

Attention And Memory In The Normal
And Neurologically Compromised
Patient:
Neuro-Optometry's Role In
Developing And Recapturing
Perceptual And Cognitive Skills

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The 47th Annual Meeting
Of The
College Of Optometrists In Vision Development

Gravity Is The Driving
Force Behind Cognitive
Development

In The Beginning

Our Primitive Reflexes
Give Us The First
Opportunity To Engage
Gravity

Attention and Memory



Is More Than What We
Typically Might Think.

In The Beginning



We Live In A Three-
Dimensional World
Immersed In Gravity

In The Beginning

Our Primitive Reflexes
Give Us The First
Opportunity To Engage
The World With Other
Sensory And Motor
Systems As Well

A Review Of The Body's
Interaction In The World

In The Beginning

Our Body Contends
With Gravity At All
Times

Along With Our Gravito-
Inertial Receptor System
(vestibular), Our Binocular And
Accommodative Systems
(visual) Provide Knowledge
That Our World Is
Three-Dimensional
-And So Are We-

As We
Engage The World

Predictions Begin To Be
Made

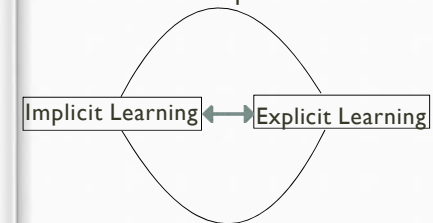
Some Of These
Memories Require
Conscious Attention,
Some Do Not

When A Prediction Is, Or Is
Not Fulfilled,
Knowledge Is Acquired
- A Schema Is Developing -

Predictions Are
Available Only Because
Of A Memory For Past
Events

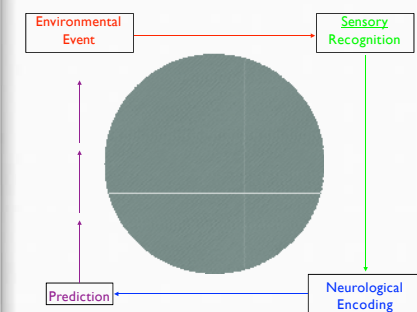
Those Memories That
Don't Require
Conscious Attention, Do
Require Some Sensory
And Motor Capacity

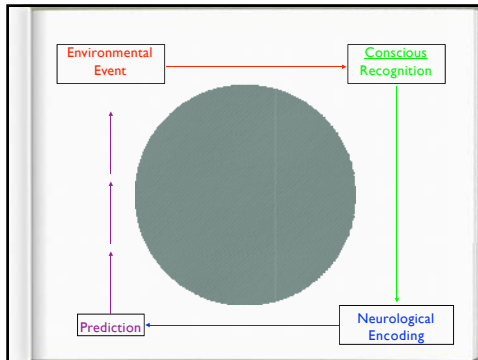
Two Fundamental Cycling Events
Help Stimulate Cognitive
Development



Some Of These
Memories Are
Incidental
Some Are Not

The More Refined One's
Sensory And Motor
Capacity Is, The More
Refined Their
Predictions Are





What Is Attention?

Types Of Attention

Selective

"Freedom from distractibility!" The ability to sustain a certain cognitive task regardless of the competing sensory environment

What Is Visual Perception ?

A visual skill that provides an opportunity to derive meaning from light and an opportunity to direct the movement of the body

-Pattern Recognition-
Linear
Spatial
Temporal

What Is Attention?

⇒ "... is the taking possession of the mind, in clear and vivid form, of one out of what may seem several simultaneously possible objects or trains of thought. It implies withdrawal from some things in order to deal effectively with others..."

-William James

Psychologist / Philosopher 1842- 1910

Types Of Attention

Sustained

The ability to maintain engagement in a repetitive and continuous task

How Does Visual Perception Develop?

The starting point is the body's sensory-motor interaction in the concrete, dynamic three-dimensional world immersed in gravity

When vision is matched with the above interactions, vision becomes dominant.

When reciprocal spoken and gestural language becomes active, visual perception is enhanced further

Types Of Attention

Sohlberg and Mateer Model - 2001

Selective

Sustained

Alternating

Simultaneous

Types Of Attention

Alternating

The mental dexterity to shift ones cognitive approach from one task to another

Types Of Attention

Simultaneous

Sometimes called "Divided Attention" is the ability to respond to more than one activity at a time

Neurology Of Attention

- Frontal Lobes
 - The Central Executive
 - Monitor Behaviour
 - Attentional Controller
 - Supervisory Attention System (SAS)
- Selective attention or divided attention
- Phonological loop or visual - spatial sketchpad



The Role Of Sensory Discrimination And Affordances In Attention

James Gibson, PhD: "The Theory Of Affordances"



Neurology Of Attention

Frontal Lobes Monitor Behavior

Neurology Of Attention

- Frontal Lobes
 - Left frontal lobe for verbal stimuli
 - Right frontal lobe for visual scenes



The Role Of Priming For Attention

Hearing the word "yellow" will cause you to more easily see objects that are yellow.



Neurology Of Attention

- Alertness
 - Brain Stem
 - Thalamus
 - Hypothalamus
- Directed Attention
 - Prefrontal Cortex
 - Anterior Cingulate
 - Basal Ganglia
 - Posterior Parietal Lobes
 - Superior Temporal Lobes



People only see what they are prepared to see-

Ralph Waldo Emerson-

Poet: 1803 - 1882

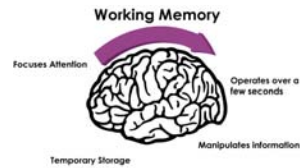
The Role Of Attention In Sports

Sports - Overt and Covert Attention



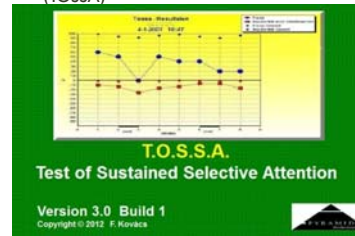
The Role Of Attention In Recovery From ABI

Frontal Lobes and Working Memory



Tests Of Attention

- Test of Sustained Selective Attention (TOSSA)



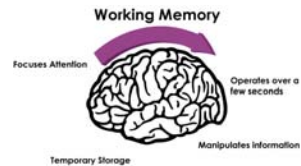
Tests Of Attention

- Test of Variables of Attention (TOVA)



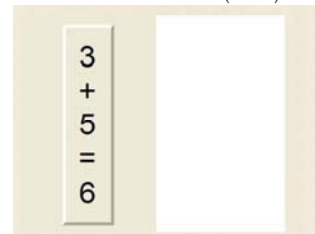
The Role Of Attention In Learning Disabilities

Frontal Lobes and Working Memory



Tests Of Attention

- Test for Divided Attention (TODA)



Tests Of Attention

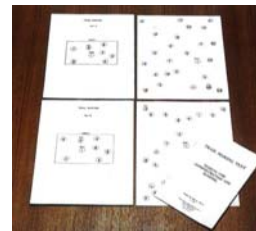
- Pepper Concentration Profile

Tests Of Attention

- Test of Sustained Selective Attention (TOSSA)
- Test for Divided Attention (TODA)
- Trail Making Test (TMT)
- Test of Variables of Attention (TOVA)
- Pepper Concentration Profile

Tests Of Attention

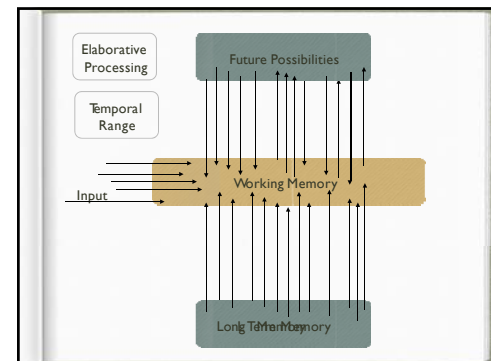
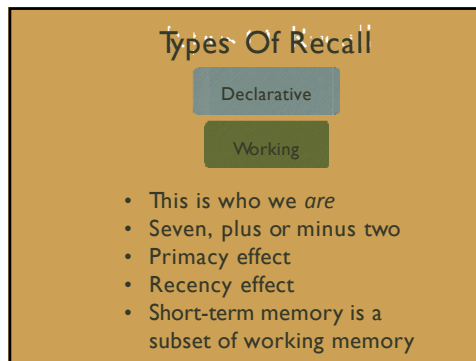
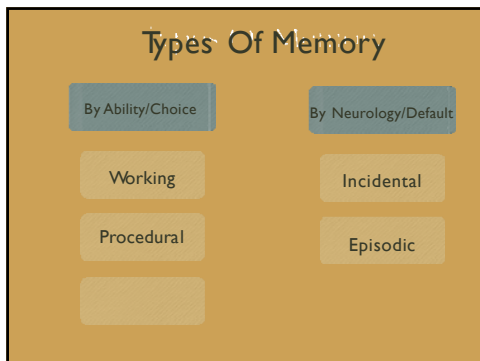
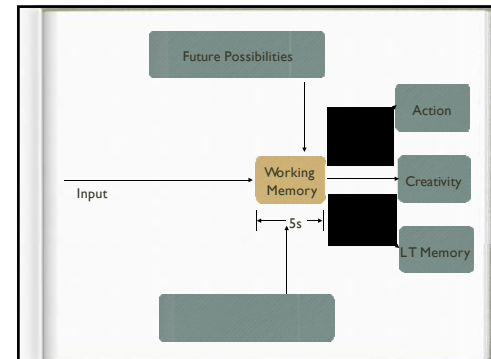
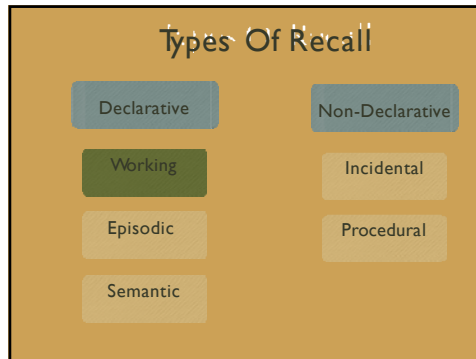
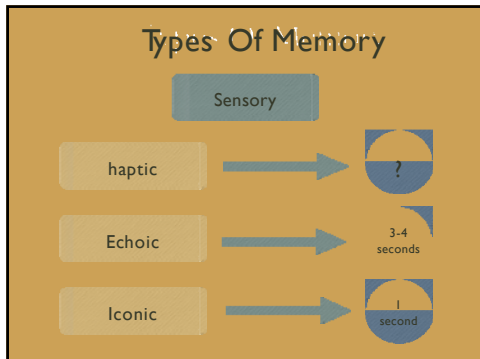
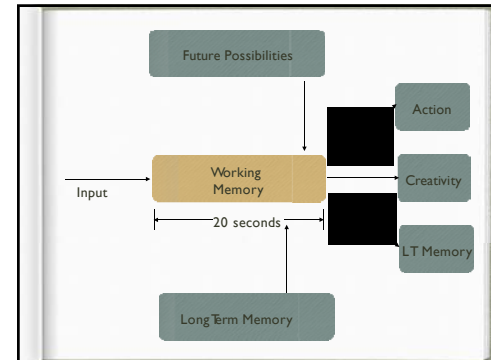
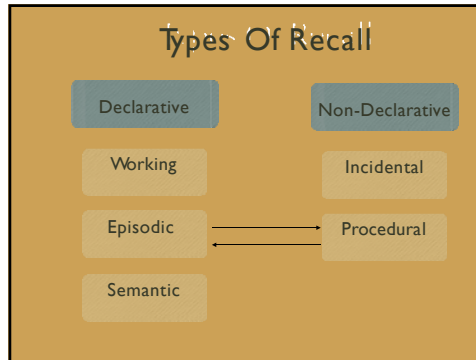
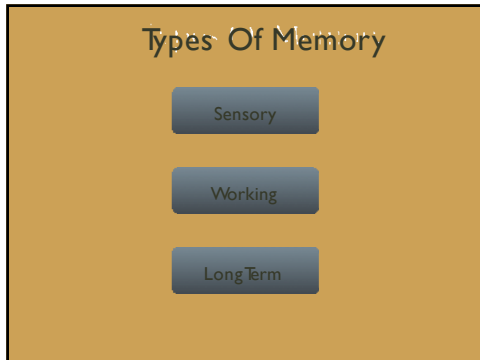
- Trail Making Test (TMT)

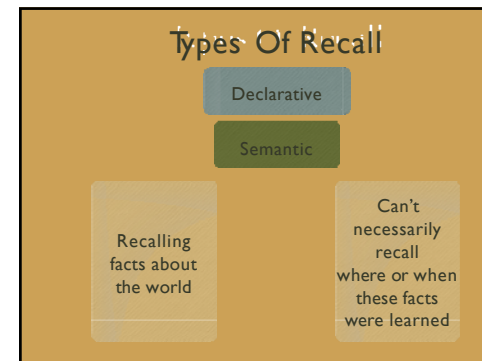
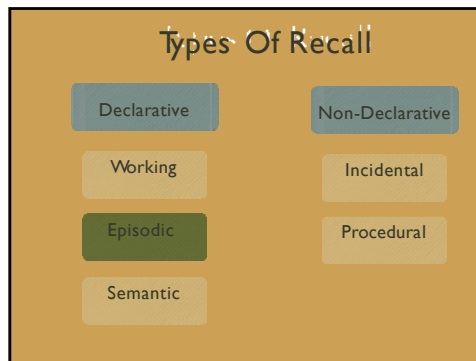
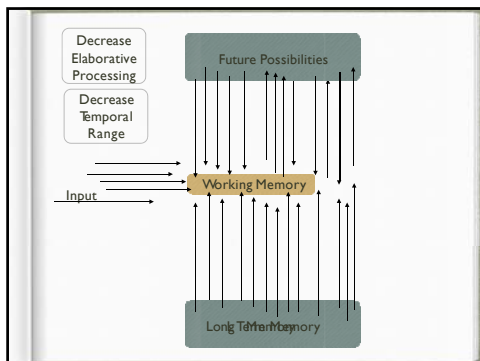
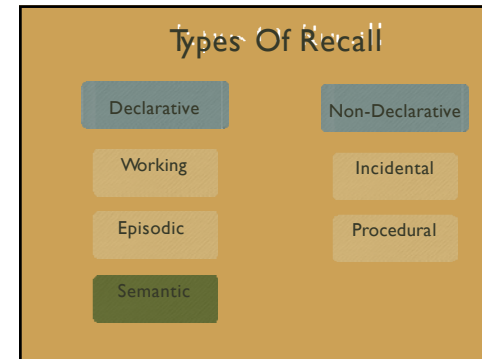
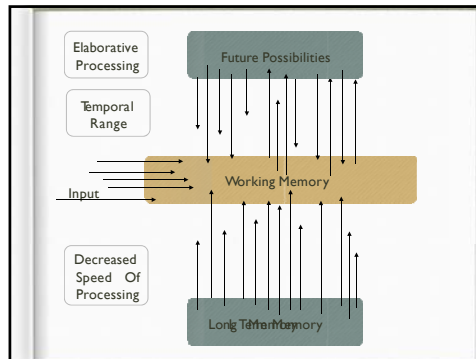
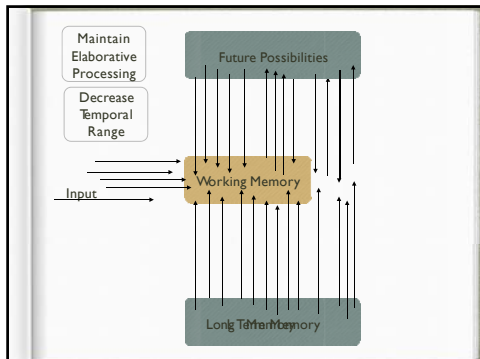
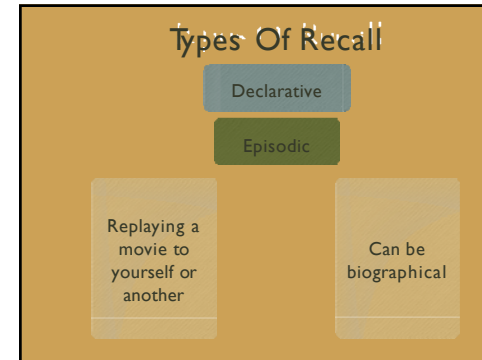
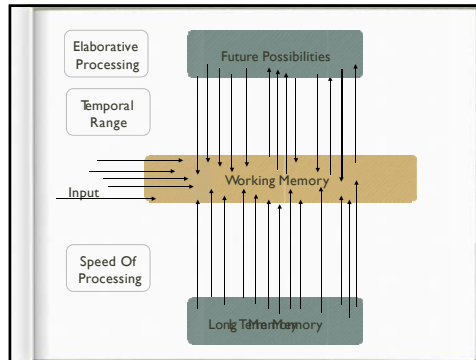
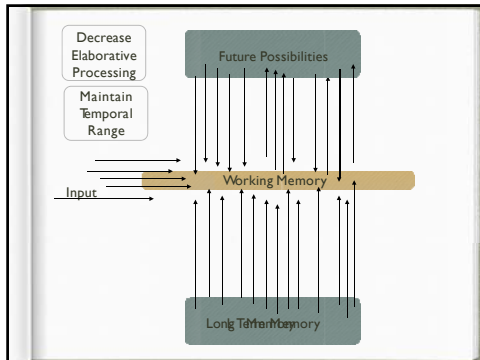


What Is Memory?

"Memory is the process of maintaining information over time." - Matlin, 2005

"Memory is the means by which we draw on our past experiences in order to use this information in the present" - Sternberg, 1999





Types Of Recall

Declarative

Non-Declarative

Working

Incidental

Episodic

Procedural

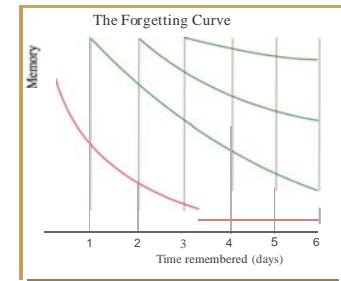
Semantic

Types Of Recall

Non-Declarative

Procedural

Tying shoes



Types Of Recall

Non-Declarative

Incidental

Grammar

The Neurology Of Memory

- Prefrontal Cortex
- Hippocampus

Forgetting

- Episodic
- Semantic

Types Of Recall

Declarative

Non-Declarative

Working

Incidental

Episodic

Procedural

Semantic

Forgetting

- Hermann Ebbinghaus (1850-1909)
- Logarithmic

Memory Loss In Acquired Brain Injury

- Prefrontal Cortex
- Hippocampus

Tests Of Visual Memory

- Monroe Visual III
- The Dyslexia Screening Test
- Rey-Osterrieth Complex Figure
- Visual Auditory Digit Span
- Test of Visual Perceptual Skills
- Word Sentence Copy Test

Tests Of Visual Memory

Test of Visual Perceptual Skills

Tests Of Visual Memory

Word Sentence Copying Test

Tests Of Visual Memory

Monroe Visual III

Tests Of Visual Memory

The Dyslexia Screening Test

Therapeutic Methods For Developing Attention And Memory

Tests Of Visual Memory

Rey-Osterrieth Complex Figure

Tests Of Visual Memory

Visual Auditory Digit Span

- Aural - Oral
- Aural - Written
- Visual - Oral
- Visual - Written

Therapeutic Methods For Developing Attention

- Nutrition
- Exercise
- Sleep
- Stress reduction
 - Syntonics
 - Lenses, prism, tints
 - Modify the environment
 - Lighting
 - Other sensory interferences

Therapeutic Methods of Developing Attention

Multi-Matrix Game

Color Sticks

Spatial Visualization

Space Matching

Concept Pieces

Time Matching

Percon III

Space Fixator

Therapeutic Methods of Developing Visual Memory

Feel Box

SET

Build In Another Place

Tachistoscopes

Flip And Rotations

Levels Of Processing

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Edward C. Godnig. Tunnel Vision Its Causes & Treatment Strategies. Journal of Behavioral Optometry, Volume 14, 2003, Number 4.

Therapeutic Methods For Developing Memory

- External Aids
 - NeuroPage
- Internal Aids
 - Visual Imagery
 - State dependent learning
 - Cogmed? Luminosity?

Therapeutic Methods of Developing Visual Memory

Levels Of Processing

Mnemonics

Method Of Loci

The Major System

The Peg System

Orienteering

State Dependent Learning

Nutrition, Sleep and Exercise

Therapeutic Methods For Developing Memory

- Cogmed?

"...after a grueling three years" of rigorous study, (Holmes, Gathercole, and Dunning 2009) Gathercole et al. found little evidence that skills transferred to the real-world.

"Generalization can occur but it needs the therapist or trainer to build a bridge between the clinic and the world outside." (Alan Baddeley 2015)

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