiment 1, using a custom-made vibrotactile apparatus, we replicated results of Cohen, Naparstek, and Henik (2014, Acta Psychologica, 150C, 26–34) and again found a moderate increase in RT for up to 4 stimuli and then a decrease for 5 stimuli. In Experiment 2 we used a within participants design and compared NR 1-5 and 1-10 in tactile and visual enumeration. The results showed that enumeration for NR 1-5 was faster than for NR 1-10, especially for numerosities 4 and 5. Within NR 1-10, in the visual modality the subitizing range was 4, the counting range was from 5 to 9, and there was an end effect of 10 dots. In the tactile modality, when excluding one-hand arrangements, the subitizing range was 2, the counting range was from 3 to 5, there was an acceleration of counting from 5 and on, and there was an end effect for 10 stimuli that was stronger than for 10 visual stimuli. We suggest that NR influences enumeration and that number-hand association (i.e., resulting from finger counting) influences enumeration, resulting in faster counting. Email: Avishai Henik, henik@bgu.ac.il

**Numerical Cognition**

**Influence of Time Limit and Gender on a Rediscovered Spatial Orientation Test.**

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**Estimating Fractions on Number-Lines as Display-Based Reasoning.**

REALITY CANTY, University of Illinois at Chicago, JAMES PELLEGRINO, Learning Sciences Research Institute, SUSAN GOLDMAN, University of Illinois, LOUIS DIBELLO, Learning Sciences Research Institute. — Variability in fraction number-line estimation tasks has been attributed to mental representation of numeric magnitude (Siegl et al., 2013) and, alternatively, psychophysical judgments about a part to whole relation (Barth & Paladino, 2011). The proximity judgments (e.g., “Is 1/8 closer to 0 inches, 1/2 inch or 1 inch”) of 37 10-12 year-olds were used to assess knowledge of the cognitive reference points, 0 and 1whole. Variation in proximity judgments predicted patterns of estimation bias (Accuracy: number-line estimation task), ordinality (Accuracy: unit-fraction inference task), and proportionality (Curve-Fit: number-line estimation task) in accord with a model of display-based reasoning (Canham & Hegarty, 2010) from which we propose: (a) number-lines are diagrams that optimally display information for estimates; (b) optimal estimates on bounded number-lines are proportions best-fit by power functions and (c) bottom-up psychophysical estimates are constrained by unit-whole knowledge, a mental representation that constrains visual search and inference in number-line estimation tasks. Email: Reality Canty, rcanty1@uic.edu
Can Approximate Number Training Really Improve Arithmetic Skills? JACKY AU, SUSANNE JAEGGI, KIMBERLY BUNARJO, JULIAN QUINTANILLA, and CLAIRE ARAKELIAN, University of California, Irvine, MARTIN BUSCHKUEHL, MIND Research Institute (Sponsored by Martin Buschkuehl). — The approximate number system (ANS) is an evolutionarily ancient cognitive mechanism that enables individuals to estimate and discriminate quantity without the use of symbols. Studies demonstrate a modest correlation between the precision of the ANS and performance on basic arithmetic tasks. Moreover, recent reports have suggested plasticity of this system in response to training, and that these training gains also transfer to improved arithmetic performance. The goal of the present study is to replicate these results and shed light on mechanisms that drive these effects. The data of our ongoing study with 38 participants suggest that participants do improve in the trained task. However, compared to an active control group, we did not find significant improvements in arithmetic performance. Our results stand in contrast to previous findings and do not confirm the assumed plasticity of the ANS. Potential reasons for the non-replication are discussed. (Jacky Au and Martin Buschkuehl receive salary from the MIND Research Institute. In addition, the MIND Research Institute is compensating participants directly.) Email: Jacky Au, jwau@uci.edu

Operator Preview and Generalization of Practice in Adults’ Simple Arithmetic, YALIN CHEN and JAMIE CAMPBELL, University of Saskatchewan (Sponsored by Jamie Campbell). — Recent research testing skilled adults showed that operator preview facilitated addition, but not multiplication, suggesting that a general addition procedure was primed by the + sign. In Experiment 1, we applied this operator-priming paradigm to identity-rule (0+N, 1×N, 0×N) and 1+N problems. For the identity-rules, we found both operator-preview facilitation and generalization of practice (e.g., practicing 0+3 sped up unpracticed 0+8), the latter being a signature of procedure use; however, we also found operator-preview facilitation for 1+N in the absence of generalization, which implies the 1+N problems were solved by fact retrieval but were facilitated by an operator preview. Experiment 2 investigated whether an arithmetically-skilled special population would show generalization of practice for non-rule-based simple addition problems. The 0+N again presented generalization, whereas no non-zero problem type did; but all non-zero problems sped up when the identical problems were retested, as predicted by item-specific fact retrieval. The results pose a strong challenge to the generality of the proposal that skilled adults’ simple addition is based on fast procedure, and instead support a fact-retrieval model. Email: Yalin Chen, yalin.chen@usask.ca

Response Trajectories Capture Individual Differences in a Size Congruity Task, TRINA L. GEYE and THOMAS J. FAULKENBERRY, Tarleton State University (Sponsored by Thomas J. Faulkenberry). — The size congruity effect refers to the tendency for irrelevant numerical magnitude to interfere with physical size comparison. In the present study, we used computer mouse tracking to examine the dynamics of the size congruity effect in low math achieving (LMA) adults compared to typical math achieving (TMA) adults. Participants completed a physical size comparison task in which they used a computer mouse to select the physically larger of two numbers presented in the corners of a computer screen. We found a larger area under the curve (AUC) for incongruent trials, suggesting competition from activation of the irrelevant numerical magnitude. While there was no group by condition interaction, we did find that the LMA group exhibited significantly more complex trajectories than the TMA group. Critically, this effect did not carry over to RT, revealing that hand tracking may be a more sensitive measure for uncovering individual differences in numerical cognition. Email: Trina L. Geye, geye@tarleton.edu

The Emergence of Linear Ordering in Long Term Memory: The Role of End Stimuli, RONIT GOLDMAN and JOSEPH TZELGOV, Ben-Gurion University of the Negev (Sponsored by Joseph Tzelgov). — The current study examined the role of end stimuli (i.e., the smallest and the largest member of a set) in formation of linear ordering relations in LTM. Pairs of artificial symbols corresponding to adjacent magnitudes (e.g., A>B, B>C) were presented during training. The number of training sessions was manipulated across experiments. Following the learning phase, participants selected the physically larger symbol within pairs of adjacent and non-adjacent symbols. An increased Stroop-like size congruity effect (SiCE) was found for pairs containing end stimuli. Non-end pairs demonstrated an increased SiCE after short training and a relatively small inverted SiCE after longer training. These results emphasize the importance of end stimuli as anchors for generating the symbolic mental line in LTM. This suggests a reinterpretation of the increase of the SiCE with intra-pair numerical distance found in earlier studies and replicated in this study. Email: Ronit Goldman, ronitgo@bgu.ac.il

The Language of Arithmetic Across the Hemispheres: An Event-Related Potential Investigation, DANIELLE DICKSON and KARA D. FEDERMEIER, University of Illinois, Urbana-Champaign. — Mathematical arithmetic expressions, like verbal sentences, incrementally lead readers to expect particular completions. Despite work in the language domain to understand how the two hemispheres differently contribute to these cognitive processes, relatively little work has been done with arithmetic. We studied the event-related potential response to probe answers, which varied both in correctness (given an equation context) and in visual field of presentation (to bias processing to the left or right hemisphere; RVF/LH, LVF/RH). There was an effect of correctness prior
to the traditional N400 timewindow in both visual fields. Equation answers also elicited a late positive complex (LPC) for incorrect answers. This LPC effect was most prominent in the LVF/RH, and it was also sensitive to the confusability of the wrong answer: incorrect answers that were closely related to the correct answer elicited a smaller LPC. This suggests a special, prolonged role for the RH during answer evaluation. Email: Kara D. Federmeier, kfederme@illinois.edu

(5024)
Pupillary Response and Mental Multiplication: Problem Size and Individual Differences. ALEX M. MOORE, University of Missouri, GABRIEL A. ALLRED, WEI AN, and MARK ASHCRAFT, University of Nevada, Las Vegas. — The extant literature concerning cognitive effort and pupillary response reveals a reliable increase in pupil dilation when performance requires increasing amounts of mental resources. Interestingly, the domain typically employed to vary cognitive effort is mental arithmetic. Our concern, however, is that the effects have not been examined in ways useful to the field of mathematical cognition; previous studies present results relating to problem sets and other constructs that fall outside the conventional purview of the field, making their interpretations less than straightforward. The present study was aimed at addressing these concerns by replicating and extending previous studies on mental multiplication, specifically, to examine the problem size effect on the pupillary response. We also examined mathematics anxiety and mathematical achievement to test for individual differences as revealed by pupil dilation during mathematics processing. Email: Alex M Moore, moore.alex85@gmail.com

(5025)
Do Numerals Automatically Activate Magnitude? Evidence From the PRP Paradigm. NATALIE FORD and MICHAEL REYNOLDS, Trent University (Sponsored by Michael Reynolds). — The Psychological Refractory Period (PRP) paradigm was utilized to test the claim that numerals activate their magnitude representations automatically, by assessing whether this process requires central attention. Task 1 was a color discrimination task (is the box red or blue) and Task 2 was a parity judgment task (is the numeral odd or even). Three levels of stimulus onset asynchrony (SOA) were used (50, 150, and 2000 ms). The spatial numerical association of response codes (SNARC) effect was used to index the activation of magnitude information. Critically, the size of the SNARC effect decreased with decreasing SOA. This finding is consistent with numerals activating their magnitude representations in the absence of central attention, which is consistent with the widely held belief that the magnitude of numerals is activated automatically. Email: Natalie Ford, natalieford2@trentu.ca

(5026)
Is Action Information Afforded by an Object Automatically Activated When Viewing an Image of the Object? KIMBERLY HALVORSON, Metropolitan State University, ELIOT HAZELTINE, University of Iowa. — Tucker & Ellis (1998) suggested motor information related to an object’s function is automatically activated during identification. Evidence for this comes from a compatibility effect (C.E.) observed when participants made categorization judgments based on the orientation of images of objects; RTs were faster when the response hand and the handle side of the object pictured were the same compared to when they were different. The interpretation of these findings depends critically on whether the activation is automatic. Under a strong embodied view, activation of the motor codes associated with an object’s affordance is necessary for identifying a visually presented object. In the current experiment, we manipulated the number of blocks of experimental trials. The findings from this experiment show a C.E. only in the first two blocks of experimental trials and no evidence for a C.E. in blocks 3-22. These findings suggest the C.E. is mitigated by practice and the motor information associated with the objects is no longer necessary for identification after sufficient exposure to the stimuli and task context. Email: Kimberly Halvorson, khalvorson@metrostate.edu

(5027)
Effects of Movement and Symbolic Meaning of Speed on the Perceived Duration of a Stimulus. GIOVANNA MIONI, University of Delaware, FRANCA STABLUM, University of Padova, DAN ZAKAY, New School of Psychology IDC, Herzeliya, SIMON GRONDIN, Universite Laval (Sponsored by Simon Grondin). — The study investigated how symbolic meaning of speed and movement affect time perception. Two experiments were conducted in which participants were required to reproduce the duration of a previously presented stimulus and a third study was conducted with a time bisection task. The experimental stimuli were vehicles that recalled different meaning of speed. Specifically, we selected vehicles recalling the meaning of fast speed (car or motorbike) or slow speed (truck or bicycle). In Experiment 1, 45 children and 22 adults were asked to perform a time reproduction task (11 and 21 s) in static and moving condition. Results showed that younger participants under-reproduced the duration more than the older participants, especially when the stimulus presented was a fast vehicle. In Experiment 2, 291 children and 25 adults performed a time reproduction task (11, 21 and 36 s) in static and moving condition. The results confirmed the effect of symbolic meaning and movement on children time perception. These results were confirmed in the third study conducted with time bisection task in adults. Taken together, the results showed that presenting a stimulus that recalls the meaning of fast speed produce an under-estimation of time. Email: Giovanna Mioni, mioni.giovanna@gmail.com
(5028)

Do Changes to the Motor System Modulate Representations of Time? JONNA LOEFFLER, German Sport University Cologne, ROUWEN CANAL-BRULAND, VU University of Amsterdam, MARKUS RAAB, German Sport University Cologne (Sponsored by Rouwen Canal-Bruland). — Abstract concepts of space and time have been shown to mutually influence each other (e.g., Boroditsky, 2000). Because embodied cognition theories posit that abstract concepts of time and space are grounded in the sensory-motor system, changes to the motor system should modulate representations of time and space. To test this hypothesis, in the current study 90 participants walked forward or backward (control: standing) on a treadmill and answered a temporally ambiguous question. Preliminary results indicate a tendency that walking on the treadmill— as opposed to standing—indeed affected the responses to the ambiguous temporal question. However, walking forward and backward modulated representations of time in the same direction rather than in opposite temporal directions. We discuss this surprising finding in the light of current theories of embodied cognition. In an ongoing experiment, we moved on to also examine the impact of the same manipulations on perceptions of space. Email: Jonna Loeffler, jonnaloeffler@hotmail.com

(5029)

Distributing Memory Demands Over Internal and External Spaces. TIMOTHY LEE DUNN and EVAN F. RISKO, University of Waterloo (Sponsored by Evan F. Risko). — A fundamental feature of distributed cognitive systems is the ability to offload internal demands onto-the-body and into-the-world. Previous research examining offloading in the context of a short-term memory task demonstrated that individuals most often stored information either exclusively internally or externally, although in some cases individuals appeared to distribute demands across both internal and external spaces. The current investigation looked to further examine this latter strategy by utilizing a short-term memory task where individuals had the option to fully offload or only partially offload strings of letters. Interestingly, having the ability to only partially offload memory demands, a manipulation that would seemingly decrease the perceived utility of offloading, did not affect the frequencies of offloading. In addition, when individuals partially offloaded, the overwhelming strategy was to write the first portion of the string and store the latter part internally. Results are considered within current accounts of cognitive offloading. Email: Timothy Lee Dunn, timothy.l.dunn1@gmail.com

(5030)

Tough and Tender: About Face. JOHN SKOWRONSKI, JAMES A. CLINTON, and KATJA WIEMER, Northern Illinois University. — Slepian et al. (2011) found that participants, while grasping a hard ball, judged androgynous faces more often to be male than to be female. Similarly, participants, while grasping a soft ball, judged androgynous faces more often to be female than to be male. Slepian et al. argued that the proprioceptive information provided by the ball was integrated into the cognitive representation of each face, influencing the judgment made about each face. We repeatedly failed to replicate the Slepian et al. effect. These failures occurred across a number of methodological variations. These included studies that used the same stimuli employed by Slepian et al. (2011), as well as studies that used modified stimuli (e.g., a ball that was softer than the one employed by Slepian et al.). These failed replications suggest that the effect reported by Slepian et al. (2011) might be limited to certain settings or to certain subject populations. Email: John Skowronski, jskowron@niu.edu

(5031)

Eye Movements During Reading Are Affected by Hand Proximity to the Text. ANDREW S. CLEMENT and JAMES R. BROCKMOLE, University of Notre Dame (Sponsored by James R. Brockmole). — Although placing one’s hands near visual stimuli can improve visual and spatial processing of objects, it also impairs semantic processing of text. Here, we link these semantic impairments to specific changes in oculomotor behavior during reading. Participants judged the sensibility of sentences, some of which ended with a nonsensical critical word (e.g., The airplane was piloted by the wings.). Participants who placed their hands closer to the display were less accurate when sentences contained errors, revealing impaired semantic processing. For all sentences, closer hand proximity led to more fixations per word and longer individual fixations. These effects were up to three times larger for critical words in nonsensical sentences. This indicates that global effects across the entire sentence and local effects on semantic inconsistencies are additive. We conclude impaired semantic processing near the hands involves difficulties extracting meaning at the point of acquisition, rather than later rationalization of semantic errors. Email: Andrew S. Clement, aclemen3@nd.edu

• COGNITIVE SKILL ACQUISITION •

(5032)

Determinants of Music-Perception Skills in Children and Adults. SWATHI SWAMINATHAN, University of Toronto, E. GLENN SCHELLENBERG, University of Toronto Mississauga (Sponsored by E. Glenn Schellenberg). — We examined predictors of music-perception skills in children (experiment 1) and adults (experiment 2). All participants were tested for their music-perception skills, IQ, and working memory. In addition, we also collected information relating to demographic background, history of music training and personality (Openness-to-Experience, Conscientiousness, Extraversion, Agreeableness, Neuroticism). In both experiments, participants’ overall music-perception scores were correlated positively with working memory, openness-to-experience, and music training. When these variables were entered into a linear multiple-regression model predicting music-perception scores, only working memory and openness-to-experience made significant independent predictions. Importantly, after controlling for demographic
variables, general cognition and personality, music training was no longer a significant predictor of music-perception ability. All in all, these data suggest that individuals with high openness-to-experience and working memory have better music-perception abilities. They are also more likely to enroll in music lessons. Thus, music training may be the consequence rather than the cause of better music-perception skills.

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(5033)
Judging the Absolute Pitch of Novel Recordings of Familiar Songs. STEPHEN VAN HEDGER, SHANNON HEALD, SALINA WU, and HOWARD NUSBAUM, University of Chicago. — While absolute pitch (AP)—the ability to name or produce an isolated note without the aid of a reference note—is an exceedingly rare ability, most individuals have some memory for absolute pitch. Typically, this implicit AP ability manifests when participants are able to select the correct-pitched version of a familiar song, even when incorrect versions of the song are pitch shifted very slightly. The present research assesses whether this implicit AP ability is dependent on hearing the exact recordings encountered in one's environment, or whether implicit AP memory generalizes to novel versions of stimuli. We demonstrate that participants can select the correct version of familiar songs at above-chance levels, even when the songs are played as “covers” or as simple piano melodies. These results suggest that listeners’ AP judgments of a song do not depend on an episodic echoic representation, thus suggesting a more generalized representation of familiar songs.

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(5034)
Evidence Against Moderators of Working Memory Training. JEFFREY CHRABASZCZ, DONALD BOLGER, MAUREEN KELLOGG KAYES, BRANDEE FEOLA, and SHARONA M. ATKINS, University of Maryland, College Park, AMBER M. SPRENGER, MITRE Corporation, J. ISAIAH HARBISON, Center for Advanced Study of Language, BRADLEY HATFIELD and MICHAEL R. DOUGHERTY, University of Maryland, College Park (Sponsored by Donald Bolger). — A critical test for working memory training (WMT) effectiveness is far transfer—attribution on tasks that require working memory but are otherwise unrelated to the task used for training. With mixed findings for working memory training, some have argued that uninformative or null results for WMT come from failure to account for important moderators that influence the effectiveness of WMT. We analyzed a number of moderators including: physical activity, genetic markers, personality, and education, all of which have been suggested as important predictors of training effectiveness. We find evidence against moderation of WMT by any of these variables for a variety of transfer tasks.

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(5035)
N-Back Test-Retest Performance and Stimulus Similarity. MICHAEL KRANZ, University of Illinois, ARTHUR KRAMER, Beckman Institute, ERIKA HUSSEY, University of Illinois at Urbana-Champaign (Sponsored by Arthur Kramer). — The n-back task has been used to assess working memory; yet little work has investigated how varying the stimuli influence performance and learning across multiple sessions. Here, we modified a 2-/3-back task (Kane et al., 2007) to include 2 sessions. During session 1, participants either completed a version of n-back with high or low similarity among to-be-remembered stimuli. During session 2, they performed the same task with either the same or different stimuli as in session 1. Although we replicated classic n-level and lure effects, our results revealed no effects of stimulus similarity. However, target sensitivity; as given by d', increased at session 2 (compared to session 1) for only 3-back. Importantly, we provide the first findings suggesting that subtle changes to stimulus properties across sessions do not alter performance and learning on the n-back task. These results will be discussed within the context of task-specific strategy formation.

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(5036)
Do Both Positive and Negative Y-Intercepts Cause an Anchoring Effect in Linear Function Learning Tasks? GUY LACROIX, MARK BROWN, JAMIE GRANT, GINA HERNANDEZ, LINDSAY MORGAN, and TESS WALSH, Carleton University. — Function learning research seeks to understand people’s ability to learn the relationship between continuous variables (DeLosh et al., 1997). Typically, participants are given a cover story, which requires them to learn X-Y pairs generated from a mathematical function. Participants’ knowledge of the function is then tested in a transfer phase where all X values are new. A fascinating result emerges when the function is linear; new X values smaller than the training range lead to an underestimation of Y values. Kwantes and Neal (2006) have proposed that this occurs because participants are biased to anchor their responses at zero (assuming Y=0 when X=0). This prediction was tested by asking participants to learn functions with positive or negative intercepts. As predicted, negative intercept group overestimated values smaller than the training range. Unfortunately, the positive intercept group did not reliably underestimate them. Possible explanations for this unexpected results are discussed.

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(5037)
The Distraction-Error Model: A Simplified Account of the Effects of Prohibition on Motor Control. TRAVIS SEYMOUR and SARA G. GOODMAN, University of California Santa Cruz. — Prohibition in instruction is commonplace in performance-oriented motor tasks, providing a simple and intuitive method for shaping behavior. Previous research warns against the use of prohibition, particularly for gender-biased tasks. In contrast with Wegner and colleagues’ (1998) ironic process theory of motor control and de la Peña’s (2008) implicit overcompensation hypothesis, we offer a distraction-error model that suggests attentional disruption
following prohibitive instruction. As we demonstrate across three separate motor tasks, prohibitive instruction results in a dramatic initial increase in error followed by attenuation toward the target level of performance, whereas no increase in error is observed in the absence of prohibition. Assessment of this hypothesis across neutral, male- and female-stereotyped tasks suggests comparable patterns of error, supporting the parsimonious distraction-error model. Thus, prohibitive instruction may induce temporary and preliminary increases in error, but performance ultimately improves over time. Email: Travis Seymour, nogard@ucsc.edu

• EYEWITNESS IDENTIFICATION •

(5038)
Verbal Descriptions Reduce Discriminability but the Confidence-Accuracy Relationship Is Strong. TRAVIS MORGAN SEALE-CARLISLE (Graduate Travel Award Recipient) and LAURA MICKES, Royal Holloway, University of London (Sponsored by Laura Mickes). — “Verbal overshadowing” refers to lower accuracy in a lineup test that occurs after verbally describing the target (Schooler & Engstler-Schooler, 1990). Thirty-one labs directly replicated the original result (Alogna et al., 2014). The original (and replicated) experiments did not include target-absent lineups and therefore were unable to measure false alarm rates (Mickes & Wixted, 2015). Thus it was unclear whether verbalization affected discriminability and/or response bias. In a direct replication, that included target-absent lineups, we found that verbalization did reduce discriminability (as measured by receiver operating characteristic analysis). This result is of theoretical interest, however, given that police investigators are unlikely to stop collecting verbal reports, more informative results are from confidence-accuracy characteristic (CAC) analysis. We found that the CAC curves did not differ whether or not participants provided verbal reports. The upshot is that identifications made with high confidence were likely to be accurate even in the verbal condition. Email: Travis Morgan Seale-Carlisle, travis.seale-carlisle.2013@live.rhul.ac.uk

(5039)
Evaluating the Cross-Race Effect on Eyewitness Memory: Race of Face Does Not Affect Confidence-Specific Accuracy. THAO B. NGUYEN and KATHY PEZDEK, Claremont Graduate University (Sponsored by Kathy Pezdek). — Race of face has been considered an important estimator variable that affects eyewitness identification accuracy. Discrimination accuracy is reportedly higher for same- than cross-race faces. However, Mickes (2015) recently argued that discrimination accuracy for estimator variables is not informative to triers of fact. An examination of the confidence-accuracy relationship for estimator variables is more informative because it gives judges and jurors a posterior probability of guilt (i.e., probability that a face is old given that the observer said “old”). We analyzed two datasets from two recognition memory studies on same- and cross-race faces. Confidence was highly predictive of accuracy, and at each level of confidence the proportion correct did not differ between same- and cross-race faces. These results suggest that a cross-race identification may be as trustworthy as a same-race identification, and more importantly, confidence at the initial identification may be a better indicator of accuracy than race. Email: Thao B. Nguyen, thao.nguyen@cgu.edu

(5040)
Determinants of Juror Belief in Witness Testimony: The Role of Witness Confidence. RACHEL DEFRANCO, MARIA ZARAGOZA, and DAVID RICCO, Kent State University (Sponsored by David Riccio). — In a prior study we found that mock jurors’ judgments about the believability of testimony were well calibrated with the amount of uncertainty expressed, but only if these judgments were made immediately after the testimony was provided—after one week, there was no evidence that mock jurors remembered the uncertainty with which testimony had earlier been provided. Given the evidence that jurors put much faith in highly confident testimony, it is possible that information about witness certainty is less prone to forgetting than information regarding witness uncertainty. To test this hypothesis, this study compared how believable mock jurors would find those aspects of a witness’s testimony that were reported with confidence, and those aspect that were reported with uncertainty, with half the participants providing believability judgments immediately, and all participants doing so after one week. The results supported a differential decay hypothesis. Email: Rachel DeFranco, rdefranc@kent.edu

(5041)
Eyewitness Confidence and Accuracy: Pre- Versus Post-Lineup Confidence Assessment. JANE BEDNARZ, CURT CARLSON, MARIA CARLSON, ALEX WOOTEN, DAVID YOUNG, and JESSICA MAYBERRY, Texas A&M University-Commerce. — Researchers have used point-biserial correlation to show that eyewitness confidence assessed prior to a lineup does not predict lineup identification accuracy. However, recent research has shown the benefits of using calibration analyses to determine the relationship between eyewitness confidence and accuracy (CA). We applied this method to explore the CA relationship both for pre- and post-lineup confidence using a multiple-block face recognition paradigm. There were three conditions, which differed only in the timing of confidence assessment: (a) immediately after the encoding phase, (b) immediately after the lineup decision, or (c) both immediately after encoding and immediately after the lineup decision. We found that pre-lineup confidence assessment harmed calibration as well as discriminability (based on ROC analysis). This implies that police might want to be careful what questions they ask of eyewitnesses after a crime, as there is the potential to weaken the CA relationship and even harm subsequent identification accuracy. Email: Curt Carlson, curt.carlson@tamuc.edu
Evaluating Eyewitness Testimony: The Effect of Clarifying Memory Information on Cognitively Busy Jurors. KARENNA MALAVANTI, Carson-Newman University; COURTNEY KURINEC, Baylor University; ASHLEIGH TRAN, University of Kansas, KARENNA MALAVANTI, Carson-Newman University, CHARLES WEAVER, III, Baylor University (Sponsored by Elizabeth Loftus). We investigated eyewitness use of linguistic concreteness on juror decision making and eyewitness perceived credibility using a mock juror paradigm. Mock jurors read a trial summary describing an ambiguous criminal case before being randomly assigned to read either a concrete or abstract version of the testimony of an eyewitness for the prosecution. After reading the trial information, jurors indicated their verdict, level of confidence in their verdict, and the perceived level of credibility of the eyewitness. Jurors who received the concrete version of the eyewitness testimony were more likely to find the defendant guilty, although both groups had similar levels of confidence in their verdicts and found the eyewitness equally credible. Our results suggest that jurors indirectly perceive concrete testimony as more truthful and are therefore more likely to render their verdicts in line with the eyewitness's version of events. Email: Kareena Malavanti, kmalavanti@cn.edu

The Concreteness of Truth: The Effect of Linguistic Concreteness on Eyewitness Credibility and Juror Decision Making. COURTNEY KURINEC, Baylor University, ASHLEIGH TRAN, University of Kansas, KARENNA MALAVANTI, Carson-Newman University, CHARLES WEAVER, III, Baylor University (Sponsored by Elizabeth Loftus). We investigated eyewitness use of linguistic concreteness on juror decision making and eyewitness perceived credibility using a mock juror paradigm. Mock jurors read a trial summary describing an ambiguous criminal case before being randomly assigned to read either a concrete or abstract version of the testimony of an eyewitness for the prosecution. After reading the trial information, jurors indicated their verdict, level of confidence in their verdict, and the perceived level of credibility of the eyewitness. Jurors who received the concrete version of the eyewitness testimony were more likely to find the defendant guilty, although both groups had similar levels of confidence in their verdicts and found the eyewitness equally credible. Our results suggest that jurors indirectly perceive concrete testimony as more truthful and are therefore more likely to render their verdicts in line with the eyewitness's version of events. Email: Kareena Malavanti, kmalavanti@cn.edu

Perceptual Load Affects Eyewitness Accuracy & Susceptibility to Leading Questions. GILLIAN MURPHY, University College Cork, CIARA MARY GREENE, University College Dublin (Sponsored by Fiona Newell). Perceptual Load Theory states that the level of perceptual load in a task (i.e., the amount of information involved in processing task-relevant stimuli) determines the efficiency of selective attention. There is evidence that perceptual load affects distractor processing, with increased inattentional blindness under high load. Across two experiments (one video-based and one in a driving simulator), the effect of perceptual load on eyewitness memory was assessed. The results showed that eyewitnesses were less accurate under high load, in particular for peripheral details. High load memories were also more open to suggestion, showing increased susceptibility to leading questions and higher levels of source confusion. High visual perceptual load also affected recall for auditory information, illustrating a possible cross-modal perceptual load effect on memory accuracy. These results have important implications for eyewitness memory researchers and forensic professionals, as well as providing real-world evidence for the Load Theory model of attention. Email: Gillian Murphy, gillian.murphy@ucc.ie

Aggregating Eyewitness Data With a Graphical Model. STEPHEN BENNETT and MARK STEYVERS, University of California, Irvine (Sponsored by Mark Steyvers). This research uses Bayesian modeling to determine the cognitive processes that underlie memory and attention. This work has direct applications in eyewitness memory and is extended to aggregate individuals’ answers into a single most probable reality. The model aims to maximize predictive accuracy given relatively sparse data sets and little corroboration from the truth. It also aims to give insight into the machinations of the human memory system and individual differences therein. The model is similar to consensus-type models in that the goal is to determine the collective knowledge that individuals are answering from. My approach differs insofar as it takes a theory-based approach to understand why individuals vary from this collective knowledge. This year, my research has focused on data collected from an original laboratory experiment and the implementation of a graphical model. Email: Stephen Bennett, sbennett@uci.edu

Response Latency and Confidence as Postdictors of Witness Accuracy in Lineups and Showups. KYLIE KEY, University of Alabama in Huntsville, JEFFREY NEUSCHATZ, University of Alabama, DANIELLA CASH, Louisiana State University, STACY WETMORE, The University of London, Royal Holloway, SCOTT GRONLUND, The University of Oklahoma (Sponsored by Jeffrey Neuschatz). This study examined response latency and confidence as postdictors of witness accuracy in lineups and showups. We found that lineups resulted in more accurate identification decisions than did showups. For choosers (those who made an identification), we found that accurate witnesses, target present procedures, and showups had faster latencies than inaccurate witnesses, target absent procedures, and lineups, respectively. We posit that this is likely because faster witnesses deliberate less before making a choice. We also examined the confidence accuracy relationship, and
found that showup witnesses are overconfident. We discuss these results in terms of theory and practical implications.

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(5047) Showups and Lineups: Exploring (and Improving) Identification Performance With WITNESS. CHARLES GOODSELL, Canisius College, SCOTT GRONLUND and RYAN MCADOO, University of Oklahoma, JEFFREY NEUSCHATZ, University of Alabama, STACY A. WETMORE, University of London. — We utilized WITNESS (Clark, 2003) in conjunction with receiver operating characteristic (ROC) curves to examine the memory and decision processes in lineup and showup identifications across two studies (Gronlund et al., 2012 and Wetmore et al., 2015). The WITNESS model predicts similar levels of performance across the different identification procedures, however, these studies found that showups were always inferior. A modification to WITNESS first proposed by Goodsell et al. (2010) was implemented and allowed the model to match the data, suggesting actual witnesses treat showups differently. Next, we conducted an experiment testing the idea that showups could result in similar performance to lineups by asking witnesses to evaluate known-innocent faces prior to the identification. This pre-identification procedure brought the showup performance in line with the lineup performance.

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(5048) Evidence of Signal Detection in Facial Recognition. RYAN MCADOO and SCOTT GRONLUND, University of Oklahoma (Sponsored by Scott Gronlund). — An ongoing debate in the eyewitness memory literature asserts that simultaneous lineups (view all options at once) promote guessing amongst choices and that sequential lineups (evaluate options serially) alleviate this propensity to guess. This standard theory invokes a discrete-state model of recognition memory. Using faces as the critical stimuli, and the computation of the conditional probability of the target's ranking among test alternatives as the dependent measure rather than ROC analysis, we found results consistent with a continuous signal detection model. A second experiment replicated the results of the first, and added consideration of reaction time and confidence data. We are exploring subsets of these data to determine if there are certain classes of responses that indicate reliance on continuous or discrete mediation. Evidence of these differences would have implications for basic theory, and for the standard theory in the eyewitness domain.

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(5049) Comparing the Effectiveness of Three Lineup Modalities. JONATHAN TERRELL, University of Mary Hardin-Baylor, MICHELLE N. DASSE, Baylor University. — We exposed participants to either a traditional crime scenario (stealing a wallet) or a more atypical scenario (littering in a hallway). Following a fifteen-minute delay, participants were asked to identify the perpetrator from either a simultaneous, sequential, or hybrid lineup. The hybrid lineup presented photos one-at-a-time in a continuous loop, allowing witnesses to see all the photos before making an identification, but never the opportunity to see them all at once. Target-present and target-absent versions of each lineup were produced. Participants provided confidence judgments and ROC analysis was conducted for each lineup type. Our results mirror those reported in previous simultaneous and sequential lineup studies, and suggest that the hybrid lineup modality may provide some advantage in terms of reducing false identifications and better calibrating witness confidence to accuracy.

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(5050) Re-Examining the Verbal Overshadowing Effect With Showups. BRENT M. WILSON and EDMUND FANTINO, University of California, San Diego, LAURA MICKESS, Royal Holloway, University of London. — Schooler and Englster-Schooler (1990) identified the verbal overshadowing effect wherein verbally describing the appearance of a culprit reduces the hit rate compared to a control condition, and this study was replicated in a large-scale effort (Alogna et al., 2014). Because these studies included only target-present lineups, the reduced hits could be due to a more conservative response bias not a reduced ability to discriminate guilty from innocent suspects. We extended this research to showups (i.e., presentation of a single suspect) and included target-absent showups. Discriminability was reduced when verbal descriptions were given immediately before the test phase but not when verbal descriptions were given immediately after the study phase. Our findings comport with the original and replicated studies and allow for distinguishing a response-bias effect from a discriminability effect. More critically for the legal system, however, is that high-confidence identifications were equally reliable even when memory performance was reduced.

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(5051) The Effect of Sleep on Eyewitness Memory. MICHELLE ELIZABETH STEPAN, TAYLOR DEHNKE, and KIMBERLY M. FENN, Michigan State University (Sponsored by Kimberly M. Fenn). — Sleep strengthens episodic memory by preventing the loss of information. However, the extent to which sleep affects eyewitness memory has remained unexplored. Eyewitness memory is notoriously poor and mistaken eyewitness identification is the leading cause of known false convictions. Here, we tested the role of sleep in eyewitness memory. Participants watched a video of a mock crime and attempted to identify the perpetrator from a lineup. We tested participants after a 12-hour retention interval which either spanned a waking day or a night of sleep. In Experiment 1, the perpetrator was present in the lineup and in Experiment 2, he was absent. We found that sleep reduced false identifications when the perpetrator was absent from the lineup (Experiment 2) but had no effect on correct identifications when the perpetrator was present (Experiment 1). These results will be discussed with respect to decision making strategies and strength of a memory representation.

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(5052)

Does Mind Wandering Reduce Misinformation Effects? AMALIA DONOVAN, ELIAS THEODOSIS, and DAVID RAPP, Northwestern University. — People regularly encounter inaccurate information in the world. Studies have shown that people rely on misinformation to complete subsequent tasks, even when they should know doing so would be problematic. We investigated whether mind wandering might attenuate these effects. Mind wandering, defined as engagement in task unrelated thought, can detrimentally influence comprehension and performance. But people could benefit from mind wandering if distracted during the presentation of misinformation. Specifically, mind wandering could reduce the likelihood of encoding and later relying upon textual inaccuracies. To test this hypothesis, 104 participants read a story containing general knowledge facts, half of which were inaccurate. They were routinely probed to indicate whether they were mind wandering during their reading. Participants similarly relied on misinformation when completing a post-reading questionnaire regardless of the quantity and quality of their mind wandering. These results suggest that even seemingly superficial exposures can result in a reliance on misinformation.

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(5053)

Dealing With Errors During Retrieval Practice: Effects of Feedback With and Without Hints. GESA VAN DEN BROEK and ELIANE SEGERS, Radboud University Nijmegen, HEDDERIK VAN RIJN, University of Groningen, ATSUKO TAKASHIMA and LUDO VERHOEVEN, Radboud University Nijmegen (Sponsored by James McQueen). — Retrieval practice is most beneficial when the retrieval is successful or combined with feedback that provides a new encoding opportunity after failed retrieval. In this study, we focused on the feedback phase and compared the long-term retention of words after practice with different types of feedback. As retrieval is a more efficient form of practice than restudy (cf. the testing effect), we tested if responding to errors with a hint that creates a new retrieval opportunity leads to better retention than directly showing the correct answer. High school students (n=203) practiced foreign vocabulary with a spaced retrieval program with correct-answer feedback, orthographic hints, or semantic hints with keyword mnemonics. There were no benefits of orthographic hints: Students practiced less words than in the control condition and retention was only enhanced on a test with the same hints. Semantic hints seemed more beneficial: Students practiced and remembered more words, and benefits were not restricted to a test with the same hints. Differences in the amount of transfer from retrieval practice with hints to memory tests without hints are discussed in light of the specific cue-target associations that are activated during practice.

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(5054)

How Should Clickers Be Used in Classrooms? It Depends on Which Students You Want to Help. SHAW L. KETELS, ALICE HEALY, MATT JONES, D. K. SASNETT-MARTICHUSKI, L. LALCHANDANI, and M. J. GUHL, University of Colorado. — A common pedagogical prescription for best practice in the use of classroom response systems, or “clickers,” is that questions should be presented with protected time for discussion. However, the efficacy of this practice has not been systematically evaluated. To examine the effect of discussion during clicker questions on learning, we manipulated the use of clickers in 2 statistics classes at the University of Colorado, taught by the same instructor during a single semester. We varied whether or not students were allowed time to discuss each clicker question before answering. Discussion conditions were alternated within-subjects, and these patterns of alternation were counterbalanced between the two classes. Performance on midterm and final exam questions was used as the dependent measure. Allowing students time for discussion was predicted to yield superior performance on corresponding test questions for all students. However, we found expertise reversal effects: Discussion affected students differentially depending on their knowledge of, and/or exposure to, class material.

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(5055)

Do Retrieval Practice and Feedback Promote Transfer of Learning? A Sequel to Butler’s Transfer Study. GEROUDIEN VAN EERSEL and PETER VERKOEIJEN, Erasmus University Rotterdam, REMY RIKERS, University College Roosevelt (Sponsored by Peter Verkoeijen). — In 2010, Butler showed that retrieval practice enhances far transfer of learning compared to restudying. We replicated the crucial third experiment of his study, in which subjects studied text passages and then either restudied them or performed retrieval practice with feedback. On the transfer test one week later, we also found a large benefit of retrieval practice. Additionally, we observed an advantage of retrieval practice on the transfer test administered after five minutes. This latter finding suggests that the provided feedback was the crucial component in the retrieval practice effect. We will therefore conduct another experiment with an extra “reread-plus-feedback” condition, which involves rereading the text followed by another piece of text containing the same information as the feedback in the retrieval practice condition. If feedback is the locus of the retrieval practice effect, this ‘reread-plus-feedback’ condition will result in transfer scores comparable to the transfer scores after retrieval practice.

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(5056)

Retrieval Practice Can Eliminate Both the Cost and Benefit of Directed Forgetting. SARA D. DAVIS and JASON CHAN, Iowa State University (Sponsored by Jason Chan). — In the list-method directed forgetting paradigm, subjects study two lists of words separated by either an instruction to forget or remember List 1. Relative to the remember instruction, the forget instruction produces a cost (i.e., impaired recall) for List
1 and a benefit (i.e., enhanced recall) for List 2. Research shows that retrieval practice can reduce time-dependent forgetting; how might it impact intentional forgetting? Here, we found that interpolating an initial test before the forget instruction eliminated both its cost and benefit. In contrast, Sahakyan, Delaney, and Kelley (2004) showed that initial testing only eliminated the benefit, but not the cost, of directed forgetting. We replicated this pattern by reducing the duration of the initial and final tests in Experiment 2. We propose that initial test duration, which modulates initial test performance, may play an important role in how testing impacts directed forgetting. Email: Sara D. Davis, sddavis@iastate.edu

The Impact of Reviewing Self-Created and Peer-Created Notes on Learning. MICHAEL FRIEDMAN and SAMUEL MOULTON, Harvard University, DANIEL OPPENHEIMER, University of California, Los Angeles. — We investigated the extent to which reviewing one's own notes versus another's would impact learning. Self-created notes may highlight idiosyncratically difficult material, and allows the learner to reconstruct his/her thought process during initial learning. However, reviewing a peer's notes may highlight important information the learner neglected or misunderstood during initial learning. Participants watched TED Talks and were told to take notes on the videos as if they were in a real classroom. After a brief distractor, participants were assigned to review: their own notes (self-created), another's notes (peer-created), both their own and another's notes (both), or review neither (no review). After this review opportunity, participants answered a series of short answer questions on the factual and conceptual content from the TED Talks. Metacognitive predictions of performance were also measured. Unexpectedly, any form of review, regardless of the notes' author, created a deficit in performance. Implications will be discussed. Email: Michael Friedman, michael_friedman@harvard.edu

Negative Effects of Self-Explanation on Learning From Expository Texts. LUDMILA D. NUNES, JOSHUA WHIFFEN, JANELL BLUNT, and JEFFREY D. KARPICKE, Purdue University. — Self-explanation involves explaining a text sentence-by-sentence in one’s own words by making connections among sentences and elaborating on information. In three experiments we examined the effects of self-explaining a scientific text relative to rereading it. Importantly, total learning time was matched across conditions in all three experiments. Students self-explained while reading the texts intact (Experiment 1) or sentence-by-sentence (Experiment 2) and had the opportunity to reread the full text after completing the self-explanation task (Experiment 3). Learning was assessed on immediate or delayed short-answer questions. We expected to observe positive effects of self-explanation, but instead, all three experiments showed negative effects: self-explanation produced worse performance than rereading. We discuss possible explanations for the negative effect of self-explanation. Email: Ludmila D. Nunes, nunes@purdue.edu

There’s a Test Today? The Effects of Test Type and Expectancy on Open-Book, Closed-Book, and Open-Notes Test Performance. JENNIFER COANE, SARAH E. CARRIGAN, SAMUEL GLAISHER, and MISHA STRAGE, Colby College. — Practice retrieving information from memory promotes long-term retention of tested material. This mnemonic advantage occurs both with closed-book and open-book tests. A third type of exam allows students access to crib sheets or notes; whether this also results in improved retention is unclear. Participants studied two passages for an open-book, closed-book, or open-notes test. For the first passage, the test was consistent with expectations; the second test violated expectations (i.e., participants in the open-book and open-notes conditions took a closed-book test and vice versa). Two days later, a closed-book test on both passages was administered. Initial closed-book tests resulted in lower performance on an immediate test but showed reduced forgetting after 2 days compared to open-book testing, both for expected and unexpected tests. Initial open-notes testing resulted in some forgetting, but less so than open-book testing. Both encoding difficulty and retrieval difficulty influence performance on delayed testing. Email: Jennifer Coane, jhcoane@colby.edu

Structure Matters: Benefits and Penalties of Spaced Practice in Text Learning. CAROLINA E. KUEPPER-TETZEL and MARK MCDANIEL, Washington University in St. Louis. — Spaced practice is usually treated as a ubiquitous learning strategy despite the fact that the underlying processes are not well understood and that it has not often been tested with educationally relevant material. We suggest that spacing augments individual item processing but may increase the challenge of constructing organization in complex material. If so, we reasoned that back-to-back presentation of a hard-to-structure text may enhance organization more so than a spaced presentation, resulting in a negative spacing effect. In contrast, for well-structured text that is easily organized, the increased item processing stimulated by spaced practice should be beneficial (given that organization is easily extracted), leading to positive spacing effects. We report experimental results that are in line with these predictions. The results suggest that spaced practice should not be promoted as a general learning strategy; rather, the characteristics of the to-be-learned text dictate how beneficial spaced practice might be. Email: Carolina E. Kuepper-Tetzel, carolinakt@gmail.com

A Generation Effect for Mnemonics, not Examples: Evidence From a Classroom Activity. JENNIFER MCCABE, Goucher College. — The goal of this research was to determine whether there is a generation effect for learner-created keyword mnemonics and real-life examples, compared to instructor-provided materials, when learning neurophysiological terms and definitions in Introductory Psychology. Students participated in an individual (Study 1) or small-group (Study 2) in-class activity during which they used three strategies: generate new keyword mnemonics, generate new real-life mnemonics and real-life examples, and instructor-provided mnemonics and real-life examples.
Tracking Students Review Patterns: Use of Retrieval Versus Study. SHUHEBUR RAHMAN, TERRY J. S. LUND, CLARK R. COFFMAN, PATRICK I. ARMSTRONG, MONICA H. LAMM, ROBERT D. REASON, and SHANA CARPENTER, Iowa State University (Sponsored by Shana Carpenter). — Survey research has revealed important information about students’ study habits, particularly with regards to the use of retrieval practice to learn course material (e.g., Hartwig & Dunlosky, 2012). To complement existing self-report data, we monitored the study behaviors of students in an introductory biology course throughout a 16-week semester. We provided students with daily, non-mandatory reviews online, and students could either complete the reviews as a test with multiple-choice questions followed by feedback (Test), or as a study opportunity where they simply read the questions and answers together (Study). Students who completed Test reviews consistently scored higher on exams than students who completed Study reviews or no reviews, and the number of Test reviews completed (but not Study reviews) correlated positively with later exam scores. Email: Shuhebur Rahman, rahman@iastate.edu

Effects of Framing on JOLs and Learning Choices. BAVANI PANEERSELVAM and AIMEE CALLENDER, Auburn University (Sponsored by Aimee Callender). — The framing effect shows that people’s choices differ depending on whether the choice is worded positively or negatively. We investigated how different types of frames can influence JOLs and choices about restudying versus test-taking. Study 1 investigated how goal framing influenced the learning choice, whereas study 2 investigated risky-choice framing. Both studies investigated how attribute framing influenced the JOLs. In study 1, participants received feedback for the initial test and made JOLs for a second test. In study 2, participants made JOLs after studying. Finally, participants in both studies received different frames prior to making their study choice. Consistent with Prospect Theory, when choices were worded positively, attribute framing increased the JOLs (Study 1 and Study 2) and the risky-choice framing increased test-taking behavior (Study 2). These findings suggest that the framing effect can be used to increase test-taking as a study strategy among students. Email: Bvani Paneerselvam, bpr0012@auburn.edu

Inhibition and Facilitation in the Retrieval Practice Paradigm: Evaluating the Pattern-Suppression Model. THOMAS BOBBITT and DANIEL KIMBALL, University of Oklahoma. — Practicing retrieval of some items can inhibit or facilitate memory for other items. The pattern-suppression model assumes that an important determinant of inhibition versus facilitation is the degree to which practiced and unpracticed items share features: When such items share many features, facilitation results; when they share fewer features, inhibition results. The current study tests predictions of the pattern-suppression model. In addition to manipulating the degree of feature overlap between practiced and unpracticed items, we manipulate the manner in which items are re-exposed after initial study, the types of features that are tested, and the manner in which the tests measure memory. We interpret the results in terms of the pattern-suppression model and possible alternative accounts. Email: Daniel Kimball, dkimball@ou.edu

Completing Practice Problems Collaboratively Versus Alone Does Not Enhance Subsequent Individual Memory. KATHRYN T. WISSMAN and KATHERINE A. RAWSON, Kent State University. — Engaging in collaborative testing during practice enhances subsequent individual memory. However, prior work involved simple verbal materials. The current experiments explored whether completing practice problems alone or in a group leads to greater performance on an individual final test. After initial study of a text excerpt about factorial designs and how to identify main effects and interactions, learners completed practice problems either alone or in a triad. All learners completed individual final transfer tests one week later. With experimenter-paced practice in Experiment 1, completing practice problems in a group versus alone yielded no benefit to final test performance. With self-paced practice in Experiment 2, completing practice problems in a group versus alone required more time during practice but yielded lower final test performance (although both practice groups outperformed a restudy-only comparison group). Overall, engaging in collaborative testing for practice problems does not enhance individual learning. Email: Katherine A. Rawson, krawson1@kent.edu

Intermittent Testing Reduces Proactive Interference in Multiple Document Comprehension. REBECCA M. MCCABE and JASON L. G. BRAASCH, The University of Memphis, FRANCES DANIEL, Indiana University Northwest. — Proactive interference (PI) is when old knowledge interferes with learning of, and memory for, new information. We examined if PI occurred in the context of reading-to-remember multiple argumentative texts, and if retrieval practice reduced PI. Across three groups, we tested participants’ memory for a target set of eight texts. The control group read only the eight target texts; the PI group and the retrieval practice group each read 16 texts prior to the eight target texts, and the retrieval practice group completed retrieval practice of the first 16 texts. After a distractor, all
participants completed final free recall of all texts. Analyses suggest PI occurs when reading-to-remember multiple documents, and retrieval practice reduces PI. Additionally, better recall of the initial 16 texts during retrieval practice was related to better memory for those same texts, as well as for the subsequently read eight target texts, during final recall. Email: Frances Daniel, frdaniel@iun.edu

(5067) Testing the Context-Change Account of List-Method Directed Forgetting: The Role of Retention Interval. MAGDALENA ABEL and KARL-HEINZ BÄUML, Universität Regensburg. — List-method directed forgetting (LMDF) refers to the finding that when cued to forget a previously studied item list, participants show reduced recall of the list items. According to the context-change account, participants deliberately change mental context in response to the forget cue, which, at test, impairs access to the study context. Consistently, engagement in diversionary thought after study of a list leads to comparable forgetting of the list items. In two experiments, we directly compared the effects of a forget cue and a diversionary thought task after short and long retention intervals. In both experiments, forgetting was present after a short retention interval of few minutes, regardless of type of task. In contrast, after retention intervals of 20 min and 24 h, forgetting was present after the forget cue but was absent after the diversionary task. These findings dissociate the two tasks and challenge the context-change account of LMDF. Email: Magdalena Abel, magdalena.abel@ur.de

(5068) Testing the Boundaries of Optimal Sequencing Effects for Rule-Based and Information-Integration Category Learning. SHARON M. NOH, University of Texas, TYSON K, KERR, University of California, Los Angeles, W. TODD MADDOX, University of Texas. — Research on sequencing effects during category learning has shown that blocking exemplars by category enhances rule-based category learning, whereas interleaving exemplars across categories benefits information-integration category learning. We tested the boundaries of these effects by manipulating stimulus dimensionality. Participants studied stimuli that fell into one of 4 categories based on 2 relevant dimensions (line length and orientation) and either 1 (stimulus position), 2 (position and ellipse length), or 3 (position, ellipse length, and ellipse saturation) irrelevant dimensions. In general, the blocking benefit for RB-categories and interleaving benefit for II-categories were strongest when there was only 1 irrelevant dimension. The blocking benefit for RB-categories attenuated with increasing irrelevant dimensions, and was completely eliminated for rule-based stimuli with 3 irrelevant dimensions. These results add to the growing literature on sequencing effects and suggest that optimal sequencing of category exemplars could depend on various factors. Email: W. Todd Maddox, maddox@psy.utexas.edu

(5069) Effect of Reflective Verbalization on Implicit Learning in a Dynamic Control Task. SACHIKO KIYOKAWA, Nagoya University. — We investigated the effects of reflective verbalization on implicit learning using a dynamic control task. We hypothesized that reflective verbalization's effect on implicit learning differs depending on whether verbalizations focus on success or failure in a previous task session. Since participants tend to focus on incorrect rules in the first session, success-focused verbalization should disrupt finding of the correct rule, whereas failure-focused verbalization should facilitate finding of the correct rule. Eighty-nine participants were randomly assigned to one of three conditions: success-focused, failure-focused, or control. Participants engaged in the sugar factory task in two sessions. A two-minute verbalization session was inserted between task sessions. Performance in both reflective verbalization conditions improved between task sessions; performance did not improve in the irrelevant verbalization condition. Contrary to our hypothesis, reflective verbalization's effect on implicit learning did not differ depending on verbalizations' focus. We therefore conclude that reflective verbalization, regardless of focus, may facilitate implicit learning. Email: Sachiko Kiyokawa, kiyokawa.sachiko@b.mbox.nagoya-u.ac.jp

(5070) Retrieval Practice Versus Worked Examples: Matching Learning Strategies to Learning Goals. DARREN YEO, Vanderbilt University, KEN R. KOEDINGER, Carnegie Mellon University, LISA K. FAZIO, Vanderbilt University. — Numerous studies have found that retrieval practice (having students recall material) and worked examples (having students study a completed example problem) are both effective methods for improving learning. Yet, these methods are inherently contradictory. The retrieval practice literature suggests that actively recalling an answer is more effective than studying, while the worked example literature suggests that studying a solution is more effective than actively solving the problem. The current experiment examines this apparent contradiction and seeks to show that the key difference is in the kind of knowledge being learned (stable facts vs. flexible procedures). When college students' goal was to remember the text of a worked example, retrieval practice was more effective than restudy. However, when students' goal was to learn a novel math procedure, those who studied four worked examples were better at solving problems than those who studied one worked example and then solved three problems. Email: Lisa K. Fazio, lisa.fazio@vanderbilt.edu

(5071) Embodied Learning in Adults Exposed to Bilingual Education as Children. MAYRA SAUCEDO, DEVIN LOUDEN, LUKEGORCZYNSKI, DINA LATIF, WILLIAM CAMACHO, RUTH BRECKINRIDGE CHURCH – and LINDA RUECKERT, Northeastern Illinois University. — The concept of embodied cognition suggests that motor processes form the basis of higher level thought. Speech accompanied by gesture has been shown to result in greater learning of abstract
concepts than speech alone, and gesture improves learning in children when it accompanies instruction in their non-native language. Adult participants were shown a video instructing how to solve polynomial equations while muscle activation in their bicep muscles was measured with electromyogram. Participants were tested on the ability to solve polynomial equations before and after the video. Greater muscle activation was found in participants who were previously exposed to bilingual education, and that activation correlated with learning. Muscle activation was lower and not related to learning in monolinguals and bilinguals not exposed to bilingual education. Children exposed to bilingual education may learn to focus on gesture for understanding, and this may result in enhanced embodiment of abstract concepts in adulthood.

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• METAMEMORY/METACOGNITION III •

(5072)
The Power of the Picture: How Narrative Film Captures Attention and Disrupts Goal Pursuit. ANNA-LISA COHEN, ELLIOT SHAVALIAN, and MEIR COHEN, Yeshiva University. — Narrative transportation is described as a state of detachment that arises when one becomes immersed in the narrative of a story. Participants viewed either an intact version of an engaging 20 min film, “Bang! You're Dead” (1961) by Alfred Hitchcock, (contiguous condition), or a version of the same film with scenes presented out of order (noncontiguous condition). In this latter condition, the individual scenes were intact but were presented out of chronological order. Participants were told a cover story that we were interested in the amount of gun violence depicted in films. Both groups were given the goal to remember to lift their hand every time they heard the word “gun” spoken during the film. Results revealed that participants were significantly less likely to remember to execute their goal in the contiguous condition, presumably because this narrative transported viewers’ attention and thereby “hijacked” processing resources away from internal goals. In a second experiment, we examined whether offering a reward incentive would reduce the effect of detachment that arises when one becomes immersed in the narrative of a story. Participants were given the goal to remember to lift their hand every time they heard the word “gun” spoken during the film. Results revealed that participants were significantly less likely to remember to execute their goal in the contiguous condition, presumably because this narrative transported viewers’ attention and thereby “hijacked” processing resources away from internal goals.

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(5073)
Interpreting Verbal Confidence Statements: Interpersonal Metacognition. DANIELLA K. CASH, SEAN MICHAEL LANE, and KACIE MENNIE, Louisiana State University. — When an eyewitness makes an identification from a lineup, he or she is asked to provide a confidence statement to help jurors assess witness credibility. However, these are verbal statements and people must rely on metacognitive processes to correctly interpret them. Recently, Dodson and Dobolyi (in press) argued that a person's interpretation of verbal confidence is influenced by the diagnosticity of the features a witness uses to justify their identification. We tested this hypothesis in two experiments. Experiment 1 found that participants reduced their ratings of confidence when statements were justified using a facial feature that was shared by lineup members, but not when the feature was unique. In Experiment 2, we found that participants confounded their judgments of witness confidence and accuracy, even when making separate ratings. Altogether, the results suggest that people readily integrate contextual information into their interpretations of witness confidence. Implications of the results are discussed.

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(5074)
Does Belief in Feedback Influence the Correction of Misconceptions and the Effectiveness of Refutations? PATRICK RICH, Kent State University, MARIETTE VAN LOON, University of Bern, JOHN DUNLOSKY and MARIA ZARAGOZA, Kent State University (Sponsored by Maria Zaragoza). — When correcting misconceptions, refutation texts (texts containing the misconception, an explicit refutation of the misconception, and an explanation supporting the correct answer) are more effective than providing the correct answer alone. However, even when given a refutation text, people may not correct their misconceptions when they do not believe the feedback. Hence, we conducted two experiments that investigated the role of participants’ subjective belief in the validity of the feedback. Consistent with our expectation, across both experiments, higher ratings of belief in the feedback were associated with better performance on a 1-week delayed final test, regardless of whether they received a refutation text or simple yes-no feedback. The results of Experiment 2 further suggest that refutation texts provide the most benefit when participants do not believe the initial yes-no feedback (prior to receiving the refutation text).

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(5075)
Confidence-Accuracy Correlations for Remembered, Known, and Guessed Memories. K. ANDREW DESOTO, Association for Psychological Science, HENRY L. ROEDIGER, Washington University in St. Louis. — We assessed the relationship between confidence and accuracy as a function of whether subjects indicated they were remembering, knowing, or guessing when making recognition decisions. Subjects read items from categorized lists and took a recognition test while making confidence ratings and remember/know/guess judgments after recognition decisions. Overall, both confidence and remember/know/guess judgment related to accuracy, and remembered memories rated with high confidence were more accurate than either high confidence or remembered memories alone. We calculated confidence-accuracy correlations using four methods and found a positive correlation for remembered and known memories, but not for guesses. These results suggest that confidence ratings and remember/know/guess judgments are valuable when used jointly and relate to a recent theoretical model of recognition memory.

Email: K. Andrew DeSoto, kadesoto@gmail.com
(5076) Self-Regulated Learning of Rule-Based Concepts. NATHANIEL FOSTER, KATHERINE A. RAWSON, and JOHN DUNLOSKY, Kent State University. — Acquisition of rule-based concepts involves learning how and when to apply a specific rule to different instances of the same problem type. Within this domain, learning is best achieved when practice involves studying worked examples followed by conventional problem-solving. When given the choice to use worked examples versus problem solving, how effectively do students regulate their learning? Participants in three experiments learned how to solve probability problems under practice conditions involving self-regulated learning (i.e., students could choose a worked example or problem solving on each trial), a combined schedule of worked examples followed by problem solving, or problem solving only. Self-regulated learners rarely chose to study worked examples and seldom did so prior to problem solving. On a final test, self-regulated learners rarely outperformed students who learned via normatively effective practice schedules. These outcomes suggest that students will profit from guidance on how to effectively regulate learning of rule-based concepts. Email: Nathaniel Foster, nfoster6@kent.edu

(5077) Achievement Goals Affect Metacognitive Judgments. KENJI IKEDA, Doshisha University, ALAN CASTEL, University of California, Los Angeles, CAROLE YUE, Covenant College, KOUMURAYAMA, University of Reading. — The present study examined the effect of achievement goals on metacognitive judgments, such as judgments of learning (JOLs), and actual recall performance. We conducted three experiments manipulating the instruction of achievement goals. In each experiment, participants were instructed to adopt mastery-approach goals, which focus on absolute and/or interpersonal standards, (i.e., develop their own mental ability on a memory task) or performance-approach goals, which focus on social comparison standards (i.e., demonstrate their strong memory ability by getting a high score on a memory task). The results of three experiments showed that JOLs in the mastery-approach goal condition tended to be lower than those in the performance-approach goal condition. In contrast, actual recall performance did not differ between the two goal conditions. These findings suggest that achievement motivation affects metacognitive judgments during learning. Thus, learners may use cues concerning motivational factors (i.e., achievement goals), regardless of their relevance. Email: Kenji Ikeda, a21nas@yahoo.co.jp

(5078) Failure to Update Metacognitive Control in Response to Expected Retention Intervals. JOSEF FIECHTER, AARON BENJAMIN, University of Illinois, Urbana-Champaign (Sponsored by Duane Watson). — Accounting for the forgetting that transpires between encoding and recall is a critical element of effective remembering. We assessed whether learners differentially encode items that they expect to be tested on at different retention intervals. Each to-be-learned synonym pair was cued to be tested at one of two retention intervals. To evaluate whether subjects engaged in differential encoding, we tested a small subset of items at the contraindicated interval (and the remainder at the expected interval). Over four experiments, cued-recall performance did not vary across expected intervals, suggesting that subjects were not varying the extent of their encoding or their encoding strategies in order to account for the disparate forgetting that the different retention intervals induced. Strategy questionnaire results and self-paced study times aligned with this interpretation. A power analysis and Bayesian t-tests on pooled data both provided strong evidence that subjects did not differentially encode items based on their cued retention interval. Our data suggest that learners fail to update their encoding strategy in the face of varied retention intervals, revealing a massive insensitivity to the effects of time on forgetting. Email: Josh Fiechter, fiechte2@illinois.edu

(5079) Context Effects on ‘Don’t Know’ Responding to Answerable and Unanswerable Questions. ALEKSANDRA KROGULSKA and ZUZANNA SKÓRA, Jagiellonian University, KATARZYNA ZAWADZKA and MACIEJ HANCZAKOWSKI, Cardiff University (Sponsored by Maciej Hanczakowski). — Context effects in recognition may take two forms. Reinstating the exact encoding context at retrieval can facilitate recollection of item-context associations, while reinstating a familiar context at retrieval can increase the perceived familiarity of the tested items. Using simple materials such as faces or words (Hanczakowski, Zawadzka, & Coote, 2014; Hanczakowski, Zawadzka, & Macken, 2015), we have shown that reinstated and familiar contexts reduce the rate of “don’t know” (DK) responses in a free-report test, as compared to novel contexts. Here we investigated context effects in a recognition test for more complex eyewitness-related materials. We compared the influence of context on responding to answerable questions, for which the DK response reflects a lack of relevant memory, and unanswerable questions, for which DK may also reflect knowledge that the relevant detail was not witnessed. The results suggest that the benefits of context reinstatement might be limited when complex materials are used. Email: Aleksandra Krogulska, krogulska.aleksandra@gmail.com

(5080) Memory for Flags: Stars, Stripes, and Flagging Metacognition. ADAM B. BLAKE, TYSON KERR, and ALAN CASTEL, University of California, Los Angeles (Sponsored by Alan Castel). — Visual memory is often a remarkably accurate component of human cognition. However, people often show impairments in memory for common objects with high importance, frequent use, or high familiarity (e.g., the Apple logo; Blake, Nazarian, & Castel, 2015). We further examined the effects of cultural salience, personal relevance, and ease of rule-generation by asking people to identify various flags among competitive lures and then rate their confidence. Though nearly all participants were able to express some of the inherent rules of the US flag (50 stars, 13 stripes), fewer than half could correctly identify the flag. Participants showed poor metacognition for the US flag and had higher calibration for other flags with which they had less experience.
In addition to supporting the above research in memory for common objects, these data show how familiarity and experience are often inappropriately used as metacognitive cues despite explicit knowledge for certain features. Email: Adam B. Blake, adambblake@g.ucla.edu

(5081)
**Age Differences in Remembering Valuable Associative Information Are Moderated by Fluid Intelligence and Strategy Use.** ROBERT ARIEL, Georgia Institute of Technology, JODI PRICE, University of Alabama in Huntsville, CHRISTOPHER HERTZOG, Georgia Institute of Technology. — Older adults can freely recall valuable (or important) information from word lists as well younger adults. However, it is unclear if they can also selectively remember important associative information as well as younger adults. The current experiment examined age differences in metacognitive self-regulated study behavior and value-based remembering for associative (paired associates) and non-associative material (words). Participants regulated their study for either words or word pairs by moving a mouse controlled cursor into different spatial locations to either study items or view their value. They then completed either a free recall test or a cued recall test. Retrospective strategy reports were also obtained for some paired-associate items. The results revealed that younger and older adults regulated their study in a similar manner and used similar effective encoding strategies to learn valuable information. However, older adults with lower fluid intelligence benefited less from using effective encoding strategies when studying valuable associative information than did younger adults. As a consequence, age differences in value-based remembering emerged for only associative information. Email: Robert Ariel, robert.ariel@psych.gatech.edu

(5082)
**Memory and Selectivity When Short on Time: The Value in Rushing.** CATHERINE D. MIDDLEBROOKS and TYSON KERR, University of California, Los Angeles, KOU MURAYAMA, University of Reading, ALAN CASTEL, University of California, Los Angeles (Sponsored by Kou Murayama). — Being short on time can be frustrating, particularly because it can limit what one can remember. There are certainly costs to being rushed, but are there also benefits? The current study investigates the impact of variable time constraints on both memory and selectivity. Participants were presented with eight word lists, with words paired with a value ranging from 1–10 points. Participants were also assigned to one of four timing conditions: a constant slow (5 seconds) or fast (1 second) presentation rate; a slow rate for initial lists, then fast in later lists; or a fast rate in initial lists and then slow in later lists. While participants recalled more words overall when studying at a slower rate, there were no significant differences between timing conditions in value-based recall, with all participants demonstrating better recall for high-value words and similar selectivity. Thus, being rushed did not impair value-directed remembering and selectivity. Email: Catherine D. Middlebrooks, cmiddlebrooks@ucla.edu

(5083)
**Can Comprehenders Meta-Map?** ELAINE W. TAN and DEBORAH K. EAKIN, Mississippi State University (Sponsored by Deborah K. Eakin). — During comprehension, readers organize incoming information to form coherent situation models (e.g., Zwaan, 1995). Situation model construction requires readers to include/exclude text information using a process known as mapping. The ability to accurately map matching information and exclude irrelevant information is directly related to successful comprehension. Metacomprehension is the ability to accurately assess the degree to which comprehension has occurred; comprehenders are generally poor at this (Maki, 1998). The purpose of this study was to determine whether metacomprehension inaccuracy is due to a failure to monitor mapping, or meta-map. Poor meta-mapping leads to failures in implementing control processes that could improve the situation model, comprehension, and metacomprehension. The purpose of this study was to determine whether comprehenders could meta-map when explicitly asked to do so. Participants created concept maps and did online assessments about how each concept contributed to the map. Results will be related to research on metacomprehension accuracy. Email: Elaine W. Tan, ewt38@msstate.edu

**WORKING MEMORY IV**

(5084)
**Solving Creative Problems Through the Facilitation of Incubation.** LYUBOMIR KOLEV, TRINA C. KERSHAW, and AMINDA J. O’HARE, University of Massachusetts Dartmouth (Sponsored by Susan Goldman). — Cognitive interventions, such as incubation, and individual abilities and traits, including working memory and the ability to focus or disperse attention, have been shown to influence insight problem solving. In the present study, an intervention focusing on two differing incubation techniques (mind wandering and mindfulness meditation) was utilized to facilitate problem solving. After initial attempts at insight problems, subjects were randomly assigned to listen to a 10 minute audio asking them to either focus attention on their present awareness (mindfulness) or disperse their attention away from the present to a series of pleasant scenarios such as vacations, traveling, etc. (mind wandering). After incubation, subjects returned to the insight problems and completed measurements of working memory, trait mindfulness, and trait mind wandering. Preliminary analyses indicated no differences between the incubation conditions, but the present awareness aspect of the mindfulness trait scale was a positive predictor of solution rate. Email: Lyubomir Kolev, lkolev@umassd.edu

(5085)
**Working Memory and Reading for Comprehension: Instructional Set Matters.** ALYSSA KORELL, Idaho State University, ASHLEY L. MILLER, University of Oregon, KANDI JO TURLEY-AMES, REINALYN ECHON, CHARLES PARKER, and TINA MIYAKE, Idaho State University. — The relationship between working memory (WM) and reading
comprehension may be due, in part, to differences in how span groups approach reading tasks (e.g., Budd, Whitney, & Turley, 1993). In general, high spans appear to employ more efficient, complex strategies to manage WM demands (e.g., Turley-Ames & Whitfield, 2003). We examined differences between span groups during a reading comprehension task as a function of various instructional sets. Participants completed the strategy operation span task followed by a computerized Nelson-Denny Reading Comprehension Task. Participants were randomly assigned to reading conditions that varied by reading goal (i.e., quickly, accurately, quickly and accurately), timing (i.e., timed or untimed), and the opportunity to re-read passages. Results suggest the relationship between reading comprehension and WM is influenced by participants’ strategic behavior while reading. WM span group differences in terms of sensitivity to instructional sets are reported. Email: Kandi Jo Turley-Ames, turlkand@isu.edu

**Development of Working Memory Capacity and Precision for Tone Pitch.** KATHERINE CLARK (Graduate Travel Award Recipient), KYLE O. HARDMAN, TODD SCHACHTMAN, J. SCOTT SAULTS, BRETT A. GLASS, and NELSON COWAN, University of Missouri (Sponsored by Nelson Cowan). — Little is known about developmental changes in the capacity limits of nonverbal auditory working memory, and even less is known about developmental changes in its precision. This paper examines reproduction, on individual trials, of a tone from a short list to be retained in working memory, and the study incorporates recent modeling techniques to dissociate capacity from precision. Subjects include children (6-13 years, N=84) and adults (26-50 years, N=31). Capacity (items in working memory) and precision (fidelity of each working memory representation) both improved with age, but the developmental trajectories of these parameters differed. Moreover, based on auxiliary measures, capacity and precision were both related to general aptitude measures but only precision was also related to musical experience. Email: Katherine Clark, kmcw24@mail.missouri.edu

**Different Working Memory Components Predict Flexibility Versus Mental Set.** CHARLES A. VAN STOCKUM, JR. and MARCI S. DECARO, University of Louisville (Sponsored by John Pani). — Higher working memory capacity (WMC) supports the ability to find and implement rules for solving problems. However, higher WMC can also lead to greater rule rigidity (i.e., mental set). We tested whether multiple components of WMC differentially predict who is most likely to find a complex rule, as well as who is most likely to abandon this rule when a more efficient shortcut is also available. Participants completed the water jug task and three component measures of WMC. Greater attention control predicted complex rule recovery. Greater secondary memory predicted persistence in using this rule when a shortcut was also available. Conversely, greater primary memory predicted shortcut discovery, suggesting better ability to disengage from the complex rule and break mental set. These findings support a multifaceted view of WMC in which component processes do not always act in concert. Email: Charles A. Van Stockum, Jr., charles.vanstockum@louisville.edu

**A Tale of Three TUTs: The Role of Emotional Valence in Cognitive Task Performance.** MATTHEW S. WELHAF, AUDREY V.B. HOOD, and JONATHAN B. BANKS, Nova Southeastern University, ADRIEL BOALS, University of North Texas. — Previous research has demonstrated that Mind wandering, or experiencing Task-Unrelated Thoughts (TUTs), during an ongoing cognitive task results in impaired performance on that task (McVay & Kane, 2009). However, this negative relationship is not always consistent (McVay & Kane, 2013). The current study examined the role of emotional valence of the TUTs on working memory impairment. Participants completed two working memory tasks, the Automated Operation Span and Automated Reading Span, with thought probes inserted into the tasks to measure mind wandering. Working memory was negatively related to the percentage of negatively valenced and neutral TUTs. However, positively valenced TUTs were not related to working memory task performance. This suggests that examining the emotional valence of TUTs may be critical to understanding the subsequent impact on ongoing task performance. In order to further our understanding of mind wandering factors that modify the impact of TUTs on cognitive performance should be identified. Email: Jonathan B. Banks, jonathan.banks@nova.edu

**Music Cognition and Working Memory: Exploring a Possible Tonal Loop.** CATHERINE JORDAN, ROBERT LOGIE, and KATIE OVERY, University of Edinburgh (Sponsored by Robert Logie). — Exploring short-term memory through the multicomponent model of working memory (Baddeley & Logie, 1999; Baddeley & Hitch, 1974) presents the opportunity to discover the influence of music expertise on the processing and maintenance of information within working memory. Articulatory suppression interfered with the storage of verbal rather than tonal material (Koelsch et al., 2009), suggesting the existence of a “tonal loop” as separate from a “phonological loop” within a musician’s working memory system (Schulze et al., 2010). The present study incorporated the visual to auditory recognition design used by Schendel & Palmer (2007) with some alterations. Two experiments consisted of an auditory-auditory pitch recognition task and the visual-auditory pitch recognition task. Participants created the disruption verbally through articulatory suppression and singing suppression. Singing suppression significantly impaired musicians’ performance; articulatory suppression caused most disruption to non-musicians’ performance. These preliminary results suggest a difference between musicians and non-musicians working memory suggesting the possible existence of a tonal loop within a musician’s working memory. Email: Catherine Jordan, c.jordan-4@sms.ed.ac.uk
(5090)
Time of Day Effects on Suppression of Competing Information in Semantic Interference Resolution. KA WAII NGO, University of Toronto, ROSE ZACKS, Michigan State University, LYNN HASHER, University of Toronto (Sponsored by Rose Zacks). — We previously reported that the ability to suppress competitors during semantic interference resolution declines with age, and may contribute to memory deficits as seen in the elderly (Healey et al., 2013). Although young adults efficiently suppress distractions during their peak time of day, we present evidence that, similar to older adults, they do not show suppression in the face of competitors during their off-peak time of day. Moreover, to-be-suppressed items actually get facilitated at an off-peak time of day compared to control words. These results suggest that young adults’ ability to resolve interference between competing responses during retrieval varies greatly throughout the day. Email: Ka Wai Joan Ngo, joan.ngo@utoronto.ca

(5091)
Verbal Memory and Language Production: Evidence for Common Mechanisms. KATHERINE GUERARD, MYLENE RICHARD, and ALAIN GAUTREAU, Université de Moncton. — An increasing number of studies provided evidence in favor of the idea that verbal memory and language production rely on the same architecture. In the present study, we were interested to pursue this line of research by examining whether the content to retain influenced language production and vice versa. Participants were presented with an auditory list of letters to retain, followed by the visual presentation of a list of letters to articulate. Letters could be phonologically similar or dissimilar. We also manipulated the overlap between the content to retain in verbal memory and the list to articulate. Our results showed that the overlap between the two lists influenced the speed at which the lists of letters can be articulated, as well as the number and type of errors that were produced during serial recall. These results suggest that the mechanisms that are called upon during retention are the same as those recruited during language production. Email: Katherine Guerard, katherine.guerard@umoncton.ca

(5092)
Exploring the Unique Cognitive Operations for Hierarchical Versus Equivalent Semantic Relationships. DALE A. HIRSCH and CHRISTOPHER WAS, Kent State University (Sponsored by Christopher Was). — Previous studies support the hypothesis that specific cognitive operations are temporarily facilitated by processing in working memory. Woltz and Was (2007) devised an experimental task to demonstrate this facilitation of procedural memory (FPM). The original task was later adapted to measure individual differences in the FPM. The FPM tasks require participants to quickly identify and compare the category membership of exemplars, attributes or synonyms following the processing of related information. Previous studies have used the three stimulus types to form a latent variable for FPM (Was, et al., 2012). Of interest to the current study, however, is not the similarity among the FPM measures but the differences in the specific cognitive operations. More specifically, does processing different stimulus types in the FPM tasks result in differential facilitation of the operations? The current study provides evidence that the cognitive operations of exemplar and attribute identification are distinct from synonym identification. Email: Dale A. Hirsch, hirsch_da@yahoo.com

(5093)
Trait Anxiety Effects on the Control of Proactive Interference in Working Memory. EDA MIZRAK, CEYLA ERHAN, FUAT BALCI and ILKE ÖZTEKIN, Koç University. — Previous research has shown that individuals with high trait anxiety (HTA) perform worse in situations that require cognitive control over inhibiting task irrelevant distractors compared to individuals with lower trait anxiety (LTA) (Berggren & Derakshan, 2014). However, whether trait anxiety leads to general impairments in cognitive control is a matter of debate. We tested HTA and LTA individuals with a short-term item recognition task that manipulated proactive interference (PI). The presence of PI in the retrieval context requires resolving competition across memory representations. Our results showed that HTA individuals were less efficient (with slower reaction times) when controlling the detrimental effects of PI. Further analyses using Hierarchical Drift Diffusion Modeling (HDDM) revealed that HTA participants were more cautious (higher threshold settings) and less efficient (lower drift rates) in collecting evidence before responding in the PI conditions. These findings support the contention that trait anxiety might lead to general impairments in controlled processing. Email: Ilke Oztekin, ilke.oztekin@nyu.edu

(5094)
(Diffusion) Modelling Local Recognition: A Role for Non-Decision Time? PETER SHEPHERDSON, KLAUS OBERAUER, and ALESSANDRA SOUZA, University of Zurich. — We used the EZ-Diffusion (Wagenmakers et al., 2007) and Hierarchical Drift-Diffusion models (Wiecki et al., 2013) to investigate local recognition performance (e.g., Oberauer, 2005). Participants encoded stimulus arrays, then decided whether a location-specific probe matched the same-position stimulus. Both methods showed decreased drift rate, and increased non-decision time with larger set sizes. When a retro-cue during the retention interval provided the impending probe's location, the set-size effect on drift rate decreased, and that on non-decision time disappeared. These findings could be explained by a two-stage account wherein participants first retrieve the item matching the probe's location, then compare it with the probe, with non-decision time reflecting retrieval duration and drift rate reflecting comparison/recognition decision duration. Our results reinforce the importance of considering effects of memory set size on all parameters, as some previous efforts to model recognition tasks (e.g., Donkin & Nosofsky, 2012) restricted set-size effects to decisional parameters, potentially missing effects on non-decision time. Email: Peter Shepherdson, petershepherdson@gmail.com
(5095)
Prior Knowledge in Immediate and Episodic Memory With Low Load: A Comparison. MARIE POIRIER, LAUREN DANIEL, SHAIMA MOUDEN, and HARKIRAT ROOPRA, City University London. — Hemmer and Steyvers (2009) showed that episodic memory for the properties (i.e. size) of familiar objects is influenced by prior knowledge at multiple levels. Ensemble statistics have an effect (regression towards the mean) as well as item-level prior knowledge (e.g. average size of an apple). Heussen et al (2011) showed that Hemmer and Steyvers’ findings could be extended to a classic short-term memory (STM) task involving memory for six items. However, estimates of visual STM capacity vary and it could be argued that six-item lists exceed said capacity (Zhang & Luck, 2008; Brady et al. 2011). Exp. 1 examined the effects of prior knowledge on the immediate recall of very short lists (2 items). The results show that even under this low load, STM continues to be influenced by multiple levels of prior knowledge. Exp. 2 used exactly the same paradigm but with a 30 sec filled delay between study and retrieval. The results are quasi-identical to those of Exp. 1, provided one assumes somewhat noisier representations. The difference between immediate and episodic recall appears to mainly lay in the precision of item representations (Brady et al., 2011), with knowledge contributing systematically and in similar fashion in both cases. Email: Marie Poirier, m.poirier@city.ac.uk

(5096)
The Detrimental Effect of Backward Recall in Immediate Memory: Is it Due to Response Modality? JEAN SAINT-AUBIN, KATHERINE GUERARD, and OLIVIA BEAUDRY, Universite de Moncton. — In a typical serial recall task, participants must recall list items in their presentation order. In a variant of this task, known as backward recall, participants recall list items in the reverse order. The literature on backward recall yields contradictory findings and therefore, the underlying mechanisms are still not clear. Some studies showed that the word length effect is abolished in backward recall (e.g., Bireta et al., 2010) whereas others showed that recall direction had no influence on the word length effect (e.g., Guérard et al., 2012). In the present study, we investigated the role of output modality in accounting for this discrepancy. In four experiments, our results showed that with a manual response, the size of the word length effect is unaffected by recall direction, while it is severely reduced with an oral recall. We suggest that output modality is determinant for the processes called upon in backward recall. Email: Jean Saint-Aubin, jean.saint-aubin@umoncton.ca

(5097)
Using Ranking Judgements in Comparing Models of Visual Working Memory. ROBERT TAYLOR, MIKE LE PELLEY, and CHRIS DONKIN, University of New South Wales (Sponsored by Chris Donkin). — A major debate in modeling Visual Working Memory (VWM) is whether item storage is best described by a discrete (e.g., slots) or continuous (e.g., resources) process. We first present data from a series of experiments which used multiple response data to test the predictions of the slots model, the results from which suggesting that item storage is better described by a resource process. We then addressed how a more complex slots model might better predict our empirical data. Accordingly, we derived a slots and resource model for the ranking task and conducted Bayesian model comparisons. Though the slots model could capture some features of the data, the additional complexity required in order to do so ultimately lead to poorer consistencies between model predictions and data when compared to the resource model. Email: Robert Taylor, taylor.r17@gmail.com

(5098)
Measuring the Narrow Focus of Attention. CARLA DE SIMONI and KLAUS OBERRAER, University of Zurich, CLAUDIA C. VON BASTIAN, University of Colorado at Boulder (Sponsored by Klaus Oberraer). — Evidence for a single-object focus of attention in working memory has been established by evaluating two effects: retro-cue benefits (i.e., faster reaction times when the currently relevant object in working memory has been cued) and object-switch costs (i.e., slower reaction times when the currently relevant object differs from the one in the preceding trial). However, it is yet unclear to which degree these two measures converge and, hence, reflect identical processes. We therefore assessed both retro-cue benefits and object-switch costs in 200 young adults with a set of four updating tasks with varying material. Half of the trials had a retro-cue present. Each trial comprised 8 updating steps, half of which were object switches. As expected, results showed retro-cue benefits and object-switch costs on reaction times. However, residual object-switch costs were still observed even when a retro-cue was present, suggesting that object-switch costs reflect a distinct cognitive process. Email: Carla De Simoni, carla.de.simoni@psychologie.uzh.ch

• MEANING/SEMANTICS •

(5099)
Mapping Ambiguous Word Meanings to L2 Vocabulary: Differences Between Polysemes and Homonyms. CHELSEA EDDINGTON and NATASHA TOKOWICZ, University of Pittsburgh (Sponsored by Natasha Tokowicz). — This experiment investigates how semantically ambiguous meanings map to second language (L2) vocabulary. Specifically, we examined if there are differences between ambiguous words with related senses (i.e., polysemes such as wrapping vs. academic paper) and ambiguous words with unrelated meanings (i.e., homonyms, such as river vs. money bank). We trained participants on a set of ambiguous English words and their corresponding German translations and trained participants on only one of the ambiguous words’ meanings. We tested if the untrained meaning mapped to the L2 vocabulary using a translation recognition task with semantic distractors. We found that participants were less accurate in responding to both trained and untrained semantic distractors for polysemes, but were less accurate in responding to only trained semantic distractors for homonyms. Results suggest that there are processing...
differences between different types of ambiguous words and that this may influence how learners map meanings to L2 labels. Email: Chelsea Eddington, c.m.eddington@gmail.com

(5100) Metaphorical Color Representations of Emotional Concepts in English and Chinese Speakers. JUNQING CHEN and NATALIE A. KACINIK, The Graduate Center & Brooklyn College, CUNY, YINGJUN CHEN and NIANYANG WU, Shanghai Normal University. — This project examined whether the cultural and linguistic experiences of English and Chinese speakers can result in different metaphorical representations of emotion in those individuals. The Brief Implicit Association Test (BIAT) procedure was used to measure how strongly various colors are associated with anger, sadness, happiness, fear, envy, shame and shyness. The results showed that some associations like red-anger are common in both English and Chinese speakers, whereas other associations are culturally-specific (e.g., red is also associated with happiness in Chinese and pink with envy, while only English individuals associate blue with sadness). Some interesting gender differences were also obtained, such that Chinese females associate shyness with pink, but males with red. Black was associated with fear in both genders in Chinese, but only present in English males. This study thus demonstrates that the conceptual representations of different emotions are shaped by an individual’s linguistic and cultural background. Email: Natalie A. Kacinik, NKacinik@brooklyn.cuny.edu

(5101) The Sensational Life of Embodied Metaphors. DAWN G. BLASKO, Pennsylvania State University, VICTORIA KAZMERSKI, ALYSHA SIMMONS, and ERICA EDWARDS, Pennsylvania State University-Erie. — Many metaphors have conceptual roots that are perceptually embodied (e.g., the rejection letter was a slap; Her orders were a sharp bark), but little is known about how this characteristic influences the online understanding of these metaphors. In the current study, we asked participants to read auditory and motor-based sensory metaphors or a nonperceptual semantic control sentence. Each sentence was rated for sensory vividness, aptness, and familiarity. Participants were then asked to rate the semantic similarity of the two sentences. Individual differences in working memory, mental imagery, visioning, personality and sensation seeking were also examined. The data showed that metaphorical sentences were perceived as more vivid and less familiar than literal controls. However, individual differences predicted the perception of semantic similarity. Email: Dawn G. Blasko, dawnblasko@psu.edu

(5102) The Basic Level Effect Is Not Reversed by Speeded Category Verification. VALERIE A. KLINE, University of Louisiana at Lafayette, MICHAEL KALISH, Syracuse University (Sponsored by Michael Kalish). — Individuals typically show a speed and accuracy advantage for basic compared to superordinate level categorization. This is known as the basic level effect. Rogers and Patterson (2007) were able to reverse the basic level effect in elderly healthy participants using natural images when tested under strict time pressure. The results of their study indicate that the information contained in the superordinate level category is available before information in the basic level category. We examined this effect using neoropsychologically relevant images and young adults. Speeded category verification tasks were used to examine the early stages of object categorization. We did not observe a reversal of the basic level effect. The role of individual categories on performance will be discussed. Email: Valerie A. Kline, valakline@gmail.com

(5103) One, Two, Many: The Costs of Presupposition Processing in Different Contexts. CHRISTIAN BRAUNER, VERENA CAROLA SEIBOLD, and BETTINA ROLKE, University of Tubingen. — Discourse participants use linguistic devices like presuppositions to indicate information taken for granted. In using the definite article in a noun phrase like “the ball” speakers trigger an existence presupposition signaling the existence of a unique ball in the given context. In contrast, using the indefinite article “a” as a trigger in the same phrase presupposes anti-uniquness signaling that there is no unique ball in the given context. Using EEG, we investigated how these presuppositions are processed in different contexts. The context either provided a single referent, two competing, or multiple competing referents for a given noun phrase, resulting in matching and mismatching conditions for the two presupposition triggers. Event-related potentials (N400, P600) evoked by the definite and indefinite noun phrases were strongly influenced by the type of context and matching condition. This suggests that different cognitive processes come into play depending on trigger type and context situation. Email: Bettina Rolke, bettina.rolke@uni-tuebingen.de

(5104) Semantic Velocity Influence of Context Words on a Binary-Response Task. STEVE BUENO, ALIX SEIGNEURIC, and HAKIMA MEGHERBI, Université Paris 13-Sorbonne Paris Cité. — According to embodied cognition theory, language is grounded in action. Words dealing with velocity should then modulate RTs provided by a motor action (such as pressing a key). Precisely, this study explores the effect of context-words, dealing with velocity, on RTs: Participants performed a Lexical Decision Task on a set of velocity-neutral test-words (e.g., cake, necklace) that were preceded by a speed-word context (e.g., rocket, leopard), a slow-word context (e.g., tractor, snail), or a velocity-neutral-word context (e.g., umbrella, rooster). Results showed that the recognition of neutral test-words was slowed down when preceded by a slow-word context compared to a velocity-neutral-word context, but not accelerated when preceded by a speed-word context. Same effects were observed on the rejection of pseudowords. Nevertheless, this pattern of results differed depending on the proportion of context words (slowing down observed for high- but not for low-proportion) or when the presentation of items was totally randomized. Implications for embodied cognition theory and binary-response tasks are discussed. Email: Steve Bueno, bueno@univ-paris13.fr
(5105)
Positive Proactive Interference: Happy Versus Marriage.
H. FAYE KNICKERBOKER, University at Albany, SUNY; JULIANA BOUCHER, Skidmore College; JEANETTE ALTARRIBA, University at Albany, SUNY. — Proactive interference (PI) is the hindrance of the recall of current information by older information. Release from PI is the spontaneous recovery of recall ability. Previous research using the Brown-Peterson task (Keppel & Underwood, 1962) found that shifts between neutral, emotion, and emotion-laden categories of words led to significant release from PI effects, with the exception of shifts from emotion-laden to emotion words (Knickerbocker & Altarriba, 2013). This work only incorporated words with strong negative emotional associations in the emotion and emotion-laden conditions. The current study attempted to replicate the previous findings utilizing neutral, positive emotion, and positive emotion-laden categories. Significant release from PI effects were obtained when switching from neutral to emotion and emotion-laden categories. However, the effect was significantly smaller than that observed when switching between two neutral categories. Emotion words exhibited a higher rate of intrusions than emotion-laden or neutral words. Email: H. Faye Knickerbocker, hknicker@skidmore.edu

(5106)
Effects of Emotional Experience on Abstract and Concrete Words. PAUL SIAKALUK, PHILIP NEWCOMBE, TAMARA KUMPAN, and BRIAN DUFFELS, University of N. British Columbia, PENNY PEXMAN, University of Calgary. — We examined the effects of emotional experience (EE; Newcombe et al., 2012) for abstract and concrete words in lexical decision (LDT), semantic categorization (SCT), and a task we call semantic lexical decision (SLDT). In a series of multiple regression analyses, we statistically controlled for numerous variables including, importantly, arousal, valence, and context availability. We observed the following results. First, in LDT, EE exerted facilitatory effects on response latencies for both types of words. Second, in SCT and SLDT, EE exerted facilitatory effects on response latencies and errors for abstract words, but exerted inhibitory effects on these two dependent measures for concrete words. These results demonstrate that the influence of EE is dependent on both the conceptual nature of the stimuli and task demands. We interpret our findings within the frameworks of situated conceptualization (Barsalou, 2009) and semantic feedback of lexical processing. Email: Paul Siakaluk, sjakaluk@unbc.ca

(5107)
Single-Word Event-Related Brain Potentials Reveal Multiple Effects of Sentential Context on Lexical Processing. BRENAN R. PAYNE, University of Illinois at Urbana-Champaign, CHIA-LIN LEE, National Taiwan University; KARA D. FEDERMEIER, University of Illinois at Urbana-Champaign. — Linear mixed models of single-word event-related potentials (ERPs) were used to probe the continuous and incremental effects of semantic and syntactic context on multiple aspects of lexical processing. We recorded EEG while participants read sentences that were congruent, syntactic prose (grammatical but nonsensical) or random word strings. Accruing sentence context had separable influences on the effects of a word’s frequency and orthographic neighborhood on the N400, an ERP component linked to meaning processing and initial access to semantic memory. While frequency effects were reduced with accumulating semantic context only, neighborhood effects were robust across all words, regardless of context. These findings are consistent with models of lexical processing claiming that orthographic neighborhood indexes structural organization in semantic memory while frequency represents transient and malleable baseline activation that is overridden by contextual constraint. Modeling word-level variability in ERPs reveals mechanisms by which different sources of information simultaneously contribute to the unfolding neural dynamics of comprehension. Email: Brennan R. Payne, payne12@illinois.edu

(5108)
Novel Metaphor Comprehension: Semantic Neighbourhood Density, Topic Concreteness, and Directionality. ALBERT KATZ and HAMAD AL-АЗARY, University of Western Ontario. — Participants rated novel nominal metaphors of the form “A (topic) is a B (vehicle)” for comprehensibility in forward (e.g., A PEN IS A SWORD) and reversed formats (e.g., A SWORD IS A PEN). We manipulated noun concreteness (abstract vs. concrete, such that C-C, C-A and A-C pairings were created) and semantic neighbourhood density (SND, defined by the number of nearby semantic neighbours). Metaphors with abstract topics were judged to be more comprehensible than those with concrete topics but only for high SND metaphors. Moreover low SND metaphors, when reversed become less comprehensible than do high SND metaphors when reversed. This effect is driven by concreteness inasmuch as concrete high SND metaphors lose the least meaning when reversed. This pattern of findings indicates that word-level semantic properties contribute to a novel metaphor’s comprehensibility and to a lesser extent, its bi-directionality. Email: Albert Katz, katz@uwo.ca

(5109)
English Semantic Relatedness Norms: An Extended Database, Feature Coding, and Online Website. ERIN M. BUCHANAN, JAHNAVI DELMONICO, BENJAMIN L. GRAVES, HANNAH O. HICKMAN, THOMAS W. HUTCHISON, SPENSER C. PHILLIPS, and MY Q. VU, Missouri State University. — Linguistic word norms have exploded with the interest in big data and the potential availability of information on the Internet. However, these databases are often limited by time or programming demands on the research team willing to contribute to these norms. This project adds to semantic feature production norms presented in Buchanan et al. (2013), bringing total words normed to over 4000 concepts across existing data. We will describe the creation of the dataset including source code that will allow researchers to easily process feature lists for their own projects. We coded root words and affixes for feature lists to calculate several million semantic relatedness cosine values, which were then used to predict response times from the Semantic Priming Project (Hutchison
et al., 2013). Reliability and validity of the dataset will be discussed along with the features of the online site. Email: Erin M. Buchanan, ErinBuchanan@MissouriState.edu

(5110)
Plurals Are Derived via Scalar Implicatures: Evidence From a Picture Matching Paradigm. NIKOLE PATSON, Ohio State University. — In some contexts, a plural noun does not strictly refer to more than one object. This suggests that the plural is not semantically marked to mean “more than one.” One account of how the plural might refer to more than one entities is via a scalar implicature. That is, although the plural could refer to a single entity, a Gricean inference is made that had singular been intended, the stronger form of indicating singular would have been used. The current study used a picture-matching paradigm and found that comprehenders activate both a literal, semantic interpretation and a pragmatic, interpretation of a plural consistent with a scalar implicature account of the plural. Furthermore, after a delay of 1500 ms, only the pragmatic interpretation is active. Email: Nikole Patson, huffman.689@osu.edu

(5111)
Semantic Incongruity and Humour in Written Puns. JAMES BOYLAN and ALBERT KATZ, University of Western Ontario (Sponsored by Albert Katz). — Incongruity is frequently hypothesized to be necessary for the interpretation and enjoyment of humour, but it is a complex concept to operationalize for experimental study. Using Latent Semantic Analysis (LSA), we define incongruity as the semantic distance between alternate implied meanings in the polysemous words that are used to create humour in written puns. In study 1, we asked participants to rate one of four lists of 100 written pun items, demonstrating that higher levels of incongruity is associated with higher participant humour ratings. In Study 2, participants rated 200 puns that contained a small subset presented multiple times. The puns were rated as being less humorous with repetitions but were still rated as being somewhat humorous, even after 5 repetitions. We replicate the relationship between latent semantic incongruity and humour ratings, and demonstrate that the extent to which humour ratings change with repetition is moderated by LSA similarity. Email: James Boylan, jboylan2@uwo.ca

(5112)
Spacy: Accessible Distributional Semantics. PAWEL MANDERA, EMMANUEL KEULEERS, and MARC BRYSAERT, Ghent University (Sponsored by Emmanuel Keuleers). — Distributional semantics models trained on large text corpora can be used to generate measures of semantic relatedness between many word pairs. In order to facilitate usage and exchange of such models, we developed Spacy: an interface that can generate a large number of common relatedness metrics given a pre-computed semantic space. Spacy comes pre-packaged with a set of spaces for English and Dutch that have been validated on a large dataset of semantic priming (Hutchison et al., 2013), TOEFL, human associations, relatedness and similarity ratings. The released spaces are based on a traditional approach to distributional semantics as well as on a recent, prediction-based approach (Mikolov et al., 2013). Our validation shows that the prediction-based models provide a better fit to behavioral data, although both classes of models allow to predict item-level effects of semantic relatedness in behavioral tasks. Email: Pawel Mandera, pawel.mandera@ugent.be

(5113)
Emotions in a Mirror: Self-Focusing Affects the Imageability of Emotional Words. CLAUDIO MULATTI and XENIA SCHMALZ, University of Padova, REMO JOB, University of Trento. — Words referring to emotions are rated as abstract under concreteness rating instructions but are rated as highly imageable under imageability rating instructions. Here, we test the hypothesis that the meanings of emotional words, while lacking concrete referents, receive high imageability ratings because they accrue body-internal (intero- and proprioceptive) sensations generated while experiencing those emotions in the past. We used a mirror to manipulate the strength of attention that participants directed towards their body: participants rated the imageability of emotional and control words while they were either sitting in front of a mirror or a black screen. In line with the hypothesis, imageability ratings for emotional words were significantly higher when the participants were seated in front of a mirror than a black screen. Email: Claudio Mulatti, claudio.mulatti@unipd.it

(5114)
Direct and Indirect Modality Effects in Language Processing. SIMONE SCHAEFFNER, IRING KOCH, and ANDREA PHILIPP, RWTH Aachen University. — Language processing implies modality-specific processes in a direct and an indirect way. There is a direct processing of sensory (auditory or visual) and motor modalities (vocal or manual), which can be combined as compatible (auditory-vocal or visual-manual) or as incompatible (auditory-manual or visual-vocal) combinations. Furthermore, in terms of embodied cognition theories, it is assumed that modalities are involved in an indirect way via modality-references of the concept. In the present study, participants switched between directly used modality combinations when categorizing words with regard to their indirect modality-reference (e.g., ear- versus eye-related words). Switching between incompatible modality combinations led to higher switch costs than switching between compatible combinations and, additionally, these switch costs were reduced whenever a directly used modality corresponded with an indirectly activated modality. Thus, the results provide first evidence for the important role and interaction of direct and indirect modality-specific influences during language processing. Email: Andrea Philipp, andrea.philipp@psych.rwth-aachen.de

(5115)
What a Terrible Poster: Differences in Positive and Negative Ironic Utterances. KRISTA A. MILLER and GARY E. RANEY, University of Illinois at Chicago (Sponsored by Gary E. Raney). — We explored processing differences between positive (What wonderful weather!)
and negative (What terrible weather!) ironic statements. Kumon-Nakamura et al. (1995) found that, given positive outcomes (sunshine), negative statements (what terrible weather) can convey irony, but only when alluding to negative expectations (expected rain). We extended Kumon-Nakamura et al.'s procedure to include positive and negative expectations, and measured reading times as well as irony ratings. Participants read positive or negative statements embedded in passages with positive or negative outcomes that had positive or negative expectations. Results showed significantly longer reading times and higher irony ratings for contrasting outcomes and statements (e.g., negative outcome, positive statement; positive outcome, negative statement), regardless of prior expectation. Additionally, no differences in reading times or irony ratings were found for positive and negative ironic statements. We find evidence of irony in conditions that Kumon-Nakamura et al. said should not occur (positive expectation, positive outcome, negative statement).

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**DISCOURSE PROCESSES**

(5116) The Impact of Modality on Mind Wandering During Comprehension. KRISTOPHER KOPP and SIDNEY DMELLO, University of Notre Dame. — The executive resource hypothesis assumes a positive relationship between resource availability and mind wandering. Under the assumption that different modalities of information delivery differentially tax resources, we compared mind wandering across different modalities during the presentation of The Red Headed League (Experiment 1 and 2) and Walden (Experiment 3). An Audio only condition produced the most mind wandering. Two conditions that presumably consumed more executive resources than the Audio Only condition (i.e., Audio + Text and Self-paced reading) produced equivalent amounts of mind wandering during Experiments 1 and 2. In Experiment 3 the reading time of the Self-paced readers moderated the effect of mind wandering in that the fast readers mind wandered more than those in the Audio + Text condition. Results are discussed in the context of the demands of different modes of information delivery methods and mind wandering as well as the potential effects of material type.

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(5117) The Influence of Attentional Control on Hemispheric Processing of Predictive Inferences. MICHAEL SCHUTZENHOFER and SANDRA VIRTUE, DePaul University (Sponsored by Pablo Gomez). — This study investigates the effects of attentional control on the hemispheric processing of predictive inferences during reading. Participants read texts that were either strongly or weakly constrained towards a predictive inference and performed a lexical decision task to inference-related target words presented to the right or left visual field—hemisphere. Facilitation for strongly constrained predictive inferences was greater than facilitation for weakly constrained predictive inferences in both hemispheres. Readers with high attentional control showed significant facilitation for strongly constrained inferences in both hemispheres, but only showed significant facilitation for weakly constrained inferences in the left hemisphere. Readers with low attentional control did not show significant facilitation in any of the conditions. These results suggest that readers with high attentional control may have an advantage for generating predictive inferences during reading, a skill which could contribute to improved situation model construction and comprehension compared to readers with low attentional control.

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(5118) The Effect of Reading Ability on Coherence Building in Scientific Texts. BRENT STEFFENS, ROBERT YEAGLE, JR., MARYANNE BRITT, and KEITH MILLIS, Northern Illinois University. — In order to construct a complete mental representation of a text, readers must monitor the coherence of their mental representation. One method to detect whether readers are monitoring the coherence of their understanding is the inconsistency paradigm which compares reading times for target sentences that are consistent or inconsistent with previous text (Albrecht & O'Brien, 1993). Using the inconsistency paradigm, Wiley and Myers (2003) found that readers monitor for local coherence while reading syllogisms. The present study extended Wiley and Myers (2003) to texts that describe causal explanations. Longer reading times for target sentences were found in the inconsistent condition than in the consistent condition, but only for high ability readers. Consistent with Long and Chong's (2001) findings with narratives, low ability readers do not appear to monitor the coherence of causal explanations. These results may explain why students have trouble representing causal explanations (Millis et al., 1993).

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(5119) To Type or to Talk? That Is the Question. CONNIE SHEARS, MACKENZIE SMITH, SAMIRA AMIRAZIZI, ADRIANA ARIZA, MELISSA BOND, and AMY COHEN, Chapman University. — Why do people debate about politics? Are elections important events? One question is a yes/no response, the other invites deeper-level thinking. In moving away from key-press tasks to elicit deeper-level thinking, talk aloud methodologies (Shears et al., 2013; 2014) previously employed three-level questions (surface, counterfactual, and inference). Readers provided verbal responses, which demonstrated causal inferencing for the inference level questions, after reading stories relaying a fictional character's emotions. The presence of an experimenter during reading and responding may have impacted reader's responses. Here, readers provided typed responses to three-level questions following positive, negative, or neutral stories. If readers are forming causal inferences, then the inference-level questions should result in longer response onset, duration, and higher accuracy, relative to surface or counterfactual questions. Results show that typing responses elicits the expected hierarchy in response times and
(5120)
Common Ground and Speaker’s Identity in the Processing of Ironic Utterances. NICOLE CALMA and SUSAN E. BRENNA. Stony Brook University, SUNY. — To achieve ironic effects in conversation, speakers must accurately assess what addressees know, so that addressees can detect when pragmatic maxims are violated (Grice, 1975). Therefore, knowledge about speakers and the common ground they share is predicted to impact perceptions of irony. In 3 experiments, subjects read or heard conversations enacted by pairs of stereotyped characters who spoke target utterances that would be ironic if produced by one speaker and sincere if produced by the other. We manipulated speaker identity and the imagined relationship of the subject with the characters (as bystander to or addressee of their utterances, with characters depicted as facing one another or toward the subject, respectively). Subjects tracked speakers’ identities such that the same utterance was perceived as ironic when produced by one speaker and sincere when produced by the other. We will discuss the impact of common ground in light of theories of irony processing. Email: Susan E. Brennan, susan.brennan@stonybrook.edu

(5121)
‘Oswald Assassinates Lincoln’: The Effect of Transportation on Misinformation. ALYSSA N. BLAIR, JASON L. G. BRAASCH, and ROGER KREUZ, University of Memphis. — We investigated the role of individual differences in the acquisition of information from fictional texts. Using an established misinformation paradigm (Marsh, Meade, & Roediger, 2003; Rapp, Hinze, Slaten, & Horton, 2014), information was embedded in implausible or plausible stories and framed in accurate, misleading, or neutral statements. Participants were asked to read six stories and give ratings of perceived realism and transportation for each story before completing a general knowledge test. It was hypothesized that question difficulty, fact framing, and the plausibility of story context would all influence the amount of correct and incorrect information acquired from the stories, and that perceived realism and transportation would also significantly influence this acquisition. The results replicated effects for difficulty and fact framing but not for story plausibility. The data also support the effect of transportation on acquiring misinformation, highlighting the broader role of reader characteristics in knowledge acquisition. Email: Roger Kreuz, rkreuz@memphis.edu

(5122)
Sarcasm in Discourse: See it Now? SARA A. PETERS and ALEX ROBERTS, Newberry College. — Much work has been done on sarcasm identification in spoken language, less is known about the cues readers use to identify it in written text. The current study manipulated how information was presented to readers following positive or negative contexts, specifically whether character’s evaluations of others were emphasized with Italics (E1) or Bold (E2). In each experiment, 3-sentence experimental discourses were used: S1 introduced characters and an action, S2 created a Context, (Positive/Negative), and S3 contained a character’s judgment of the other’s actions, (Typeface/Not). Participants indicated whether they believed the S3 speaker was sincere, given the S2 and S3 conditions. E1 had a main effect of Context (p<.001) & Italics (p<.01), with no interaction; E2 a main effect of Context only (p<.001). These findings indicate that readers are sensitive to specific types of typeface manipulations, and that not all manipulations are as successful at conveying sarcasm to an audience. Email: Sara A. Peters, sara.ann.peters@gmail.com

(5123)
When Worlds Collide: Factors That Affect Narrative Recursion. GRETA C. CHAN and JOSEPH MAGLIANO, Northern Illinois University, JEFFREY E. FOY, Quinnipiac University (Sponsored by Joseph Magliano). — Narrative events are validated against notions of plausibility based on readers’ knowledge about narrative worlds. In three experiments, we explored how people read narratives that contained a separate narrative world embedded within the main story world. For example, in Neverending Story, the protagonist Bastian lives in a realistic world but reads about and travels to the magical world of Fantasia. We looked at whether genre (fantastic or realistic) and feature overlap between worlds affected whether readers expected an agent from the embedded world to cross into the main world, which we refer to as recursive transfer. Readers judged recursive transfer as more likely when they read fantastic stories relative to realistic stories. For realistic stories, higher feature overlap between the main world and the embedded world increased the likelihood that readers would expect recursive transfer. These findings are explained in terms of basic memory processes. Email: Greta C. Chan, greta.c.chan@hotmail.com

(5124)
The Closeness-Communication Bias Extends to Minimal Groups. MIJA VAN DER WEGE, CARL BOU MANSOUR, JESSI JACOBSEN, NICOLE MAGATS, and SCARLET PARK, Carleton College. — In general, speakers overestimate how well addressees understand them (Keysar & Henley, 2002). Moreover, speakers overestimate more with friends and spouses than with strangers (Savitsky, Keysar, Epley, Carter, & Swanson, 2010; Van Der Wege, et al., 2014). This closeness-communication bias could be due to friends overestimating common ground by overgeneralizing actual common ground. But it could also be due to speakers applying category-based heuristics to estimate common ground based on perceived similarity. In two studies, we test this hypothesis by looking at whether speakers and addressees show the closeness-communication bias with others that have been assigned to an arbitrary group with them. Speakers and addressees show the bias in both studies, but the effect size with minimal group partners only accounts for part of the effect size of the bias seen with friends. Thus, the closeness-communication bias seems to be due to heuristic processing involving shared knowledge and group membership. Email: Mija Van Der Wege, mvanderw@carleton.edu
(5125)

Common Ground in Conversation: Evidence From Item and Context Memory. GEOFFREY MCKINLEY, *SARAH BROWN-SCHMIDT*, and AARON BENJAMIN, University of Illinois (Sponsored by Aaron Benjamin). — Efficient conversation is guided by the joint knowledge, or common ground, that interlocutors build as a conversation progresses. Characterized from the perspective of commonly used measures of memory, efficient conversation should be closely associated with item memory—what was said—and context memory—who said what to whom. However, few studies have explicitly probed memory to evaluate what type of information is maintained following a communicative exchange. The current study examined how item and context memory vary as a function of one's role in a conversation (speaker or listener) and also how these forms of memory relate to the development of common ground over the course of a conversation. Memory for the content of the conversation is enhanced when one is speaking compared to when one is listening, but memory for who said what to whom (context memory) does not differ across conversational roles. Additionally, the development of common ground was positively related to item and context memory, independent of conversational role. These results demonstrate that memory assessments can complement language measures in revealing the means by which common ground develops in conversation. Email: Geoffrey McKinley, Geoffmck59@gmail.com

(5126)

On the Comprehension of Referring Expressions: The Role of Coordination in Conversation. DELPHINE DAHAN, MICHAEL COFFEL, and DEVIN BARNEY, University of Pennsylvania. — When communicating, people make constant reference to entities in the world. To establish reference, people use the linguistic description and the content of their common ground. In a conversation, people may also coordinate the process by which common ground is recruited and updated, seeking or giving explicit evidence, such as confirmations, of such grounding. We examined the degree to which people engage into this coordination when performing a matching game. Two participants sat on either side of an opaque barrier and took turns playing the roles of director and matcher, the former instructing the latter which one, out of 16 hard-to-describe shapes, to select on each trial. On each trial, we recorded the number and duration of utterances contributed by each participant, the nature of each contribution, and whether the matcher selected the correct shape. The frequency of coordinative contributions varied widely across dyads and predicted whether matching errors occurred. Email: Delphine Dahan, dahan@psych.upenn.edu

(5127)

Reading Scripted Conversation Disrupts Natural Turn-Taking. CHRISTOPHER ARUFLO, McMaster University. — In natural conversation, people take turns without pausing. Stage actors, however, regularly pause before saying their lines. Unnatural pausing on stage is usually blamed on theatrical training; that is, it is believed that actors learn to insert pauses as a way of expressing emotion. The present investigation shows that the act of reading a script causes people to pause unnaturally. Pairs of actors and non-actors engaged in natural and scripted conversations. In natural conversation, all listeners avoided pauses by predicting the ends of talkers' sentences and readying their responses before talkers had finished speaking. By contrast, when reading scripted dialogues, all listeners facilitated pauses by failing to make predictions and therefore not responding until a talker had finished speaking. Training and practice reduced pausing, but did not do so by helping listeners to make predictions. Rather, training and familiarity with a script enabled participants to quickly react at the moment a talker finished speaking. These results indicate that reading disrupts natural turn-taking because readers fail to make natural predictions. Email: Christopher Aruflo, aruflocc@mcmaster.ca

(5128)

Determining What Makes a Text Difficult to Comprehend Is Difficult. GARY E. RANEY, University of Illinois at Chicago, ANNIE ROY-CHARLAND, Laurentian University, JOANNA C. BOVEE and KRISTA A. MILLER, University of Illinois at Chicago. — Raney, Miller, Bovee, Roy-Charland, and Campbell (2015) developed 32 text passages and quizzes that were normed for comprehension difficulty and quiz difficulty. We examined whether Raney et al.'s difficulty ratings were related to individual differences in comprehension ability (based on a quartile split of comprehension scores) as well as a set of variables that represent word-, sentence-, and passage-level text properties (sentence length, word frequency, word concreteness, syntactic complexity, degree of narrativity, referential coherence, and deep coherence). Difficulty ratings decreased and quiz scores increased as comprehension ability increased. Degree of narrativity and sentence length were the only variables that were correlated with the passage difficulty ratings for individuals in each quartile of comprehension ability (average $r = -0.44$ and $0.33$, respectively). Our findings demonstrate that defining the properties readers use to self-assess the difficulty of a passage is itself quite difficult. Email: Gary E. Raney, geraney@uic.edu

(5129)

The Role of Verbal and Visuospatial Working Memory in Forming Situation Models. JOHN GEIGER, J. ADAM RANDELL, SARAH S. DOWNEN, and TODD MCDANIELS, Cameron University. — Perrig and Kintsch (1985) studied the different types of situation models formed during reading, and found that text type may affect which type of model is formed. Route texts led to a linear, proposition based situation model in females, whereas survey texts lead to a spatial situation model. Friedman and Miyake (2000) found that the spatial components of situation models use visuospatial WM, whereas the causal components rely on verbal WM. The present study presented 121 participants with a route or survey text while they performed either a verbal, visuospatial, or no secondary task. Route texts were recalled better, and either secondary task hurt recall and drawing maps from memory of the text. A Question Type x Text interaction demonstrated that route inference questions were harder...
to answer than other question types. It appears that both WM systems are used in forming situation models for text. Email: John Geiger, johng@cameron.edu

(5130)
Natural Language Quantifiers: How Readers Comprehend ‘Few’ and ‘a Few’. SRI SIDDHI NAVNIT UPADHYAY and CELIA KLIN, Binghamton University, SUNY (Sponsored by Celia Klin). — Natural Language Quantifiers (e.g., few, a few) inform readers’ comprehension. For example, readers interpret “a few of the juniors were accepted into the program,” and “few of the juniors were accepted into the program” differently. The students accepted (referent set) are in focus after reading “a few” whereas the students not accepted (the complement set) are in focus after reading “few.” The Presupposition Denial Account (Moxey, 2006) suggests that readers focus on the complement set when a shortfall occurs: when the expected number (many students will be accepted) is greater than the outcome (few). Expanding on this, we hypothesized that the word “few” might indicate a shortfall even without an explicit expectation in the text. The results of three experiments—using ratings, reading time, and a production task—demonstrated that readers comprehended “few” as meaning “less than expected,” and led to a focus on the complement set. Email: Sri Siddhi Navnit Upadhyay, supadhy1@binghamton.edu

(5131)
The Mental Representation of Negated Polar and Nonpolar Concepts in Discourse. WILLIAM LEVINE, University of Arkansas, KEVIN S. AUTRY, Grand Valley State University. — Negation (e.g., not cold) is more informative and comprehensible when the negated concept is polar (i.e., has an opposite). When a concept is nonpolar (i.e., with no opposite), negation (e.g., not bronze) is less informative and more difficult to comprehend. We examined whether providing an alternative concept in prior discourse (e.g., the statues might be copper or bronze) led to negated nonpolar concepts being more informative and easier to comprehend. Subjects read passages in which the context mentioned a polar or nonpolar concept, and subsequently, the concept was negated and subjects answered a verification question to measure comprehension of the negation. As expected, the presence of an alternative concept had little impact on comprehension of polar negation, but it unexpectedly made comprehension of nonpolar negation more difficult. The results will be discussed with respect to the informativeness of negation in different contexts. Email: William Levine, whlevine@uark.edu

(5132)
Adults With Autism are less Likely to ‘Bury the Survivors’: Eye Movements Reveal Context Sensitivities for Local and Global Anomalous Text Reading. SHEENA K. AU-YEUNG, University of Southampton, JOHANNA K. KAAKINEN, University of Turku, SIMON P. LIVERSEDGE and VALERIE BENSON, University of Southampton. — In a single eye movement experiment we investigated the effects of context on the time course of local and global processing during reading in high functioning adults with Autism Spectrum Disorder (ASD). In one condition short texts contained anomalous target words, such that the anomaly could only be detected through computation of global context (Passage level Anomalies). In another condition the anomaly could be detected via computation of a local thematic violation (Sentence level Anomalies). Early and late eye movement measures of reading time were analysed, revealing that the ASD group detected both levels of anomaly, but were faster at detecting sentence level anomalies compared to passage level anomalies. In contrast, typically developed (TD) controls showed the reverse pattern. Reduced global with increased local context sensitivity in ASD, as suggested by these findings is compatible with several theoretical cognitive features of Autism, such as Weak Central Coherence and Complex Information Processing Deficits. It is likely that the time course differences for attempting to resolve the anomalies in this study are underpinned by atypical cortical connectivity in ASD. Email: Valerie Benson, v.benson@soton.ac.uk

(5133)
Bigger, Faster, Stronger? Comparing Syntactic Priming in Dialogue and Monologue. WILLIAM HORTON, Northwestern University, BENJAMIN SWETS, Grand Valley State University. — It has been suggested (Pickering & Garrod, 2004) that much of the planning that one might have to do “from scratch” in monologue is facilitated in dialogue because reusing a partner’s lexical and syntactic choices reduces planning load. However, there is little direct evidence in the priming literature that the planning load of sentences is truly reduced in dialogue, nor is there much research directly comparing priming in dialogue versus monologue production. In the present study, we compared priming effects in a dialogue task based on Branigan et al. (2000) to similar priming effects in a monologue production task. In addition to measuring the tendency to reuse syntactic structures (involving the dative alternation), we also measured speech latencies. Despite similar patterns of syntactic persistence across tasks, preliminary analyses suggest that the planning advantages afforded by priming in dialogue compared to monologue are minimal at best. Email: William Horton, whorton@northwestern.edu

(5134)
Knowledge Revision and Source Credibility: Reducing the Impact of Misconceptions. MARTIN VAN BOEKEL, University of Minnesota, KARLA LASSONDE, Minnesota State University, EDWARD O’BRIEN, University of New Hampshire, PANAYIOTA KENDEOU, University of Minnesota (Sponsored by Panayiota Kendeou). — Revising misconceptions is a difficult process. Refutation texts—texts that have been specifically designed to revise misconceptions—have consistently demonstrated success in supporting knowledge revision. The Knowledge Revision Components framework (KReC) describes how and why knowledge revision arises when reading refutation texts. The present study explored source credibility as a text-level factor that may support knowledge revision. In a series of three experiments we investigated whether the credibility of sources within a text facilitates knowledge revision when reading refutation texts.
Participants read 20 refutation texts that were manipulated to vary the credibility levels of the source of the revised information. Reading times and a post-test were used to assess knowledge revision. The reading time and post-test findings taken together suggest that readers may not naturally attend to or use source credibility information when reading refutation texts, unless being instructed to do otherwise. Email: Martin Van Boekel, vanbo024@umn.edu

(5135)
Varying Irrelevant Phonetic Features During Training Reduces Non-Native Speech Learning Outcomes. MARK ANTONIOU, University of Western Sydney, PATRICK C. M. WONG, Chinese University of Hong Kong. — Second language (L2) learners commonly experience difficulty in distinguishing nonnative words that differ in a crucial phonetic feature. Typically, speech training studies explicitly direct the learner's attention to the crucial L2 feature to be learned. However, studies in the visual domain have shown that perceptual learning also occurs through implicit exposure to stimulus features, even when they are irrelevant to the task. Further, it has recently been suggested that this task-irrelevant perceptual learning framework also applies to L2 learning. We asked subjects to complete seven days of speech training to learn to distinguish one of two nonnative phonetic features, namely voice onset time or lexical tone, using speech training to learn to distinguish one of two nonnative L2 words. We found that subjects who received training with stimuli that varied in features, namely voice onset time or lexical tone, using speech training to learn to distinguish one of two nonnative L2 learning. We asked subjects to complete seven days of speech training to learn to distinguish one of two nonnative features, namely voice onset time or lexical tone, using explicit training methods consistent with the majority of speech training studies. Importantly, half were exposed to stimuli that varied only in the relevant feature, but in the irrelevant feature as well. The results demonstrate that subjects who received training with stimuli that varied in the relevant feature and held the irrelevant feature constant achieved the best learning outcomes. Varying both features hindered learning and generalization to new stimuli. The findings have implications for theories of L2 learning. Email: Mark Antoniou, m.antoniou@uws.edu.au

(5136)
The Effects of Cognitive Load on Vocal Alignment. EVA LEWANDOWSKI and LYNNE NYGAARD, Emory University (Sponsored by Lynne Nygaard). — Although previous research demonstrates that language users align their speech characteristics with other speakers along a number of linguistic dimensions, the mechanisms underlying vocal alignment remain unclear. In order to evaluate the role of cognitive control in vocal alignment behavior, the present study assessed vocal alignment with and without a cognitive load. Native English speakers first completed a baseline task in which words were read aloud. Participants were then familiarized with four speakers, two native American English and two Spanish-accented talkers. Finally, participants shadowed (i.e. repeated) words spoken by each talker with and without a concurrent visual working memory task (n-back). Vocal alignment was indexed by comparing shadowed utterances to baseline utterances using both acoustic measures and listener judgments. Results indicate differential vocal alignment under cognitive load, suggesting that cognitive control mechanisms may modulate automatic entrainment processes. Implications for theories of vocal alignment and cognitive control will be discussed. Email: Eva Lewandowski, elewand@emory.edu

(5137)
False Hearing: Age-Related Changes in Spoken Word Recognition. CHAD ROGERS and JONATHAN PEELLE, Washington University in St. Louis. — Recent work (Rogers, Jacoby, & Sommers, 2012; Rogers & Wingfield, 2015) demonstrated that older adults are more likely than young adults to falsely recognize words within the word they heard. In the current study, we tested whether older adults would be more likely to falsely recognize words than young adults, even after controlling for age-related hearing loss. Two experiments were conducted in which young and older adults completed two different recognition tasks: single item (SI) and 2-alternative forced choice (2AFC). Participants were presented with a context word followed by a masked target. Contexts could be neutral (e.g., clown–moat), supportive (e.g., row–boat), or misleading (e.g., row–goat). Results, including measures of discriminability, response bias, confidence, and ROC curves, will be discussed in terms of the relative advantages of using recognition vs. recall to measure false hearing, as well as differences between using a simultaneous (2AFC) vs. sequential (SI) recognition format. Email: Chad Rogers, rogers@brandeis.edu

(5138)
Transfer Effects Between Language and Music. YI ZHENG, Stony Brook University, ARTHUR SAMUEL, Stony Brook University and the Basque Center on Cognition, Brain, and Language. — Language and music are intertwined: music training can facilitate language abilities, and language experiences can also help with some music tasks. The fact that tone language speakers have an advantage on pitch tasks has been taken as support for three alternative hypotheses: specific transfer effects, general transfer effects, and an ethnicity effect. We tested native Mandarin, Korean, and English speakers on a pitch discrimination task with three types of sounds: speech, F0 (fundamental frequency) patterns, and musical patterns derived from the speech. To control for factors that might influence participants' performance, we included additional tasks testing memory, intelligence, and music skills. The results showed that musicians outperformed non-musicians on all three sound types, and Asian listeners (Korean and Mandarin) outperformed non-Asian listeners (American English speakers) on music sounds. The results support a specific transfer effect from music to language, and provide preliminary evidence for an ethnicity effect as well. Email: Arthur Samuel, a.samuel@bcbl.eu
Identifying the Cognitive Mechanism of the Speech-to-Song Illusion Using Node Structure Theory. NICOL CASTRO, ELIZABETH C. TAMPKE, and MICHAEL VITEVITCH, University of Kansas (Sponsored by Susan Kemper). — In the Speech-to-Song Illusion, the repetition of a spoken phrase results in the perceptual transformation of speech into song. A handful of studies have examined what characteristics of the stimulus elicit the illusion, but there has not been an attempt to identify the cognitive mechanism of this illusion until now. We suggest that satiation of lexical nodes as described by Node Structure Theory with the continued activation of syllable nodes results in a beat-like perception of the stimulus. Three experiments provide evidence of the role of satiation of the lexical node in eliciting the Speech-to-Song Illusion. Specifically, we tested word-lists of real words, word-lists of nonwords, and word-lists of Spanish words (all with monolingual English speakers). The results provide evidence that repetition is critical to the satiation mechanism and that without a lexical node (like in the case of Spanish words) the song-like transformation seems to "pop out" even more. Email: Nichol Castro, ncastro@ku.edu

Music Aptitude Is Related to Auditory Talent at Identifying Declarative and Interrogative Sentences. JEFFREY GREENSPON, Hobart and William Smith Colleges. — Interest in the role of music ability on nonmusical domains, such as language, has been increasing. Often music ability is determined by quantifying an amount of musical training. This creates potential problems of not identifying individuals with high levels of musical ability because they have little musical training and mistakenly identifying individuals receiving considerable training as having a high level of musical ability when they might have low ability. In an attempt to address these problems Law and Zentner (2012) developed a test battery across multiple perceptual musical skills (Profile of Music Perception Skills; PROMS) as a way to measure musical ability independent of musicianship. The present study investigated the influence of musical aptitude obtained from the mini PROMS on participants’ confidence in identifying heard declarative and interrogative sentences. Analysis revealed two main effects. Participants are significantly better at identifying declarative statements compared to interrogative (F1,32=95.8, p<.01, np2=.75) and participants with high musical aptitude are better at this task compared to those with low musical aptitude (F1,32=10.7, p<.01, np2=.25). There was no interaction. Email: Jeffrey Greenspon, Greenspon@hws.edu

Is Spoken Word Recognition Automatic? The Effect of Cognitive Load on Lexical Activation and Competition. XUJIN ZHANG, Stony Brook University and Carnegie Mellon University, ARTHUR SAMUEL, SUNY at Stony Brook. — Current models of spoken word recognition suggest that multiple lexical candidates are activated simultaneously upon hearing an utterance, with these candidates competing with each other for recognition. The current project investigated the effect of cognitive load on multiple lexical activation and competition. In a set of priming studies, the lexicality of the primes and the demands of two primary tasks were manipulated. We tested performance on the primary tasks under conditions with no additional load, or with cognitive load that involved either phonological or non-phonological processing. The results under the cognitive load conditions suggest that the initial access of lexical items is relatively automatic. Doing a meta-linguistic rhyme task, based on sub-lexical information, requires cognitive capacity, with resources that are not necessarily phonological. In contrast, lexical competition requires cognitive resources that are specific to phonological processing. These results provide new constraints on models of spoken word recognition. Email: Xujin Zhang, xujin.zhang@stonybrook.edu

The Influence of Statistical Learning on the Processing of Phonotactic Probability. ELENI PINNOW, NICKOLAS CAMPA, ERIKA LEMAY, and HUNTER MCGRAW, University of Wisconsin-Superior. — The current study examined the role of statistical learning and lexical status on the processing of phonotactic probability. Phonotactic probability is the likelihood that a given phoneme will occur at a given position with a word. The current study examined if a brief pre-exposure to stimuli altered the rate at which ambiguous phonemes were categorized in a Ganong task. In the pre-exposure phase, the stimuli varied by two dimensions: high and low phonotactic probability and lexical status (word and nonword). For the testing phase, four sets of stimulus pairs were formed; stimuli varied by word-initial phonotactic probability and lexical status. One set contained pairs of words (cap/gap) another contained pairs of nonwords (caz/gaz). The final two sets contained pairs that had one endpoint a word and the other a nonword (gun/kun; gare/care). Participants were asked to identify the initial phoneme, half of which had been overlaid with white noise. The results of the study will be discussed in terms of the effect of statistical learning on phoneme recognition and phonotactic probability. In particular, the results will discuss the robustness of statistical learning for phonotactic probability in both words and nonwords. Email: Eleni Pinnow, epinnow@uwsuper.edu

Sentence Context Can Guide the Retuning of Phonetic Categories to Speakers. ALEXANDRA JESSE and SARAH LAAKSO, University of Massachusetts, Amherst. — Listeners adjust their stored mental representations of speech sounds to the production idiosyncrasies of speakers. Information about what sound sequences form words can guide this phonetic retuning process. But this lexical information can become available too late to guide the retuning to word-initial idiosyncrasies. Here, we tested whether a semantically Constraining preceding sentence context can provide sufficient information to guide phonetic retuning. During exposure, listeners heard the same ambiguous sound between /m/ and /b/ spliced into the same two positions (cap/gap) and listeners heard the same ambiguous sound between /m/ and /b/ spliced into the same two positions (cap/gap). Preceding sentence context disambiguated the minimal words for one group of
listeners as /m/-initial and for another group as /b/-initial. At a subsequent test, listeners categorized more steps on a multi-buh continuum according to their exposure condition, indicating that sentence context can guide phonetic retuning.

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(5144)
Effects of Foreign-Accented Speech Maskers on Speech-in-Speech Recognition. BRITTANY T. WILLIAMS, State University of New York-New Paltz, NAVIN VISWANATHAN, University of Kansas & Haskins Laboratories. — English maskers produce more detrimental effects than foreign-accented maskers in speech-in-speech recognition (e.g., Calandruccio et al., 2010). However, it is unknown whether similar effects would be obtained with Dutch-English maskers. Furthermore, the relative roles of energetic and informational masking in this effect are unclear. We investigated the effects of English, Dutch-English, and Dutch maskers on the intelligibility of English targets. To dissociate energetic and informational masking, sex of the target and masker talkers were matched or mismatched. Results showed that listeners were less affected by masking in the mismatch compared to the match condition. Furthermore, listeners also performed worse in the English compared to Dutch-English or Dutch (which were not themselves different). Interestingly, this effect was obtained in the match condition but reversed in the mismatch condition indicating an interaction between energetic and informational masking effects. Our results indicate the need to better specify the construct of informational masking.

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(5146)
The Pseudoneglect in Sentence Bisection: A Comparison Between Italian and Chinese. LISA SASKIA ARDUINO, LUMSA University and ISTC-CNR Rome, LAURA VERONELLI, Casa Cura Policlinico, Milan, LIN CAI and SHUWEI XUE, Peking University, MASSIMO CORBO, Casa Cura Policlinico, Milan, YAXU ZHANG, Peking University. — It has been shown that the linguistic nature of the stimulus modulates the directional bias in sentence bisection. The present study investigated the effect of altered syntactic and semantic structure on sentence bisection by comparing Italian with Chinese. Native Chinese or Italian speakers were asked to read and bisect Chinese and Italian sentences, respectively. The test sentences varied in linguistic domain (Syntactic or Semantic coherence, Definiteness, and Heaviness) and the position of the manipulation of linguistic domain (Left, Right, and Control). The results showed that: i) sentences were bisected more leftwards for Chinese than for Italian; ii) syntactic incoherence resulted in smaller leftward bias in both languages; and iii) the bias was modulated by the sentence position (left or right) where Semantic coherence, Definiteness, and Heaviness were manipulated, though only for Chinese. In conclusion, visuo-perceptual, linguistic and attentional factors influence sentence-bisection errors, in a different way in Italian and Chinese.

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(5145)
Lexical and Visual Influences on Selective Adaptation of Speech. LAWRENCE D. ROSENBLUM and JOSH DORSI, University of California, Riverside, ARTHUR G. SAMUEL, Ikerbasque, Basque Foundation for Science; Basque Center on Cognition, Brain and Language; and Stony Brook University. — Samuel and Lieblich (2014) proposed a model in which lexical context, as compared to visual context, has a privileged influence on speech perception. This proposal is supported by divergent results in selective adaptation, a phenomenon in which a change in a phonemic category boundary occurs in response to having heard repeated presentations of a sound. Results show that lexically-induced perceived segments (through phonemic restoration) produce selective adaptation, while visually-induced segments (through the McGurk effect) fail to produce adaptation. One limitation of these past studies is that the lexically and visually induced segments have relied on very different stimuli. Lexically-induced segments contain signal-correlated noise while visually-induced segments typically involve clear, but audio-visually discrepant segments.

The present studies used the same critical segments in both visual and lexical contexts to test influences on selective adaptation. This provides an ideal test to see if visual context may, under certain conditions, support selective adaptation.

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(5147)
Verbal Labels Facilitate Categorization of Dissimilar Objects. SARAH FAIRCHILD and ANNA PAPAFRAGOU, University of Delaware. — When two objects share a label, they are more likely to be placed in the same category (e.g., Waxman & Markow, 1995). The question is to what extent this is a unique ability of verbal labels. To answer this, 40 adults were presented with triads of novel objects, and were asked to group the Target object with one of two Standards. Results show that non-word labels like ZEG, but not unpronounceable letter strings like GXZ or patterned frames, facilitate categorization of perceptually ambiguous and dissimilar objects. The effect persists to a delayed memory test, providing further evidence that labels are unique and not merely part of a matching strategy. We also find verbal working memory ability predicts an individual's use of labels. Findings extend previous research by showing that labels are unique for category formation in adults, and that there is individual variation in the extent to which language can be used as a tool.

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(5148)
Effects of Conventionality and Relationality on Metaphor Processing. FRANCISCO MARAVILLA and DEDRE GENTNER, Northwestern University (Sponsored by Dedre Gentner). — We examined the effects of conventionality, relationality and aptness on metaphor processing. Participants were given figurative statements in context and were asked to choose which form they preferred: simile (The X is like a Y)
or metaphor (The X is a Y). Bowdle & Gentner’s (2005) career of metaphor hypothesis predicts that people should prefer the metaphor form for figuratives with conventional bases, and the simile form for those with novel bases. In contrast Aisenmann (1999) proposes that people prefer figuratives with relational interpretations as metaphors, and those with attributional interpretations as similes. In Experiment 1 both conventionality and relationality significantly predicted metaphor preference. In Experiment 2, we elicited interpretations and aptness ratings for the metaphors used in Experiment 1, and tested whether aptness ratings varied with the rated relationality of participants’ interpretations. The results support both the career of metaphor hypothesis and Aisenmann's relational preference hypothesis. Email: Francisco Maravilla, franciscomaravilla2019@u.northwestern.edu

(5149) Conceptual Effects of Audience Design in HCI and Human Dialogues. CHRIS SCHMADER and WILLIAM HORTON, Northwestern University (Sponsored by William Horton). — In dialogue, speakers often choose descriptions of referents based on their interlocutor’s identity. How does such audience design influence how speakers conceptualize referents subsequently? We investigated whether speakers use different conceptual perspectives to describe referents in human-computer interaction (HCI) than in human dialogue, and whether these differences persist post-dialogue. Specifically, we examined whether speakers in HCI dialogues are relatively more likely to adopt geometric (“triangle”) than analogical (“tree”) perspectives on referents. In a Wizard-of-Oz paradigm, participants used text-chat to describe ambiguous images for a confederate they believed was a person (human condition) or a computer (HCI condition), then after the dialogue task they sorted the images into categories. HCI participants were more likely to not only describe but also sort images according to geometric features. Speakers make particular assumptions about the semantic content dialogue partners can process, and these assumptions have downstream effects on how speakers conceptualize referents for themselves. Email: Chris Schmader, chris.schmader@gmail.com

(5150) Chinese Learning in Adult Novices: Implicit Versus Explicit Learning of Semantic Radicals. RAN SHI, Australian College of Applied Psychology. — A distinctive feature of Chinese orthography is the semantic radical: a sublexical orthographic component that sometimes indicates the semantic category of the character. Semantically transparent Chinese characters are characters whose meaning is predicted by the semantic radical, whereas semantically opaque Chinese characters are not meaningfully related to their semantic radicals. The current study investigates whether novice Chinese learners can pick up on the functional role of semantic radicals during character learning and whether they will further benefit from explicit instruction regarding the semantic radical. Undergraduate students with no previous knowledge of Chinese were asked to learn the meanings of 30 Chinese characters, half of which were transparent and half were opaque. Participants were randomly assigned to the Implicit or explicit learning conditions. In a recall test taken immediately after learning, performance was significantly higher for transparent compared to opaque characters. This transparency effect was maintained in a recognition test administered one week later, where the Implicit group performed significantly better than the Explicit group. Implications for learning Chinese are discussed. Email: Ran Shi, ran.shi@acap.edu.au

(5151) The Influence of Causal Information on Pronoun Disambiguation. EYAL SAGI, University of St. Francis. — The disambiguation of pronouns is a complicated process that has been shown to be influenced by many syntactic and grammatical factors. Here I present evidence that non-linguistic knowledge, specifically causal information, informs these processes. For example, in the sentence pair “John accused Mark of stealing a car. He called the police,” the antecedent of “he” is more likely to be John than Mark because of the perceived causal link between the accusation and calling the police. A series of experiments explored the implication of this link between causality and pronoun disambiguation. The results demonstrated that the underlying process is similar to that used to track the identities of individuals and objects over time. This suggests that the process of pronoun disambiguation makes use general cognitive processes in addition to psycholinguistic ones. Email: Eyal Sagi, eyal@u.northwestern.edu

(5152) Contributions of Memory to Partner-Specific Common Ground: Evidence From Amnesia. SI ON YOON, University of Illinois, Urbana-Champaign, MELISSA C. DUFF, University of Iowa, *SARAH BROWN-SCHMIDT, University of Illinois, Urbana-Champaign. — Previous research demonstrates that in a referential communication task, individuals with amnesia successfully design and remember novel labels for abstract tangram images. In healthy individuals, these novel labels are represented as part of the common ground with one’s discourse partner. However, it is unknown if the preserved learning of referential labels in amnesia reflects partner-specific common ground. We tested participants in a referential communication task in which the participant and an experimenter first established labels for tangram images. Participants then repeated the task with the same experimenter or a new experimenter. Performance of individuals with bilateral hippocampal damage and amnesia (n=3) was compared to that of healthy comparison participants (n=2). Both groups established brief referential labels, replicating previous findings. Critically, both groups used significantly longer descriptions with the new experimenter. This result suggests the use of partner-specific common ground is not dependent on declarative memory. Email: Sarah Brown-Schmidt, brownsch@illinois.edu
Second Language Knowledge Development Across Training Conditions. KATHERINE A. BRILL-SCHUETZ and KARA MORGAN-SHORT, University of Illinois at Chicago (Sponsored by Kara Morgan-Short). — Previous literature has explored whether different types of second language (L2) training are more or less effective in fostering adult L2 development (Norris & Ortega, 2000; Morgan-Short et al., 2012). However, little is known about what type of knowledge develops through different training conditions. This study investigated how the type of L2 knowledge may change as a function of training condition. Participants were assigned to either uninstructed, rule-search, or instructed L2 training conditions. After training, participants completed a judgment task to assess development of L2 syntax. Participants also reported whether each response was based on guess, intuition, memory, or rule, indicative of subjective measures (Rebuschat & Williams, 2012). Results showed overall development in the rule-search and instructed groups. However, when examining knowledge type, learners in the uninstructed and instructed group developed only rule knowledge whereas rule-search participants developed both intuitive, memory, and rule knowledge. These results suggest that providing participants instruction to search for rules in otherwise uninstructed training conditions was best for developing more diverse L2 knowledge. Email: Katherine A. Brill-Schuetz, kbrill@uiuc.edu

Fast Learning of Long-Distance Phonotactic Constraints. FRANCIS X. SMITH and PRAHLAD GUPTA, University of Iowa. — Individuals’ speech errors have been shown to quickly reflect novel phonotactic constraints, indicating that sensitivity to such constraints can develop rapidly even for production. However, it is unknown whether this holds for learning of constraints between non-adjacent phonemes in the linguistic stream. In two experiments, we examined acquisition of sensitivity to a constraint between the onsets of two syllables in polysyllabic nonwords (eg if the first onset was /k/ the second was /b/). At exposure, participants read aloud sequences of four syllables in which the k --> b contingency was between the onsets of the first and third (E1) or second and third (E2) syllables. At test, participants read aloud novel sequences which either followed or violated the constraints. In both experiments, accuracy was lower for novel sequences that violated the constraints. These results indicate that participants’ productions can rapidly develop sensitivity to constraints between nonadjacent phonemes within the linguistic stream. Email: Prahlad Gupta, prahlad-gupta@uiowa.edu

Associative Networks Learn Grammatical Categories From Sequential Order, Alone. GEOFFREY BROOKSHIRE and DANIEL CASASANTO, University of Chicago (Sponsored by Daniel Casasant). — How do people learn syntactic categories? Learning categories like “noun” and “verb” could depend on innate, domain-specific mechanisms. Here we tested an alternative: Could a domain-general learning mechanism form categories based solely on the sequential order of symbols? We trained a feedforward neural network model, with one hidden layer, to predict the next symbol in a continual sequence. Symbols were grouped into three categories (A, B, C), with the sequence following the pattern ABCABC, etc. Category membership was therefore only present implicitly in the model’s training input. Each symbol in a category transitioned to most – but not all – of the symbols in the next category. Crucially, the model successfully learned categories and generalized to novel sequences. The model predicted correct-category transitions over incorrect-category transitions, even when neither transition was present in the training corpus. This result suggests that a domain-general associative learning mechanism may be sufficient to acquire syntactic categories. Email: Geoffrey Brookshire, brookshire@uchicago.edu

Covertly Shifting Attention to Indexed Locations Increases Memory Retrieval of Verbal Information. AGNES SCHOLZ, ANJALI PRITTSMANN, and JOSEF KREMS, Chemnitz University of Technology (Sponsored by Josef Krems). — People look at emptied spatial locations where information was presented during encoding. There is evidence that this so-called looking at nothing behavior plays a functional role in memory retrieval of verbal materials. However, it is unclear whether this effect is caused by the oculomotor movement of the eyes per se or if covertly shifting attention is sufficient to guide the eyes back to associated spatial locations. In two experiments using eye tracking, we manipulated whether participants were able to shift either their eyes or their focus of attention to a spatially indexed location while retrieving verbal materials associated to screen locations during encoding.
Results indicate that people show higher response accuracy when they were allowed to shift their attention towards in comparison to shifting their attention away from the associated location, indicating that covert attention shifts underlie the functional effect of the looking at nothing behaviour. Email: Agnes Scholz, agnes.scholz@psychologie.tu-chemnitz.de

(5158) Does Reactive Control Reflect a Context-Dependent Exertion of Effort? NATHANIEL T. DIEDE, MADELINE KLEINER, and JULIE BUGG, Washington University in St. Louis. — In the flanker task, the compatibility effect is reduced for stimuli presented in mostly incongruent compared to mostly congruent locations. This context-specific proportion congruence effect has been attributed to reactive control, a rapidly acting mechanism that resolves conflict post stimulus onset. Leading accounts cast reactive control as a relatively automatic and effortless mechanism, in part reflecting participants' post-experimental lack of awareness of the proportion congruence manipulation. We tested this assumption by manipulating context-specific proportion congruence while measuring pupil response via an eye tracker to gauge cognitive effort during task performance. Behaviorally, the compatibility effect was smaller in the mostly incongruent location relative to the mostly congruent location. Preliminary results indicate change in mean pupil size was larger on incongruent than congruent trials. More importantly, growth curve analysis on the time course of pupil response was consistent with the view that reactive control entails increases in effort in a context-specific fashion. Email: Nathaniel T. Diede, ndiede@wustl.edu

(5159) Interfering With Fluid Intelligence: When Competing Answer Alternatives Influence Raven's Performance. ERIKA HUSSEY, University of Illinois at Urbana-Champaign, ELLEN SHEEHAN and SUSANNE JAEGGI, University of California, Irvine. — Performance on the Raven’s task has been shown to relate to working memory, a constellation of cognitive functions that help guide behavior, and it is engaged when conflict or ambiguity is detected. Recent evidence suggests that these control mechanisms are domain-general, meaning that they operate similarly across conflicts that arise in different domains. Data from our lab (Kan et al., 2013) demonstrated enhanced conflict resolution in one domain after conflict was initially experienced in another domain (i.e., from perceptual to verbal; from syntactic to non-syntactic). This enhancement in conflict resolution is called “conflict adaptation.” In this study, we extended previous findings and observed conflict adaptation in a Stroop task that followed visual perceptual ambiguity (gender discrimination of faces) but not in a Stroop task that followed auditory perceptual ambiguity (phoneme discrimination). Finally, we consider how individual differences in discrimination may affect these findings. We will discuss how these data could inform our understanding of domain-generality in cognitive control. Email: Erika Hussey, ehussey@illinois.edu

(5160) Is There a Role for Cognitive Control for Conflict Resolution During a False Belief Task? RACHEL WYNN, MYEONG-HO SOHN, and MATTHEW HITCHINS, George Washington University. — In false belief tasks, the participant’s knowledge and the protagonist’s knowledge about the location of the item in question conflicts on false belief (FB) trials. These two pieces of information do not conflict during true belief (TB) trials. It has been shown that FB trials are slower and less accurate than TB trials, and we have previously suggested that this difference is driven by cognitive control mechanisms. Previous work in our lab has shown that this difference is modulated by the proportion of false belief trials, similar to the finding in the cognitive control literature. The current project focused on sequential modulations, testing whether the belief valence of the previous trial influenced the difference between FB and TB on the current trial. To do this, we designed a paradigm in which trials were paired so we could examine the different trial sequences and the interaction between the first trial type (FB or TB) and the difference between FB and TB during the second trial. Evidence for sequential modulations was found, such that the difference between FB and TB trials was smaller when the first trial in the pair was false belief as compared to when the first trial in the pair was true belief. Email: Rachel Wynn, rwynn@gwmail.gwu.edu

(5161) Conflict Adaptation Across Tasks: In Search of Boundary Conditions for Cognitive Control Domain-Generality. BRIAN E. EMMERT, JOSEPH C. TOSCANO, KATHRYN CUSHING, and IRENE P. KAN, Villanova University. — “Cognitive control” refers to a constellation of cognitive functions that help guide behavior, and it is engaged when conflict or ambiguity is detected. Recent evidence suggests that these control mechanisms are domain-general, meaning that they operate similarly across conflicts that arise in different domains. Data from our lab (Kan et al., 2013) demonstrated enhanced conflict resolution in one domain after conflict was initially experienced in another domain (i.e., from perceptual to verbal; from syntactic to non-syntactic). This enhancement in conflict resolution is called “conflict adaptation.” In this study, we extended previous findings and observed conflict adaptation in a Stroop task that followed visual perceptual ambiguity (gender discrimination of faces) but not in a Stroop task that followed auditory perceptual ambiguity (phoneme discrimination). Finally, we consider how individual differences in discrimination may affect these findings. We will discuss how these data could inform our understanding of domain-generality in cognitive control. Email: Brian E. Emmert, bemmert@villanova.edu

(5162) Test-Retest Reliability of PEBL Executive Control Tasks in Younger and Older Adults. ABIGAIL FONTAINE and JENNIFER COANE, Colby College, BRIAN PIPER, Husson University; SHANE MUELLER, Michigan Technological University. — The Psychology Experiment Building Language (PEBL) software is an open-
source free collection of computerized tasks and includes over 50 classic neurocognitive and neuropsychological tests used in clinical and research settings. A key issue for any test is that the results be consistent over time, measurement, and administration platforms. Younger and older adults completed a subset of the executive function (e.g., Tower of London), attention (e.g., Continuous Performance Task), and working memory (e.g., Digit Span, Corsi Block Tapping) tests on standard desktop or touchscreen computers. All participants completed two sessions between 2 and 6 weeks apart. Tasks varied in reliability, with some, like the Iowa Gambling Task, showing poor reliability across sessions and age, whereas others, such as Digit Span, yielded robust correlations. Response mode—touchscreen or mouse—did not seem to consistently affect performance, suggesting the tasks are robust to modality. Email: Abigail Fontaine, abigailm.fontaine@gmail.com

(5163)
Coupling and Decoupling Attentional Set and Task-Set. CAI S. LONGMAN, AURELIU LAVRIC, and STEPHEN MONSELL, University of Exeter (Sponsored by Stephen Monsell). — One potential contributor to the task “switch cost” is the reorienting of attention to the task-relevant stimulus attribute. In eye-tracking experiments using tasks consistently associated with different locations we (Longman et al., 2014) found that switching tasks delayed orientation to the relevant location, and resulted in a tendency to fixate the previously relevant location, even with ample opportunity for preparation (“attentional inertia”). New experiments revealed that explicit location cues (arrows or directional words) largely eliminated the attentional handicaps, but substantially increased the switch cost, suggesting decoupling of attentional set from other task-set components. We did not observe such decoupling when the cues were arbitrary (e.g., “A”, “X”) and the instructions emphasized locations over tasks, suggesting that the natural tendency is for attentional set and task-set to be strongly coupled, and that only radical manipulations such as cues that emphasize spatial over other aspects of the task can result in their de-coupling. Email: Cai S. Longman, c.s.longman@exeter.ac.uk

(5164)
Instruction Moderates the Location Priming Effect of Egocentric and Allocentric Specific Processing. EDWARD MERRILL and ZACHARY HIMMELBERGER, University of Alabama. — The current project sought to better understand the role of different instruction types on egocentric and allocentric processing. Participants completed a visual search task under four priming (egocentric, allocentric, combined, and control) conditions and two types of instructions (absolute and relative). The visual search task required participants to identify the location of a red target among two blue distractors with all stimuli positioned in three of four horizontal boxes. In the absolute instruction condition, participants were asked to respond to the box that contained the target. In the relative instruction condition, participants were asked to respond to the position of the target in relation to the two blue circles (i.e., left, between, right). While all three priming conditions demonstrated a facilitative effect compared to the control, the effect was moderated by instruction, indicating that frame of reference specific processing may be at least partially controlled by top down attentional resources. Email: Edward Merrill, emerrill@bama.ua.edu

(5165)
Proactive Inhibitory Control: A General Biasing Account. HEIKE ELCHLEPP, AURELIU LAVRIC, and *FREDERICK VERBRUGGEN, University of Exeter, CHRISTOPHER D. CHAMBERS, Cardiff University (Sponsored by Aureliu Lavric). — Flexible behaviour requires the ability to inhibit actions in response to environmental changes. Inhibitory control relies on perceptual, decisional, and inhibitory motor mechanisms. We tested whether and how these mechanisms are influenced by proactive inhibitory control. Subjects responded to the color of a stimulus. On some trials, an extra signal occurred. The response to this signal depended on the task context: in the ignore context subjects ignored it; in the stop context they had to withhold their response; and in the double-response context they executed a secondary response. Event-related potentials for no-signal, stop context trials revealed that proactive inhibitory control works by biasing the settings of lower-level systems involved in stimulus detection, action selection, and action execution. Subjects made similar adjustments in the double-response context indicating an overlap between various forms of proactive action control. Results also suggest an overlap between preparatory control in task-switching and proactive action control. Hence, biasing subordinate processes is an integral part of proactive inhibition and other forms of action control. Email: Heike Elchlepp, H.Elchlepp@exeter.ac.uk

(5166)
Changing State Irrelevant Sound Impairs Problem Solving: Evidence for the Role of Subvocal Rehearsal in the Solution of Compound Remote Associate Problems? JOHN MARSH, LINDEN J. BALL, and EMMA THREADGOLD, University of Central Lancashire. — Continuously changing, as compared to non-changing, to-be-ignored sounds produce marked disruption to the performance of visually-based serial short-term memory tasks (e.g., serial recall): The changing-state effect. This study investigated whether visually-based problem solving is also susceptible to the changing-state effect. Participants attempted to solve compound remote associate (CRA) problems in the presence of quiet, steadystate or changing-state irrelevant pitch. The results were replicated in a second experiment wherein the minimum requirement for changing-state was used: Alternating tones of different pitch. The results extend the changing-state effect beyond serial recall and suggest that either CRA problem solving requires processing of serial order (e.g., subvocal rehearsal), or the changing-state effect is not restricted to serial short-term memory tasks (e.g., an attentional effect). Given the findings that CRA problem solving is impaired by articulatory suppression (Ball & Stevens, 2009) and that changing-state sound impairs speech planning (Jones, Macken, & Nicholls, 2004), we advocate the former interpretation. Email: John Marsh, jemarsh@uclan.ac.uk
The Laterality of Distraction: Evaluating the ‘Coarse-Fine’ Model of Semantic Processing. LEA PILGRIM and JOHN MARSH, University of Central Lancashire. — Hemisphere asymmetries in semantic processing are well-documented. One model that attempts to account for such asymmetries is Beeman and colleagues “coarse-fine” processing model (Beeman et al, 1994). This model proposes that the left hemisphere (LH) activates a narrow semantic network of closely related associates; in contrast, the right hemisphere (RH) activates a broader more diffuse semantic network, including more weakly-related associates. We use this model as a framework for understanding findings from our recent studies of distraction. The studies used a classic picture-word interference (PWI) paradigm, in which visual concepts were presented with (to-be-ignored) auditory associates. The auditory associates varied in their strength of association to the visually-presented concepts and were presented to either the LH or RH. The results, both the facilitation and impedance of responses to the visual concepts, are discussed in light of predictions arising from our recent studies of distraction. The studies used a classic picture-word interference (PWI) paradigm, in which visual concepts were presented with (to-be-ignored) auditory associates. We use this model as a framework for understanding findings from our recent studies of distraction. The studies used a classic picture-word interference (PWI) paradigm, in which visual concepts were presented with (to-be-ignored) auditory associates. The auditory associates varied in their strength of association to the visually-presented concepts and were presented to either the LH or RH. The results, both the facilitation and impedance of responses to the visual concepts, are discussed in light of predictions arising from our recent studies of distraction.

Disentangling the Unfolding Context-Related Action Dynamics in the AX-CPT Paradigm. ULRIKE SCHULZ and MAJA DSHEMUCHADE, Technische Universität Dresden, DOROTHEA HÄMMERER, University College London, THOMAS GOSCHKE, HANNES RUGE, ANNETTE BOLTE, and STEFAN SCHERBAUM, Technische Universität Dresden (Sponsored by Thomas Goschke). — Active maintenance and attentional selection of goal-relevant contextual information as well as inhibition of even strong goal-incongruent responses constitute essential components of adaptive behavior. In behavioral studies error rates and reaction times indicate a strong preparatory attentional expectancy effect, but only small interference from stimulus-driven action tendencies on performance. In order to elucidate how these processes interact continuously over time and influence goal-directed overt behavior, we tracked mouse movements in a variant of the AX-CPT paradigm. Distinct deflections of the mouse movements revealed both the strong preparatory attentional expectancy triggered by contextual cues as well as the stimulus-driven interference triggered by stimuli associated with a strong action tendency. Hence, the mouse movements provided direct behavioral indicators of the ongoing context-related processes on behavior that have been proposed based on simulation data. Email: Ulrike Schulz, uschulz@psychologie.tu-dresden.de

Age-Related Effects in a Novel Dual-Task Stroop Paradigm. NATHAN WARD, ERIKA HUSSEY, and JOHN GASPAR, University of Illinois at Urbana-Champaign, ARTHUR KRAMER, Beckman Institute. — One measure of executive control is Stroop, which involves resolving interference by ignoring goal-irrelevant information. We developed a modified Stroop task containing a simultaneous secondary counting task that emphasizes either goal-relevant (font color) or irrelevant information (word). Older (24 between 61-81 years) and younger adults (34 between 18-24 years) completed 3 versions of Stroop: a classic (single) task (ST), a goal-relevant dual-task (RDT), and a goal-irrelevant dual-task (IDT). Beyond replicating response time effects of Trial Type (incongruent > neutral > congruent), Age (older > younger), and their interaction (older > younger for incongruent), our results revealed a novel effect of Version (IDT > RDT > ST), alongside an interaction of Trial Type and Version (IDT > RDT > ST for incongruent). Version did not interact with Age. This indicates that Stroop performance is differentially influenced by additional dual-task demands, which may be resistant to age-mediated individual differences in executive control. Email: Nathan Ward, njmedein@illinois.edu

Experimentally-Induced Hypervigilance Modifies Perception of Cutaneous Pressure. MARK HOLLINS and SLOAN WALTERS, University of North Carolina. — We earlier showed that fibromyalgia patients are more hypervigilant than controls and give higher ratings to localized pressure stimuli. This supports the idea that hypervigilant attention amplifies threatening sensations—Rollman’s Generalized Hypervigilance Hypothesis (GHH). But the causal link remains in doubt because studies comparing patients with controls do not involve random assignment. In the present study, healthy participants were randomly divided into experimental (E) and control (C) groups. To focus attention on health and somatic sensations, E subjects wrote about the flu, and counted their own blinks, breaths, and heartbeats; C subjects wrote about daily routine and counted external events. All Ss then rated intensity and unpleasantness of pressure sensations. Neither set of ratings differed between groups, but the ratio of intensity to unpleasantness was higher in the E group. The results imply that some hypervigilance can be induced by a brief manipulation, and can change subjective experience, consistent with the GHH. Email: Mark Hollins, mhollins@email.unc.edu

An Eye for Detail: Attentive States Modulate the Social Gaze-Cue Effect in Multiple Object Tracking. ALISA BROCKHOF and MARKUS HUFF, University of Tuebingen (Sponsored by Georg Jahn). — In MOT tasks, observers track a set of target objects that move among identical distractors. The Flexible Weighting Tracking Account suggests that object features are processed automatically when spatiotemporal information is unreliable. We showed that a task influences information weighting in a similar manner. To measure effects of object features specifically, gaze-cues of multiple moving cartoon eyes were used to manipulate the allocation of attention during tracking. We compared how often participants marked the cued object without or with the task to identify the eye-gaze behaviors they were informed about. Results: With no task participants marked cued and non-cued objects equally frequently. With the identification task participants differentiated between helpful trials (cued target) and non-helpful trials (cued distractor); they only marked the
cued target more often. Control experiments confirmed that the observed strategic reliance on object features generalizes to dynamic arrow-cues and is not due to learning effects. Email: Alisa Brockhoff, alisa.brockhoff@uni-tuebingen.de

(5172)
Is Cognitive Control Unreliable? When Means Are Not Enough. CHRIS BLAIS, PETER WHITEHEAD, and GENE A. BREWER, Arizona State University. — Delta plots show how the magnitude of an effect changes across the distribution of response times. Recent work using delta plots has shown that the Flanker effect increase as RTs increase but the Simon effect decreases. Interesting, delta plots for the higher-order control effects (e.g., sequential congruency effects [SCE] and proportion congruency effect) are similar across tasks. These facts suggest that, although the mechanism of conflict differs between the tasks, how control is exerted is similar. The implication is that the size of the SCE should correlate across tasks. However, we are unaware of any study that directly assesses this hypothesis. To this end we conducted a large-scale (N=100) within-subject experiment to examine whether the SCE in both tasks were positively correlated. Although both experiments yield a robust SCE, this effect only correlates across tasks if the entire distribution is considered, not the just the mean. We argue that these different time courses of response conflict support a multi-level cognitive control architecture. Email: Chris Blais, chris.blais@gmail.com

(5173)
Attentional Reset Caused by Shifts in Processing Mode: Evidence From Sequential Modulation of Crossmodal Congruency Effects. MAGALI KREUTZFELDT, DENISE NADINE STEPHAN, KLAUS WILLMES, and IRING KOCH, RWTH Aachen University (Sponsored by Iring Koch). — Reduced congruency effects after a preceding incongruent trial suggest a conflict monitoring process that reactively triggers recruitment of attentional control in subsequent trials. In the present study, we assessed the sequential modulation of crossmodal congruency effects in two different tasks. Participants performed a location judgment task and a numerical judgment task in a blockwise fashion in a cued-modality switching paradigm. Stimuli were simultaneously presented in two modalities (e.g., left visual object, right sound) and were either congruent or incongruent with each other. The target modality was indicated by a cue, so that target modalities either repeated or switched in successive trials. Results indicated reduced congruency effects after an incongruent trial only for modality repetitions but not for switches. This finding suggests that modality switches induce a shift in processing mode, which in turn leads to an attentional reset. This reset eliminates the sequential modulation of congruency effects. Email: Magali Kreutzfeldt, kreutzfeldt@psych.rwth-aachen.de

(5174)
Putting Space Back in the Spatial Cuing Paradigm. BRADLEY GIBSON, PEDRO SZTYBEL, JOSEPH R. PAUSZEK, KATHRYN J. RALPH, and TRINH T. NGUYEN, University of Notre Dame. — William James diminished the functional importance of spatial attention because his views were shaped by experiments in which the spatial position of the imperative stimulus remained fixed. Although contemporary research has clearly validated the functional importance of spatial attention using the spatial cuing paradigm, most of this research is still based on an impoverished specification of space in which the direction of a target is varied, but its distance remains fixed. Here we present experiments which examine the extent to which attention can be oriented in space by spatial symbols that specify either the distance, direction, or both spatial dimensions on a trial-by-trial basis. As expected, observers were less vulnerable to distractor interference when the location of the target was specified by two dimensions relative to only one dimension. However, even when the location of the target was specified by one dimension, observers were less vulnerable to distractor interference when only direction was specified than when only distance was specified. Fixing distance has therefore clouded the discovery of important functional distinctions in the control of spatial attention. Email: Bradley Gibson, bgibson@nd.edu

(5175)
Referential Coding of Steering-Wheel Button Presses in a Simulated Driving Cockpit. ROBERT PROCTOR and AIPING XIONG, Purdue University. — Participants sat in a simulated driving cockpit and held a steering wheel with their thumbs on two response buttons. They performed a go/no-go Simon task in which one of the buttons was to be pressed to a high pitch tone, presented from a left or right speaker, but not to a low pitch tone (or vice versa). This arrangement yielded a small Simon effect relative to button position (and hand) for each response. When a simulated infotainment visual display was located to the right or left of the participant, the Simon effect was smaller for the response on the side of the display than for the response on the opposite side. This interaction indicates that, in a driving cockpit environment, the pushbutton responses are coded as left and right with reference to their positions on the wheel and relative to an extraneous, salient object like the infotainment display. Email: Robert Proctor, proctor@psych.purdue.edu

(5176)
The Relationship Between Mind-Wandering and Sustained Attention in ADHD. ALEXANDRA HALL-RUIZ and JOHN JONIDES, University of Michigan (Sponsored by John Jonides). — Mind-wandering is characterized by a decoupling of attention from the present task context towards unrelated concerns. Previous research has found that increased mind-wandering is associated with increased inattention symptoms and poor vigilance. However, this relationship often relies on retrospective self-report which is problematic because it assumes that the subject is aware of his/her mind-wandering, and it does not allow detailed analyses of when and why these lapses of attention may occur. Also, studies that have related ADHD symptomatology to increased mind-wandering have not used clinical populations and consequently cannot account for potential compensatory strategies. We are investigating these issues using two versions of a sustained attention task: one with intermittent mind-wandering probes
and another that is self-paced by the subject. These tasks allow us to evaluate, on a trial by trial level, the relationship between mind-wandering and performance and whether subjects are able to monitor their thoughts and behavior.

Email: Alexandra Hall-Ruiz, alexandra.hall.ruiz@gmail.com

• AUTOMATIC PROCESSING •

(5177)
Blocking Bloch’s Law as an Account of the Mutations Phenomenon. RICARDO MAX, New York University, HAYLEY LACROIX and THOMAS SPALEK, Simon Fraser University, YEHOSHUA TSAL, Tel Aviv University, VINCENT DI Lollo, Simon Fraser University (Sponsored by Yehoshua Tsal). — The mutation paradigm assesses the time window in which distractors impair target processing in a flanker task. Each trial presents a stream of eight frames of 8-ms each. While the target never changes, neutral flankers replace incongruent flankers (a mutation), once per trial, randomly, in one of the 8 alternative frames. After the mutation, the target and neutral distractors remain onscreen. In earlier work, target processing was progressively impaired as the number of pre-mutation frames increased. This impairment might be explained by Bloch’s law: on each trial, target strength was constant (8 frames), but incongruent flankers’ strength increased with number of pre-mutation frames, thus increasing target interference correspondingly. We tested this account with a sequence of only two 8-ms frames (pre- and post-mutation) separated by blank intervals of zero to 67 ms—thus maintaining the target-to-flankers strength ratio invariant across frames. The earlier result was faithfully replicated, thus refuting the Bloch’s law account. This is consistent with the notion that, except when the flankers are incongruent, the target can be processed—and thus immunized from subsequent masking—in 17 ms or less. Email: Ricardo Max, ricardo.max@nyu.edu

(5178)
Do Task-Irrelevant Accessory Signals Increase the Scope of Visuo-Spatial Attention? VERENA CAROLA SEIBOLD, University of Tübingen. — Previous research shows that the presentation of a task-irrelevant accessory signal (AS) increases interference in the flanker task. The aim of the present study was to investigate whether this effect is due to an increased scope of visuo-spatial attention. To this end, a probe technique was employed: In the majority of trials, participants’ attention was focused on a central location by letting them respond only to the middle item in a five-item array. In randomly intermixed probe trials, participants had to respond to a probe occurring at any of the five possible locations. An AS was presented in half of the trials. As expected, probe-RT exhibited a V-like shape, with RT increasing from central to lateral locations. The probe-RT function, however, was not flattened by the AS. This result is inconsistent with the hypothesis of an increased visuo-spatial scope, but consistent with non-spatial accounts of the AS effect. Email: Verena Carola Seibold, verena.seibold@uni-tuebingen.de

(5179)
Processing Emotional Faces: An ERP Study of Age-Related Differences in Affective Influences on Attention. JAMES R. HOUSTON, University of Akron, JOSHUA W. POLLOCK, Kent State University, MEI-CHING LIEN, Oregon State University, PHILIP ALLEN, University of Akron. — Age differences in emotional processing have been attributed to bias in emotional regulation or to a deficit in emotional arousal. We examined neural correlates of facial emotion processing for emotional arousal and regulation using event-related potential (ERP) measures. Specifically, we examined ERP components reflecting attentional and face processing (P1 and P3) at occipital and parietal regions. Both younger and older adults performed a face emotional discrimination task (neutral, happy, or angry). For early ERPs (100-200 ms; P1), younger adults showed a higher-amplitude for negatively-valeted relative to neutral faces. In contrast, older adults exhibited greater amplitude for neutral faces relative to positively-valeted faces. For late ERPs (400-600 ms; P3), younger-adult ERP amplitudes were greater for negative relative to neutral faces while older adults showed no emotional bias. These results suggest both an attenuated early emotional arousal and later emotional regulation for older adults, and a consistent negative bias for younger adults. Email: Philip Allen, paallen@uakron.edu

(5180)
Attention and Willpower Are Not the Same Resource: Evidence That Cognitive Load and Ego Depletion Operate by Different Processes. HEATHER M. MARANGES and ROY F. BAUMEISTER, Florida State University, BRANDON J. SCHMEICHEL, Texas A&M University (Sponsored by K. Anders Ericsson). — We examine the differences in mechanism and effect on emotion between cognitive load and ego depletion. Our findings support the notion that cognitive load limits attentional resources, that ego depletion limits self-regulatory resources, and that these are two distinct resources. Specifically, we find that loaded individuals attend more to local rather global attributes, endure pain for longer and feel less negative affect (Study 2), and match words based on positive emotions more often than on negative emotions (Study 3) relative to depleted participants. These results, we argue, can be accounted for by mechanistic differences: cognitive load distracts attention from the broader picture (leading to a focusing in on local attributes), pain, and negative affect while ego depletion leaves one without the regulatory resources to direct attention, and, thus, leads to greater consideration of the broader picture, pain, and negative affect. Email: Heather M. Maranges, maranges@psy.fsu.edu

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(5181)  
Do Subliminal Primes Influence Voluntary Choice in Oculomotor Action? SEEMA PRASAD, University of California, Davis. KAUSHIK SAKRE and RAMESH KUMAR MISHRA, University of Hyderabad (Sponsored by Ramesh Kumar Mishra). — Several studies have shown that stimuli presented below the threshold of awareness can influence motor responses. In this study, we examined whether subliminally presented primes can also bias the voluntary choice of a response. We presented masked primes that either matched or mismatched the numbers corresponding to a target location on the screen. Participants were expected to choose a number and generate a saccade to the location corresponding to it freely. We observed that primes affected participants' choice of location. We conclude that unconscious stimuli can affect the choice of responses even in the oculomotor domain. Pupillary analysis of the data showed that trials involving a mismatch between prime and choice of response elicited more mental effort. Thus, we also discuss a novel way of tracking the influence of subliminal primes on choice behaviour. 
Email: Seema Prasad, gp.seema@gmail.com  

(5182)  
Sex in the Blink of an Eye: Extracting Sex Ratio Information From Briefly Flashed Male and Female Faces. HALEY MOSS DILLON, LESTER LOSCHKY, and GARY BRASE, Kansas State University (Sponsored by Gary Brase). — Can information as detailed as sex ratio (proportion of males to females) be extracted from stimuli as complex as an array of photographic faces while using few attentional resources? Theories of mating market adaptation assume so, but this has been untested. We used methods from studies of summary statistics perception to examine the degree of automaticity with which sex ratio information is extracted from sets of male and female faces. We found that sex ratios of from sets as large as 12 males and females (or as small as four) can be extracted and later recalled from images flashed for durations as short as a single eye fixation (330ms). We also found strong correlations across two image flash durations (1000ms and 330ms) for both the actual and reported sex ratio of a set. Our smallest set size emerged as the boundary for automaticity, performance decreased for larger set sizes. 
Email: Haley Moss Dillon, haleymoss@gmail.com  

(5183)  
Primming With Art Images: Non-Realistic Art Slows Us Down. ARTURO E. HERNANDEZ and MADELEINE V. Z. GORGES, University of Houston. — For decades psychologists have studied priming with images that are related, unrelated, or non-objects. But perhaps the mental processes evoked by laboratory stimuli also exist in the outside world. This study used images of real artwork in a priming task. Participants were primed with realistic paintings followed by target paintings from one of five conditions: realistic related, realistic unrelated, surreal related, surreal unrelated, and abstract. Consistent with classic priming, reaction times were fastest in response to realistic related images and slowest in response to realistic unrelated images. When the paintings were surreal or abstract, however, the difference between related and unrelated images decreased. These findings suggest viewing unrealistic art reduces semantic priming. Efficient semantic processing, while highly beneficial in most situations, may increase functional fixedness, which is in many ways the opposite of creativity. Future studies will examine the relationship between exposure to novel stimuli and performance on creative tasks. 
Email: Arturo E Hernandez, aehernandez@uh.edu  

(5184)  
Why Do We ‘Go With Our Guts’?: Heuristics for Judging Truth. NADIA BRASHIER and HILLARY MULLET, Duke University, ERYN NEWMAN, University of Southern California, ELIZABETH MARSH, Duke University (Sponsored by Alan Brown). — When evaluating claims, people often rely on their "gut instincts," or subjective feelings of truth. Much evidence suggests that people base these judgments on how easy a claim is to process, or fluency; for example, prior exposure to a statement and high-contrast font both increase perceived truth. More recent work shows that pairing a statement with a picture also increases truth ratings, even though the picture does not provide any information about the claim's truthfulness (Newman, Garry, Bernstein, Kantner, & Lindsay, 2012). In multiple experiments, we investigated whether the fluency heuristic best explains this "truthiness effect," or whether pictures encourage the use of multiple heuristics. Our results replicated the basic effect (i.e., bias towards responding "true" increased when a picture accompanied a claim), but the effect remained unchanged when the number of pictures increased, speaking against a simple quantity of evidence heuristic. 
Email: Nadia Brashier, nadia.brashier@duke.edu  

(5185)  
Are We Bayesian? Evidence Against Humans as Ideal Observers in Visual Perception. APRIL SWAGMAN and JEFFREY ROUDER, University of Missouri-Columbia (Sponsored by Jeffrey Rouder). — Bayesian ideal observers act in a way that preserves Bayes’ rule: they optimally combine prior information and current likelihood of the data to produce posterior distributions of belief and corresponding optimal responses according to some loss function. Ideal observer models are popular in various cognitive domains and perceptual tasks. We believe the evidence for ideal models has been overstated due to loose methodological control leading to unrestrained assumptions about participants’ beliefs. We attempt to bring prior information, likelihood of data, and loss function under explicit control in a set of perceptual experiments. Participants saw ellipses of varying eccentricities and orientations and responded with the correct orientation. They were given the prior distribution of orientations and awarded points for their responses based on a squared error loss function. Participants performed well when ellipses were narrow, but became considerably less ideal when ellipses were circular and prior information should have been utilized. 
Email: April Swagman, aprilswagman@mail.missouri.edu
(5186) Metacognitive Approach of Decision Processes Implied in Time Perception. MATHILDE LAMOTTE, Clermont Universités-Université Blaise Pascal, MARIE IZAUTE, University Blaise Pascal, SYLVIE DROIT-VOLET, Clermont Universités-Université Blaise Pascal (Sponsored by Marie Izaute). — To examine the decision level of the time perception we propose a metacognitive approach. Metacognition researches have developed confidence judgments that allowed exploring decision processes by comparing performance and confidence (i.e. magnitude and accuracy of judgments). In this study, participants were given a temporal generalization task in which they were initially presented with a standard duration. They must determine whether comparison durations to the standard duration were similar or different from the standard. Then they assessed their confidence in their response. Participants were presented with three different ratios that varied task difficulty. Results revealed decrease of performance through ratios not balanced by sufficient decrease in confidence: performance assessment is good in the easy ratio and becomes worse in the two other ratios leading to overconfidence. This overconfidence accounts for the difficulty to discriminate durations close to the standard. Email: Mathilde Lamotte, mathilde.lamotte@etudiant.univ-bpclermont.fr

(5187) Unskilled but Not Necessarily Unaware: Differentiating the Effect of Skill Levels and Task Difficulty on Overconfidence. JOO YONG PARK and JUNHO LEE, Seoul National University. — Researchers have claimed that those who are unskilled show more overconfidence in self-assessment than the skilled (i.e., Kruger & Dunning, 1999). In these previous studies, however, the perceived difficulty of the task was higher for the unskilled than for the skilled subjects, which might have been a confounding factor. Therefore, we systematically manipulated the difficulty of two test sets (hard and easy tests) using Rasch modeling so that the average score of the skilled subjects on the hard test matches that of unskilled subjects on the easy test. When the test scores were controlled, there was no difference between the self-assessments of the skilled and unskilled subjects. Consistent with previous findings by Lee and Park (2014), the perceived difficulty of a task at hand, rather than the individual’s skill level itself affects overconfidence. Implications of the study were discussed. Email: Joo Yong Park, jooypark@snu.ac.kr

(5188) Why and When Often-Heard Things Tend to be True: An Ecological Analysis of the Truth Effect. STEFAN MICHAEL HERZOG, Max Planck Institute for Human Development, CHRISTIAN UNKELBACH, University of Cologne, RALPH HERTWIG, Max Planck Institute for Human Development. — The more often a statement is repeated, the more people tend to believe it. Repetition can produce this truth effect for two complementary reasons. First, people remember having heard a repeated statement before and therefore conclude that it is probably true. Second, because repeating a statement increases its processing fluency, people infer truth directly from fluency (because they have learned that fluency and truth tend to correlate). Although ample research showed that judgments of truth can be biased by irrelevant factors, little is known about when this frequency–truth link holds. We investigate the boundary conditions of this link using conceptual analyses and an ecological analysis of the truth effect in naturalistic, large text corpora. Our analyses are informed by (a) models from cognitive science and computational linguistics and (b) experimental paradigms from cognitive psychology and judgment and decision making (e.g., recognition, cued recall, semantic similarity, associative strength). A simple example: Among the ~4,000 most commonly misspelled words on Wikipedia, the more common spelling is the correct one in 98% of cases—suggesting that fluency and truth are closely linked in this domain. Email: Stefan Michael Herzog, herzog@mpib-berlin.mpg.de

(5189) Comparative Judgments of Feelings: Loss Aversion in Non-Monetary and Monetary Evaluations. ALEX COOKE, Kingston University London, PETKO KUSEV, Kingston University London/City University London (Sponsored by Petko Kusev). — Loss aversion is a psychological phenomenon whereby loss decisions are weighted greater than the equivalent gain decisions (Kahneman & Tversky, 1979; Tversky & Kahneman, 1992). Recent research by McGraw, Larsen, Kahneman and Schkade (2010) revealed that the occurrence of loss aversion relies on psychological measures and scales. Specifically, loss-aversion was present only when there was a possibility for comparing losses and gains directly (employing unipolar scales). Previous studies, however, have emphasized the variation of choice preferences as a function of the decision content (Kusev, van Schaik, Ayton, Dent & Chater, 2009). In one experiment we studied loss aversion for judgments of feelings with non-monetary and monetary unipolar and bipolar scales. The results revealed that the mismatch between perceived and evaluated decision content (and not comparative monetary judgments) eliminates loss aversion. Email: Alex Cooke, k1002593@kingston.ac.uk

(5190) How We Compare Our Health to Others: A Rank-Based Model of Social Comparison. KAREN L. MELROSE (Graduate Travel Award Recipient) and GORDON D.A. BROWN, University of Warwick (Sponsored by Adrian Von Muhlmenen). — Despite an abundance of research on social comparison, it appears that the cognitive mechanisms underlying the comparison process, i.e., how people actually compare to others, have received little attention to date. Two cognitive models of relative judgement, decision by sampling (DbS) and adaptation level theory (ALT), were applied to health-related social comparisons in order to determine whether people compare to others using rank-based strategies (proposed by DbS) or compare to the average of the comparison sample (proposed by ALT and widely assumed in the social comparison literature). Two studies (N = 1186) showed that where people believed their experience of symptoms ranked in comparison to others (and not how their experience compared to the average symptom experience)

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was the strongest predictor of symptom severity judgements, worry about symptoms and help seeking behaviour. These findings have implications for the study of social comparison, social norms based interventions and health help seeking. Email: Karen L. Melrose, k.l.melrose@warwick.ac.uk

(5191)
Individual Differences in Engaged Attention Can Influence Misinformation Effects. MEGHAN M. SALOMON and DAVID N. RAPP, Northwestern University (Sponsored by Edward O’Brien). — Misinformation routinely appears in our everyday information processing experiences. Unfortunately, after encountering misinformation, people can exhibit a tendency to rely on those details to complete subsequent tasks. This has been shown to occur even when participants should be aware the information they have encountered is inaccurate, and even when they are instructed to monitor for potential inaccuracies. To date, the effects of exposure to misinformation have included limited consideration of potential individual differences in information processing. In this study, we examined whether differences in participants’ tendencies to apply attentional focus might influence patterns of misinformation use. We tested participants who scored high on such a tendency as measured with the Tellegen Absorption Scale (TAS). In contrast to traditionally obtained patterns, these participants revealed an attenuated pattern of misinformation use. The results are consistent with work demonstrating that motivated evaluation can reduce the likelihood that readers will fall victim to misinformation. Email: Meghan M. Salomon, mmsalomon@u.northwestern.edu

(5192)
Similarity Judgments of Time Delays and Reward Amounts in Intertemporal Choices. JEFFREY STEVENS and LEEN-KIAT SOH, University of Nebraska-Lincoln. — Would you prefer $100 today or $105 in one month? Rather than discounting future rewards, people may compare similarity judgments of time delays and reward amounts for these intertemporal choices. Receiving $100 or $105 may be judged similar, whereas receiving something immediately versus in one month may be judged dissimilar. Yet, we do not know how people make these judgments. We used decision tree algorithms from machine learning to categorize people’s similarity judgments of time delay and reward amount values. Individuals varied in the primary attributes that they used to judge similarity. Decision trees suggest that most participants used either the ratio of small to large values (e.g., ratio = 100/105 = 0.95) or the difference between large and small values (e.g., difference = 105 - 100 = 5). These trees predicted about 90-95% of the judgments accurately, with slightly higher accuracy for delays compared to amounts. Machine learning decision trees suggest that rather simple attributes such as ratio and difference can determine similarity judgments. Email: Jeffrey Stevens, jeffrey.r.stevens@gmail.com

(5193)
Inference of Intention and Permissibility in Moral Judgment. MAX KLEIMAN-WEINER and TOBIAS GERSTENBERG, Massachusetts Institute of Technology; SYDNEY LEVINE, Rutgers University; JOSHUA TENENBAUM, Massachusetts Institute of Technology (Sponsored by Joshua Tenenbaum). — The actions of a rational agent reveal information about its mental states. These inferred mental states, particularly the agent’s intentions, play an important role in the evaluation of moral permissibility. While previous computational models have shown that beliefs and desires can be inferred from behavior under the assumption of rational action they have critically lacked a third mental state, intentions. In this work, we develop a novel computational representation for reasoning about other people’s intentions based on counterfactual contrasts over influence diagrams. This model captures the future-oriented aspect of intentional plans and distinguishes between intended outcomes and unintended side effects. Finally, we give a probabilistic account of moral permissibility by combining these inferred intentions with social utility maximization. Our model quantitatively predicts judgments about both intention and moral permissibility in classic and novel trolley dilemmas. Email: Max Kleiman-Weiner, maxkw@mit.edu

(5194)
Aging and the Interpretation of Ambiguous Scenarios. JOSEPH MIKELS and MICHAEL SHUSTER, DePaul University. — When faced with ambiguous situations, people often interpret them in a positive or negative manner to make sense of the world. In the current study, we presented 32 older and 32 younger adults with a series of ambiguous scenarios and had them continue the stories. Older adults continued the scenarios with less negativity than younger adults as measured by negative and positive emotion word use and by the coded overall emotional valence of each interpretation. These results illuminate an interpretative approach by older adults that favors less negative endings and that supports broader age-related positivity. Additionally, older adults interpreted social scenarios with less emotionality than younger adults. These findings uncover a new manifestation of age-related positivity in spontaneous speech generated in response ambiguity, indicating that older adults tend to create emotional meaning differently from the young. Email: Joseph Mikels, jmkikels@depaul.edu

• STATISTICS AND METHODOLOGY •

(5195)
Optimizing the Efficiency of Estimating Stop-Signal Reaction Time Distributions via Bayesian Adaptive Experimentation. WOOJAE KIM, MARK PITT, and JAY MYUNG, Ohio State University — Response inhibition, or the ability to stop an ongoing mental process, can be studied using the stop-signal (SS) paradigm. Following the modeling work by Logan (1981), statistical properties of SS reaction times (SSRTs), which are otherwise unobservable, have been
measured and studied extensively for the purpose of scientific inquiry as well as clinical diagnosis. Characterizing an SSRT distribution for a given participant requires a large number of trials (e.g., go and SS trials > 500) with the most efficient methods to date: The staircase mean method for a mean SSRT (Logan & Cowan, 1984) or the Bayesian parametric estimation for the mean and variance (Matzke et al., 2013). This requirement can be burdensome (e.g., testing children, elderly or in a clinic). Addressing the challenge, the present study explored the advantage of Bayesian adaptive methods. Simulation studies demonstrate that the number of trials required to obtain mean and variance estimates with reasonable precision can be reduced considerably with this adaptive method. The results also suggest what conditions concerning the design (e.g., proportion of SS trials) or the underlying parameters (e.g., large vs. small variance) can benefit most from the method. Email: Woojae Kim, wjaekim.1124@gmail.com

(5196)
Analyzing Ordinal Data: Support for a Bayesian Ordinal Model. TORRIN M. LIDDELL and JOHN KRUSCHKE, Indiana University (Sponsored by John Kruschke). — Ordinal data are common across many disciplines, and are often analyzed using statistical methods that assume metric data. Analyzing ordinal data as if they were metric has been very controversial, with staunch defenders and detractors. Using simulated data sets and real world examples we demonstrate that analyzing ordinal data as if they were metric can systematically lead to erroneous conclusions. We show that false alarms can be systematically inflated and that effect sizes and predicted data probabilities can be badly mis-estimated. Moreover, averaging multiple items into a single Likert “scale” does not solve these problems. In contrast, we show that Bayesian estimation of an ordinal model is straightforward and yields rich and accurate information. We conclude that ordinal data ought to be analyzed with ordinal models, and that Bayesian estimation is an excellent method for accomplishing this goal. Email: Torrin M. Liddell, torrin.liddell@gmail.com

(5197)
Cognitive Analysis of Multi-Sensor Information. ELIZABETH FOX and JOSEPH HOUPT, Wright State University (Sponsored by Joseph Houpt). — Multispectral imagery can supply an observer with different components of information. With cognitive fusion sensors are presented next to one another and the operator must determine the important information in each sensor image. With algorithmic fusion the observer must rely on the algorithm to correctly identify important information. Thus far, conclusions about the use of image fusion are inconsistent with no clear understanding for what experimental manipulations cause performance changes and why changes may occur. I used systems factorial technology (Townsend & Newaza, 1995) to test underlying information processes across two task difficulty levels. The results of both Experiment 1 and 2 demonstrate that the efficiency of processing cognition fusion sensor information is at least equal to algorithmic fusion across two task difficulty levels. Additional research is needed to understand the relationship between how operators process different types of multi-sensor information and their predicted performance in more real-world environments. Email: Elizabeth Fox, fox.119@wright.edu

(5198)
STEM Participation and 2D:4D. NATHAN D. OMASTA, Carlow University, SHARON BERTSCH, University of Pittsburgh (Sponsored by Sharon Bertsch). — Success in the fields of Science, Technology, Engineering, and Mathematics (STEM) is dependent upon an individual’s cognitive ability in abstract mathematical reasoning and spatial reasoning. The ratio between an individual’s second and fourth digits (2D:4D) is influenced by prenatal exposure to androgens (e.g., testosterone). Using a novel method for measuring 2D:4D, we found that university faculty in STEM fields tend to exhibit a smaller 2D:4D ratio than those in other academic fields (e.g., history, literature). On average, women within STEM fields exhibited a smaller 2D:4D ratio than did women in other fields. Email: Nathan D. Omasta, NDomasta@gmail.com
Testing the Absolute Validity of Mathematical Models Used in Working Memory. KYLE HARDMAN (Graduate Travel Award Recipient), EVIE VERGAUWE, and TIMOTHY J. RICKER, University of Missouri (Sponsored by Evie Vergauwe). — In working memory research, mathematical models of psychological processes are commonly used to test the claims of theories and to learn about the processes used by participants. To select the best model out of several competing models, researchers often use model comparison techniques. However, model comparisons do not verify that the best model is in fact valid. This study focuses on an approach to testing the validity of mathematical models by examining how well the model fits the data without reference to any other model. We applied our approach to a number of mathematical models of working memory and found that there is a good deal of variation in the rate at which models are rejected, with some popular models being rejected for nearly all participants, bringing their validity into question. We will present the approach and our results for a subset of the models we have tested. Email: Kyle Hardman, kh832@mail.missouri.edu

Improving the Interpretation of Confidence and Credible Intervals. RINK HOEKSTRA and ERIC-JAN WAGENMAKERS, University of Groningen, RICHARD DONALD MOREY, Cardiff University (Sponsored by Richard Donald Morey). — Confidence intervals (CIs) are often advocated as an alternative to or supplement for the frequently criticized significance test. It has been shown, however, that neither students nor researchers find them easy to interpret (Hoekstra et al., 2014). The interpretation of CIs is difficult by nature (Morey et al., submitted); if they are to be standard tools, it is critical that potential users understand them. To understand why students and researchers misunderstand CIs, we undertook an analysis of introductory statistical textbooks, which show striking variability of interpretations of CIs and an alarming frequency of incorrect interpretations. Notably, quite a few textbooks authors themselves show uncomfortableness about the interpretations of CIs. To help remedy the confusion we present a freely available R-package in which the interpretation of both CIs trained and compared to that of Bayesian credible intervals. The software is informed by previous findings in the statistical cognition literature. Email: Rink Hoekstra, r.hoekstra@rug.nl
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