The following presentations and posters were presented during the 2012 COVD 42nd Annual Meeting in Fort Worth, Texas.

**Oral Research Presentations**

**A COMPARISON OF ACCOMMODATION WITH MULTIFOCAL CONTACT LENS TO PLUS LENSES IN SPECTACLES**

**Author:** Christine Schiller, BS, 3rd Year Student, Southern College of Optometry  
**Co-Authors:** Marc B. Taub OD, MS, FAAO, FCOVD; Richard Hoenes, MS

**Background:** Accommodative insufficiency is one of the most frequently diagnosed binocular vision anomalies, and is commonly treated with plus lenses in spectacles, which decrease the demand on the accommodative system and alleviate ocular discomfort and fatigue. Multifocal contact lenses are an additional treatment option and may be more appealing and practical to patients than bifocals. This study will compare the accommodative lag with the Bausch & Lomb Pure Vision low addition multifocal contact lens to plus lenses in spectacles as measured objectively with the Grand Seiko WR-5100K Auto Refractor.

**Methods:** Forty subjects (mean 24.95 years, range 23-32 years) were recruited. All participants exhibited corrected visual acuity of 20/20 or better OD, OS, OU at near and were soft spherical contact lens wearers. Accommodation in the subject’s dominant eye was measured with the Grand Seiko WR-5100K Auto Refractor under three conditions: baseline with the subject’s habitual distance contact lens, with the Pure Vision multifocal contact lens, and with a +1.25 spectacle lens over the subject’s habitual distance prescription. A .6M target and a 3.00D accommodative demand were used. In all three procedures, the non-dominant eye was patched and five measurements were taken and averaged. The order of procedures (multifocal contact lens or spectacle) was controlled.

**Results:** The mean and standard deviation accommodative lags are as follows: Baseline (0.684 +/- 0.503), Spectacle Lens (0.599 +/- 0.415), and Contact Lens (0.805 +/- 0.537). Comparing the groups via paired t-test shows that the lag of accommodation for both Spectacle Lens (p=0.242) and Contact Lens (p=1.68) were not significantly different than the Baseline measurement. The Spectacle and Contact Lenses were significantly different from each other (p=0.011).

**Conclusion:** In contrast to other studies, a difference in accommodative lag was found when comparing multifocal contact lens and spectacle lens. This difference is statistically and clinically significant as the difference approaches 0.2D. For a general optometrist, this difference may not be important, but to those in the behavioral/developmental realm, it can alter the treatment plan, including the lens power chosen. Further investigation is needed in comparing other contact lens designs and whether a population of patients with accommodative problems would demonstrate similar results.

**BINOCULAR ANOMALIES IN ELEMENTARY SCHOOL CHILDREN WITH READING PROBLEMS: A PRELIMINARY OVERVIEW OF THE RESULTS**

**Author:** Lisa W. T. Christian, BSc, OD  
**Interim Associate Director for Clinical Programs:**  
**Head, Binocular Vision Clinic**  
**Co-Authors:** Angela Peddle, BScH, OD, FCOVD; Adjunct Clinical Supervisor, WOVS; Shannon Pennifold, BSc, 4th Year Optometry Student, WOVS; Beth Schellenberg, BSc, 4th Year Optometry Student, WOVS

**Background:** Literature supports that 80% of what a child learns in the first twelve years is based on visual information; however, nearly 1 in 6 children in Ontario (Canada) has a vision problem serious enough to affect their learning. Of those children identified with learning disabilities, many of which are specific to reading, an Individual Education Plan (IEP) is created. Prior to creating an IEP, students enrolled in the Waterloo Region District School Board
(WRDSB) were advised to have a full comprehensive binocular vision assessment by the University of Waterloo, School of Optometry and Vision Science (WOVS), External Pediatric Clinic. This study provides a preliminary overview of the results which identify the binocular anomalies seen in elementary school children identified with reading problems.

**Methods:** Retrospective review of patients identified by the WRDSB as receiving a grade of less than “C” for reading comprehension from September 2011- June 2012. All patients had never had an eye exam, and were seen at the WOVS, External Pediatric Clinic. A chart review was performed on the initial binocular vision assessment for all patients with no significant refractive error.

**Results:** Sixty-eight patients with an average age of 8.1 years (range, 6 – 12 years) had no significant refractive error. Five patients were identified as strabismic. Of the 33 boys and 30 girls that were non-strabismic, twenty-seven patients (42.9%) had stereopsis of < 70 sec arc. Distance cover test identified 9 patients (14.3%) with esophoria, and 12 patients (19.0%) with an esophoria greater than 2 pd. Near cover test revealed 11 patients (17.5%) with esophoria, and 31 patients (49.2%) with exophoria greater than 5 pd at near. NPC was receded (>10 cm) in 23 (36.5%) patients, and amplitudes of accommodation differed from expected normative values in 24 patients (38.1%) when calculated using the Duane-Hofstetter minimum amplitude equation. Thirty-six patients (57.1%) had positive fusional vergences outside the limits specified by Morgan at near, and 21 patients (33.3%) had negative fusional vergences that were abnormal. Thirty-eight patients (60.3%) had two or more binocular tests with results outside expected normative values.

**Conclusion:** Preliminary findings indicate the majority of patients demonstrated positive fusional vergences outside normal limits, and an exophoria at near. Further investigation will be performed to analyse the prevalence of binocular vision disorders in this cohort when compared to children of similar age with no identified reading problems.

**BEHAVIORAL AND EMOTIONAL PROBLEMS ASSOCIATED WITH CONVERGENCE INSUFFICIENCY IN CHILDREN**

**Author:** Eric Borsting, OD, FCOVD  
**Professor, Southern College of Optometry**  
**Co-Authors:** Lynn Mitchell, The Ohio State University College of Optometry; L. Eugene Arnold, The Ohio State University, Department of Psychiatry; Mitchell Scheiman, Salus University, College of Optometry; Christopher Chase, Colleges of Optometry and Biomedical Sciences Western University of Health Sciences; Marjean Kulp, The Ohio State University College of Optometry; Susan Cotter, Southern California College of Optometry, CITT-RS Study Group

**Background:** This first part of the study investigated behavioral and emotional characteristics in children presenting to eye care clinics with a common vision disorder, convergence insufficiency (CI) prior to treatment. The second part of the study examined whether successful treatment of CI was associated with a reduction in adverse behaviors and emotional problems.

**Methods:** Parents of fifty-three children ages 9 to 17 years with symptomatic CI completed the Child Behavior Checklist (CBCL) and the Conners 3 ADHD Index. Scores were converted to T-scores and compared to normative data. Forty-four children were treated for the CI, completing 16 weeks of office based vergence accommodative therapy (OBVAT) and a 24-week outcome visit. Comparisons of the scores at baseline to normative data and post-therapy results to baseline results were completed using a Wilcoxon sign rank test.

**Results:** The mean T-score for the Conners 3 ADHD Index at baseline was 63.17 (SD = 17.0) which was significantly higher than the normative mean T-score of 50 (p < 0.0001). The results from the CBCL showed a significantly elevated score on the internalizing problems scale 54.42 (SD = 9.86; p < 0.0001). Following OBVAT, CI children showed a significant improvement in T-scores on the Conners 3 ADHD Index with a mean improvement of 9.90 and on the CBCL internalizing problems with a mean improvement of 5.93.

**Conclusions:** Parents of children with symptomatic CI report a higher frequency of inattentive ADHD-like behaviors and more internalizing problems. In an
open trial, both attention and internalizing problems improved following treatment.

---

**Poster Presentations**

**WORKING WITH PATIENTS WITH PEDIATRIC AUTOIMMUNE NEUROPSYCHIATRIC DISORDERS ASSOCIATED WITH STREPTOCOCCAL INFECTIONS (PANDAS)**

*Author: Mehrnaz D. Azimi Green, OD, FCOVD Vision & Conceptual Development Center*

**Background:** PANDAS is a term used to describe children who have obsessive compulsive disorder (OCD) and/or tic disorders such as Tourette's syndrome whose symptoms worsen following a streptococcal infection. The Basal Gaglia of the brain is thought to be affected in PANDAS. Patients with PANDAS share the following signs and symptoms: Presence of OCD and/or tic disorder, pediatric onset (3 y.o. to puberty), episodic course of symptom severity, association with group A Beta-hemolytic streptococcal infection (strep throat, Scarlet Fever), and an association with neurological abnormalities. Children with PANDAS often experience the following symptoms in conjunction with their OCD: ADHD symptoms, separation anxiety, mood changes, sleep disturbance, night-time bed wetting, fine/gross motor changes, and joint pain. Treatment includes antibiotics to the streptococcus and reducing OCD or tic disorder, includes cognitive behavioral therapy and/or anti-obsession medications.

**Methods/Case Summary:** 7 y.o. MS was referred to our office by his psychologist who felt that he may have some visual-spatial delays that were limiting his emotional and cognitive development. His mother described symptoms of ADHD, that she attributed to his PDD-NOS diagnosis. He was adopted and his parents believe he was exposed to drugs and alcohol prenatally. He was diagnosed with Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS), Fetal Alcohol Syndrome (FAS), PANDAS and is bipolar. Visual acuity was 20/20 OD, OS, OU. Retinoscopy revealed: OD +0.50SPH OS +0.50 SPH. Bell retinoscopy revealed poor grasp and release of accommodation. Pursuits and saccadic testing revealed poor fixation and significant jerky eye movements and severe head movements. He had not yet developed the oculo-labyrinthine head-righting reflex. He sustained the following primitive reflexes: moro, asymmetrical tonic neck, symmetrical tonic neck, spinal gallant, and tonic labyrinthine. Cover test revealed orthophoria at distance and 25 prism diopters intermittent exotropia O.D. at near. No stereo was detected on Randot stereotests. Convergence near point was 7” to 10”. MS reported severe asthenopia during all ocular sensorimotor testing. Ocular health was unremarkable. No spectacle Rx was given. A program of vision therapy was started that focused on integration of the primitive reflexes retained, developing appropriate postural reflexes, ocular fixation, pursuits, saccades, accommodations central-peripheral awareness and fusion. After approximately six month of therapy three times a week, MS was able to move his eyes independently from her head, appreciate 20” arc on Randot Wirt Circles and convergence near point improved to 1”. Cover test revealed orthophoria and distance and near. No strabismus was measured in the office or reported seen at home. MS’s family reported that he was better able to orient himself through space without bumping into people and that he no longer appeared anxious or nervous when he entered busy environments, such as the mall. His mother also reported that MS was now better able to regulate himself and displayed better attention. MS’s psychologist reported improved orientation and decreased tics and anxieties. MS continues to receive vision therapy, which is now concentrating on visual perceptual skills, such as visual thinking and visual logic.

**Conclusion:** Developmental ocular evaluations are warranted in patients with PANDAS. These patients may have developmental vision delays that are effecting the quality of their life and they may greatly benefit from vision therapy.

**OCULAR MOTOR DYSFUNCTION REVEALED TO BE A RESULT OF A TIMING DISCONNECT**

*Author: Alison Jenerou, OD, Michigan College of Optometry*

**Background:** Ocular motor dysfunction (OMD) is a common diagnosis for school aged children. Chief complaints include poor eye tracking while reading, specifically, losing their place while reading, skipping lines while reading, and rereading lines. Vision therapy is the recommended treatment for OMD.

**Case Summary:** An 8 year old white male presented for evaluation of eye tracking skills
associated with reading. During the exam a DEM was attempted, which the patient struggled to complete and saccadic deficiency was diagnosed. Vision therapy was recommended and weekly in office sessions with at home therapy were implemented. A visual-verbal disconnect was noticed while practicing 4 corner saccades. The patient moved his eyes onto the next set of letters before verbalizing the first set of letters. Noticing this timing divide, therapy was altered to address the integration of vision and verbalization. The modifications to therapy were made to encourage the eye movements to correspond with verbalization through the emphasis of timing: synchronizing to a metronome and music, clapping or tapping to feel a beat, jumping on a trampoline to a beat and verbal reminders. At the 4 week reevaluation, the DEM score improved to a standard score of 113 from 84 for vertical, horizontal, and the ratio. His reading fluency performance was tested by his elementary school and also improved to grade level for the first time in his academic career.

Discussion: It behooves clinicians and vision therapists to observe a timing disconnect in OMD diagnosis to make therapy more effective when aimed at the correct deficit. Modifications can be made to therapy allowing for rhythm reinforcement to connect vision to verbalization, which has been shown to improve reading fluency.

AN EVALUATION OF ANISOMETROPIA AND AMBLYOPIA USING THE NINTENDO 3DS

Author: Christina Schiller, BS, 3rd Year Student, Southern College of Optometry
Co-Author: Marc B. Taub OD, MS, FAAO, FCOVD

Background: Vision is critical to learning. Upwards of 25% of behavioral and learning problems in children that lead to the classification of special education student are actually related to undiagnosed vision problems. The increasing prevalence of 3D technology in movies, TV, and in video games such as Nintendo’s 3DS may help identify these subtle visual disorders that often dramatically and negatively impact learning. The inability to appreciate 3D may serve as a sign of an undetected visual problem such as anisometropia or amblyopia. This study will investigate at what level of uncorrected anisometropia and decreased vision a patient will lose the ability to appreciate stereopsis on the Nintendo 3DS.

Methods: Fifty subjects (mean 25.14 years, range 22-33 years) were recruited. All participants exhibited minimal corrected visual acuity of 20/20 OD, OS, OU at near and stereoaucity of 25 seconds of arc on the Wirt circles using the Randot Stereotest. Bangerter occlusion foils were introduced in front of the subject’s dominant eye in ascending strength and the subject was asked to identify whether or not they appreciated stereopsis while playing a Nintendo 3DS car racing game, Ridge Racer 3DS. The procedure was repeated using plus lenses of ascending power. Foils and plus lenses were introduced for 30 seconds, and the procedure continued until the subject reported two consecutive negative responses. The order of procedures (foils or plus lenses) was controlled.

Results: The mean Bangerter foil endpoint at which subjects lost the ability to appreciate stereopsis was 0.2684 (SD=0.1608) and the mode was 0.3 (Snellen equivalent ~20/70). The mean plus lens endpoint was +2.87D (SD=0.989D) and the mode was +2.50D. A correlation showed little to no association (r=-0.2434).

Conclusion: This study demonstrated that uncorrected anisometropia of 2.50D to 3.00D or a reduction in visual acuity to 20/70 in one eye affects the ability to appreciate stereopsis using the Nintendo 3DS. Similar 3D technology in movies, television, and phones will help uncover visual disorders such as amblyopia that might not have been otherwise identified by the patient or parent.

CHANGES IN VISION, BALANCE, GAIT AND DIZZINESS WITH BALANCE-BASED-TORSO WEIGHTING; A CASE REPORT ON A WOMAN WITH MS

Author: Laurie Chaikin, OD, OTR/L,FCOVD, Optometrist, Private Practice
Co-Author: Cindy Gibson-Horn, PT

Background: People with MS have numerous medical impediments due to the unpredictable demyelination in the brain, spinal cord, and optic nerve. Common impairments affecting gait and or balance in MS are disturbances in sensation, vision, and vestibular function, as well as weakness, spasticity, ataxia and fatigue. Balance-Based Torso-Weighting (BBTW) is an intervention that begins with assessment of directional balance impairment during standing in the Romberg position with eyes open (EO) and eyes closed (EC).
Anticipatory and reactive control is assessed with trunk perturbations at the shoulder and pelvis. Small weights in \( \frac{1}{2} \) and \( \frac{1}{4} \) pound increments are strategically placed on the torso to improve balance reactions.

**Methods/Case Summary:** MC is a 49-year-old female diagnosed with MS nine years prior after experiencing severe vertigo. She was provided with BBTW garment in 2002. In 2010 she was re-assessed to determine the continued effects of BBTW both immediately and short-term (4 months). Symptoms included visual complaints of eye fatigue, reduced reading time, loss of place when reading, blurred vision at near, nausea with eye movement; instability with standing and walking; spontaneous vertigo and disequilibrium induced by motion and positional changes in all positions.

**Results:** With the BBTW, MC demonstrated immediate improvements in symptoms, vision and balance skills.

**Discussion/Conclusion:** MC remarked that with the BBTW things looked clearer; she showed immediate ability to track repeatedly both horizontally and vertically with ease, with no adverse balance responses or dizziness. The measured improvements in stereopsis, convergence skills, fixation stability would normally be expected only after months of vision therapy. She also showed immediate improvement toward normalization of the sensory organization test and Dynamic Gait Index. Her center of gravity (COG) became consistent. Each sensory system transmits spatial information about body motion: vestibular, visual, proprioceptive. Wearing the weights on the trunk may provide augmented proprioceptive input, impacting vision through cerebellar pathways. Perhaps the additional input allows for increased automation of balance function, enabling increased capacity for attending to visual input.

**COMPUTERIZED HOME VISION THERAPY: PATIENT PREFERENCES**

**Author:** Kathleen O'Leary, OD  
**Pediatrics and Binocular Vision Resident, Illinois College of Optometry**  
**Co-Author:** Alicia Nehls, OD; Dominick M. Maino, OD, MEd, FAAO, FCOVD-A

**Background:** Computerized home vision therapy is a convenient option for patients with binocular vision disorders. When computerized home vision therapy is not used in conjunction with in-office optometric vision therapy, patient compliance and motivation becomes an even more important component in success.

**Methods:** Thirty-one optometry students, aged from 22 to 31 years of age, participated in performing one horizontal vergence technique from three different computerized home vision therapy programs. These programs included the HTS (from Home Therapy Solutions), Computer Aided Vision Therapy: Computer Vergences (Vogel), and RetCorr AB (Sweden). Afterwards, a brief survey was given that rated each of the three therapy programs.

**Results:** Statistical analysis noted that 71% of subjects most often preferred using the RetCorr AB therapy device, 16% the HTS system, and 13% Vogel. There was a significant difference between RetCorr AB vs Vogel and HTS vs Vogel (p<0.001). The HTS and RetCorr AB were preferred by participants over the Computer Vergence program. There was no significant difference found between RetCorr AB and HTS on more than half of the survey questions administered. There was also no statistically significant difference between overall patient preference for the RetCorr AB vs the HTS (p=0.091).

**Discussion/Conclusion:** In the study, RetCorr AB and HTS were both found to be favored by participants. Having an understanding of what patients prefer will help optometrists who provide vision therapy in selecting appropriate treatment tools for home use. RetCorr AB and HTS appear to be the preferred option for patients that may lack motivation and tend to be less compliant for computer moderated vergence therapy.

**BLOGGING, TWEETING AND PINNING: COVD’S MISSION ON THE WEB 2.0**

**Author:** Rochelle Mozlin, OD, FAAO, FCOVD, SUNY College of Optometry

Websites are no longer a place where users passively read information that has been carefully crafted for a specific audience. The Web 2.0 focuses on creativity, collaboration, conversations and communities. The World Wide Web has evolved and this evolution has created greater opportunities for enhancing public awareness of COVD’s mission and the accomplishments of both the organization and its members. COVD’s blog, Twitter, and Pinterest are examples of COVD’s ventures into social networking as part of the public awareness campaign. Each of
these applications presents a different pathway to promoting COVD’s mission. Becoming familiar with these applications and how to use them will offer COVD’s members another strategy to build their practices. COVD’s presence and public awareness campaign can be strengthened by greater involvement of its members in Web 2.0 applications.

CHARACTERISTICS AND MANAGEMENT OF VERTICAL OCULOMOTOR DEVIATIONS: A RETROSPECTIVE ANALYSIS

Author: M. H. Esther Han, OD, FCOVD, FAAO
Co-Authors: Chajka KA, Rutman H, Petrosyan T, Schulman EL, and Ciuffreda KJ, SUNY College of Optometry

Background: This study utilized a retrospective analysis to create a profile of patients with vertical oculomotor deviations and to examine the efficacy of optometric vision rehabilitation (OVR) as a treatment modality.

Methods: Records were reviewed for 330 patients who were diagnosed with a vertical oculomotor deviation upon examination at the University Eye Center (UEC) from the years 2005-2010. Presenting complaints, referral source, and descriptions of the deviations were analyzed. Previous interventions were noted, and treatment recommendations were reviewed. Of those patients for whom optometric vision rehabilitation (OVR) was recommended, results of this therapy and its stability on follow-up were evaluated.

Results: The most common presenting complaint was diplopia (42% of the patients), and the most common referral source was a self-referral (61% of the patients). The most prevalent vertical deviation was a constant, comitant hypertropia of small magnitude (defined as 1-5Δ). Concurrent horizontal strabismus was present in 55% of the patients. Previous interventions included surgery, prism, and OVR. Treatment recommendations were primarily prism (40%) or OVR (33%). For those patients who were recommended OVR, 59% completed their program. Of these patients, 45% reported that their primary symptoms were reduced. All patients who were available for follow-up maintained a stable reduction in their symptoms.

Conclusions: This analysis provides eye care providers with a profile of patients with vertical deviations. It also demonstrated that optometric vision rehabilitation can be a minimally invasive and highly effective treatment option.

SLEEPING BEAUTY GETS AN EYE EXAM: A CASE REPORT AND LITERATURE REVIEW OF NARCOLEPSY

Author: Jeanna M. Liechty, OD, Pediatrics and Vision Therapy Resident, Southern College of Optometry
Co-Author: Dr. Marc Taub, OD, Chief of Vision Therapy and Rehabilitation

Background: Narcolepsy is a condition characterized by chronic sleepiness and a marked disorganization of sleep/wake behavior. It usually begins in the teens and early twenties, although symptoms can begin in young childhood or after the age of 40 years. All narcoleptic subjects have chronic sleepiness, but the intensity varies across the day and between individuals. Narcoleptic subjects often have abnormal manifestations of rapid eye movement (REM) sleep that intrude into wakefulness, including cataplexy, hypnagogic hallucinations, and sleep paralysis. While the literature investigating the ocular effects of narcolepsy is limited, reports of inattention, poor memory, blurry vision, diplopia, and automatic behaviors such as driving without awareness have been reported.

Case Report: A ten-year-old female reported for a comprehensive examination complaining of distance blur for the past few months. She was diagnosed with narcolepsy at an early age and was taking Xyrem BID. Her mother noted that she is allowed to take frequent naps at school and the teacher wakes her to continue her work. She is doing well in school and is on the Honor Roll. Entering visual acuity is 20/30 OD, 20/70 OS, 20/25 OU at distance and 20/20 OD, OS, OU at near. Chair skills including EOMs, confrontation fields and pupils were unremarkable with the exception of the patient continually falling asleep. A distance pair of glasses was issued: -0.50D, 20/20; -1.25D, 20/20. NRA/PRA were balanced with this prescription and the FCC was +0.75 OD, OS. NPR was “to the nose” and accommodative amplitudes were 13D OD, OS. IOP (13mmMg OU) was taken with the NCT as we were afraid the patient would fall asleep and injure herself during Goldman tonometry. Anterior and posterior segment evaluation was normal.
Discussion/Conclusion: Narcolepsy is a chronic disorder that can severely affect a patient's quality of life. Understanding the signs and symptoms can decrease the chance of misdiagnosis. Some narcoleptics can manage their symptoms with several day-time naps; however most patients require treatment with a wake-promoting drug. None of these drugs completely eliminates sleepiness, but these medications usually reduce sleepiness enough for substantial improvements in performance and quality of life. Optometrists should be aware of the condition, the treatments available and the side-effects of medications used.

TO CUT OR NOT TO CUT, OR WHEN TO CUT; THAT IS THE QUESTION?

Author: Tressa F. Eubank, OD, FAAO, FCOVD, Professor and Clinical Consultant, Southern College of Optometry, The Eye Center

Background: Mr. G, a 61yo, presented to the VRS at TEC on 6-02-09 with 6th nerve palsy of the OD post stroke 2nd to consequences arising from a MVA on 3-17-09. Mr. G. was told to occlude the right eye to eliminate the diplopia and wait for several months to see if the paralytic strabismus would resolve. Medical history revealed hemorrhaging of the left frontal lobe, right occipital lobe, subluxation of the atlantocipital requiring surgical repair, and mild paralysis on the right side. General medical revealed history of diabetes and HTN, both under moderate control.

Case Summary: Vision exam revealed: no ability to adduct the right eye; nasal sclera was not visible; no muscle entrapment noted using forced duction; 45 pd. right esotropia; DVA 20/30+ OD, OS,OU; NVA 20/25+. Application of binasal occlusion to loaner plano spectacles was done (OD= 19mm from nasal eyewire, OS = 11mm from nasal eyewire ) on that visit with d/c of patching;. A VT program (including the use Fresnel press-on prisms) was initiated with 1st visit on 6-16-09 at which time it was noted that the OD was able to reach midline with jerkiness. Mr. G. began 2 ½ years of office and home-based activities resulting in significant decrease in diplopia by 11-09 and 10pd. alternating esotropia by 12-2011. In January, 2012, surgical intervention was discussed to eliminate the residual strabismus which was followed up by surgery in April. On 6-5-12, Mr. G. had 6pd. of esophoria and was advised to continue VT to enhance his visual efficiency. A review of the Mr. G’s general therapy and his muscle fields (from 5-2010 through 6-5-2012) will be presented.

Discussion: Should strabismus surgery be considered? If so, when? Would Mr. G have had the successful outcome without vision therapy first? Should we have considered surgery earlier in this case?

THE PEDIATRIC AND BINOCULAR VISION RESIDENCY AND THE MICHIGAN COLLEGE OF OPTOMETRY

Author: Alison Jenerou, OD, Michigan College of Optometry
Co-Author: Mark Swan, OD, Michigan College of Optometry

Background: The Pediatric and Binocular Vision Residency at the Michigan College of Optometry is a flourishing residency which began in 2009. The challenging and comprehensive residency focuses on producing a competently trained professional skilled in the assessment and management of the pediatric patient with special emphasis in infant and preschool care, integrating information processing, and binocular vision management and treatment.

Summary: With the Michigan College of Optometry’s state of the art new facility, the full time resident has the opportunity to hone their skills in the vast area of pediatrics and special populations, including binocular vision disorders, strabismus, amblyopia, and visual processing delays. Serving at the University Eye Center along with duties in private practice, school based clinics, emergency on call, and a community health center, allows for patient and practice diversity. The university setting also allows for didactic and research responsibilities while working with the experienced faculty. The program is flexible and allows for adjustments to meet the resident’s goals and special interests.

Conclusion: The Pediatric and Binocular Vision Residency at the Michigan College of Optometry challenges the resident to become a better clinician in the area of pediatrics by providing guidance and supervision as the resident keeps their autonomy in directing their education to enforce lifelong learning in their professional career. Direct questions about the residency to: the Director of Residencies, Dr. Bruce Morgan at morganb@ferris.edu or the Residency Supervisor, Dr. Paula McDowell, PaulaMcDowell@ferris.edu.
CYCLOVERTICAL DEVIATION: AN ANSWER TO “DOC, MY GLASSES DON’T WORK”
Author: Yunjie (Annie) Hao, BS
Student/ Southern College of Optometry
Co-Authors: Eric D. Weigel, OD; Drs. Weigel and Lohmueller, Optometrists, PC

Background: Patients with a cyclovertical deviation can experience varied and uncomfortable visual symptoms. These symptoms can easily be confused for simply vertical deviations and unfortunately overlooked during the exam. Detection and treatment of a cyclovertical deviation can greatly improve a patient’s quality of life. No treatment plan works for all patients; this presentation will highlight the successful resolution of one case example.

Case Summary: A 61-year-old white male presented with an initial chief complaint of diplopia. He reported being uncomfortable with driving and said he could not see road signs well enough. History revealed that he had worn vertical prism for the past 25 years, but for the past 6 years his glasses “haven’t been right.” He reported being involved in a car accident when he was a teenager and that he is “missing an eye muscle in his right eye.” He also has a history of Meniere’s disease and had ear surgery 9 years ago for sac decompression.

Upon examination he was found to have a moderate vertical deviation. Fixation disparity testing showed vertical alignment with all prism amounts between 3.5 and 7Δ BU OD. Double Maddox rod testing revealed a 15 degree excyclorotation. The vertical deviation and excyclorotation deviation was also revealed with cheiroscopic tracing.

Two treatment options, a surgical option and a lens option, were presented to the patient; a monovision lens treatment plan was pursued. The visual acuities with the finalized prescription of OD + 3.50-1.25 x 122 and OS + 1.00-2.25 x 052 were 20/20-3 OU at distance and 20/20-2 OU at near. The patient reported significantly improved comfort when driving and double vision was no longer an issue.

Discussion: The patient with a cyclovertical deviation can have a very difficult time with fusion and ocular comfort. The exact prevalence of cyclovertical deviation and cyclorotation are uncertain as they are under reported in the literature. Since cyclovertical deviations are rare, it is not always the first thing to come to mind when in the exam room when a patient complains of diplopia. The purpose of this poster is the raise awareness of the condition and to highlight the various methods for treatment.

PRESENCE OF ASTIGMATISM RELATED TO ACADEMIC READINESS IN PRESCHOOL CHILDREN
Author: Gale Olanski, OD, MEd,
Assistant Professor, Salus University
Co-Authors: Jeremy Wilmer, PhD; Elise Ciner, OD, FAAO; Marc Taub, OD, FAAO, FCOVD; Daniella Rutner, OD, MS, FAAO, FCOVD

Background: Previous investigations have begun to probe for an association between uncorrected refractive error and measures of academic readiness, yet few studies have looked specifically at astigmatism.

Methods: A vision and academic record review was performed on 176 three- to five-year-old children enrolled in the Philadelphia Public School District Head Start Program. Each child had undergone a non-cycloplegic refraction as part of their vision screening and had no binocular disorders or developmental delays. Academic readiness was assessed by the teacher reported Work Sampling System (WSS) and the parent reported Ages and Stages Questionnaire (ASQ).

Results: Academic readiness of the 81 children who had astigmatism ≥ -0.50 D in at least one eye (mean astigmatism = -1.60 D, median astigmatism = -1.50 D) was compared to that of the remaining 95 “non-astigmatic” children. The astigmatic children had lower overall academic readiness than the non-astigmatic children, as assessed by both teachers (WSS p=.002) and parents (ASQ p=.02). The astigmatic children scored significantly poorer than the non-astigmatic children on three of four WSS subscales (language and literacy, p<.001; personal and social development, p=.003, physical and health development, p=.01; math, p=.16) and three of five ASQ subscales (communication, p=.002; personal and social, p=.05; gross motor, p=.02; fine motor, p=.36; problem solving, p=.15) (reported p-values are one-tailed). These differences between groups persisted when statistically correcting for spherical refractive error, suggesting that astigmatism per se relates to academic readiness.

Conclusions: The presence of astigmatism, detected in a screening context, appears to be selectively associated with reduced academic readiness in at-risk preschool-aged children, particularly in
domains of language and communication, social functioning, and some aspects of motor coordination.

PRE-AND POST-VISION TRAINING MEASUREMENTS OF DYNAMIC AND SUSTAINED ACCOMMODATION IN ACCOMMODATIVE INSUFFICIENCY

Author: Tomohito Okumura, MEd, FAAO, FCOVD-I, Osaka Medical College LD Center
Co-Authors: Eiji Wakamiya MD, PhD;1,2 Hannu Laukkanen, OD, MEd, FAAO;3 Hiroshi Tamai MD, PhD1,4
1Osaka Medical College, LD Center; 2Aino University, Faculty of Nursing and Rehabilitations; 3Pacific University, College of Optometry; 4Osaka Medical College, Department of Pediatrics

Background: Accommodative insufficiency (AI) has been reported to be one of the leading causes of asthenopia with near work in schoolchildren. Previous researches found that accommodative insufficiency should be defined by objective methods because the prevalence of accommodative insufficiency defined by objective measures was much higher than estimated by clinical subjective measures. However, few studies reported that characteristics of pre- and post-measurements of accommodation in school children with AI by using objective measures. This study examined sustained and dynamic accommodative functions in a child with AI using objective, infrared, open-field autorefracter to investigate the advantage for clinical use.

Methods: A 12-year-old girl with AI served as the subject for this study. Her chief complaints were difficulties to keep attention for near work and reading. Accommodative responses were obtained using the commercially-available WAM 5500 objective, infrared, open-field autorefractor (Grand Seiko, Hiroshima, Japan). Vision training to improve accommodative skills was conducted for the subject.

Results: Accommodation measurements with WAM-5500 with the subjects clearly showed instability and high lag of accommodation with dynamic and sustained conditions. After vision training, results of WAM-5500 showed stable sustained accommodation and normal amount of lag. The information could be overlooked with traditional examinations because the examinations tend to be performed subjectively in short period of time.

Discussion: WAM-5500 with high-speed mode would be a useful tool to assess pre- and post-training conditions of accommodation, such as objective measurements of dynamic and sustained accommodative response.

AN EVALUATION OF VISUAL FATIGUE WHEN PLAYING 3D GAMING SYSTEMS: A PILOT STUDY

Author: Cade Kowallis, BS; Jordan Netzel, BS 2nd Year Students, Southern College of Optometry
Co-Author: Marc B. Taub OD, MS, FAAO, FCOVD

Background: The increasing prevalence of 3D technology in movies, TV, and in video games such as Nintendo’s 3DS and PlayStation 3D is a big part of the future of gaming. However many people are unable to appreciate the 3D aspect or may experience increased visual fatigue when playing 3D gaming systems. This study will investigate symptom levels before and after playing two different gaming systems in both 2D and 3D.

Methods: Twenty-five subjects (PlayStation, n=14; Nintendo DS, n=11) with a mean age of 24.3 and a range of 22-27 years participated. Inclusion criteria included: stereoacuity of 40 seconds of arc on the Wirt circles using the Randot Stereotest and minimal corrected visual acuity of 20/20 OD, OS, OU, at near for the Nintendo DS and 20/20 OD, OS, OU, at far for the Playstation. Participants filled out a seven question, five-point Likert scale visual fatigue symptom survey before playing. Participants played either the Nintendo 3DS car racing game, Ridge Racer 3DS, or the PlayStation 3D car racing game, Motorstorm Apocalypse, for 30 minutes. After playing the same survey was completed. Participants then returned on a different day at the same exact time of day to play the same game in the different presentation format (2D or 3D), for another 30 minutes. Order of presentation format (2d or 3D) was randomized to eliminate bias.

Results: Nintendo DS: ANOVA revealed significant survey score differences for all participants (f=0.0005). Student t-test showed significant difference between initial symptoms and both 2D (p=0.014) and 3D (p=0.0002) but not between 2D and 3D (p=0.073). ANOVA performed on individual questions in the survey showed a range of 0.017 to 0.57 with only the question related to eyestrain showing significance (f=0.017).
PlayStation: ANOVA revealed significant survey score differences for all participants (f<0.0001). Student t-test showed significant difference between initial symptoms and both 2D (p=0.0002) and 3D (p<0.0001) and between 2D and 3D (p=0.0008). ANOVA performed on individual questions in the survey showed a range of 0.0022 to 0.38 with questions related to eyestrain (p=0.0095), headache (p=0.007), and dizziness (p=0.0022) showing significance.

Conclusion: Playing both PlayStation and Nintendo DS in both 2D and 3D presentations lead to increased symptoms related to visual fatigue. For both systems, the 3D presentation showed a greater increase in symptom levels but was only statistically significant for the PlayStation. Further study is warranted to better understand this relationship and the potential impact on both vision and gaming.

CONSIDERATIONS WHEN PRESCRIBING SPECTACLES FOR PROGRESSIVE SUPRANUCLEAR PALSY: A CASE REPORT

Author: Lisa W.T. Christian, BSc, OD, Interim Associate Director for Clinical Programs, Head, Binocular Vision Clinic, University of Waterloo, School of Optometry and Vision Science
Co-Authors: Tammy Labreche, BSc, OD, Interim Clinic Director, University of Waterloo, School of Optometry and Vision Science; Pardie Hamboyan, BScH, 4th year optometry student, University of Waterloo, School of Optometry and Vision Science

Background: Progressive Supranuclear Palsy (PSP) is a neurodegenerative disorder with no known cause or treatment. Symptoms present in the affected individual's early sixties, and involve difficulties with gait and balance. Approximately two-thirds of PSP patients develop visual symptoms within the first year from the onset of changes in mobility with the majority of symptoms involving the binocular vision system. These symptoms include: vertical supranuclear gaze palsy, fixation instability, phoria leading to diplopia, impaired smooth pursuit movements, decreased saccadic velocity, and visual dyslexia. Difficulty in managing, visual symptoms occur due to cognitive impairment, dysarthria, and bradykinesia. Primary eye care physicians should be aware of the clinical features of PSP and work with patients and their caregivers to provide optimal treatment.

Case Summary: A sixty four year old Caucasian female presented at the University of Waterloo, School of Optometry, External Geriatric Clinic for a full oculo-visual assessment in May 2006. The patient was diagnosed with PSP approximately 3 years prior, and complained of difficulties reading and eating for which she was previously prescribed progressive addition lenses. The patient exhibited a stiff back and neck and leaned backwards in her wheelchair throughout the examination. Examination findings included a recent onset exotropia, restriction in upward and downward gaze, and hypometric saccades. All findings were done through the patients current spectacles. Treatment for the patient included prescribing single vision reading glasses with base-down yoked prism, and single vision distance glasses with base-in prism. Vision therapy was recommended to the patient but was declined.

Conclusion: Primary eye care physicians play a key role in the appropriate management of visual symptoms caused by progressive supranuclear palsy. Patient complaints often involve difficulties with daily living tasks, such as reading and eating. Care must be taken to consider patient's posture in conjunction with visual findings when prescribing lenses that are beneficial to the patient. Single vision lenses with appropriate prism are recommended to treat visual symptoms caused by PSP. This case study hopes to raise awareness about progressive supranuclear palsy, its ocular manifestations, as well as introduce supportive treatment options.

PHOTOPHOBIA IN GENERALIZED SEIZURE DISORDER

Author: Laura R. Ashe, BS, BA
4th Year Intern, Southern College of Optometry
Co-Authors: Pamela H. Schnell, OD, FAAO, Assistant Professor, Southern College of Optometry; David A. Damari, OD, FCOVD, FAAO, Associate Professor, Southern College of Optometry

Background: Generalized Seizure Disorder is a condition in which both hemispheres of the brain are affected, leading to unconsciousness. Major types include: generalized tonic clonic, tonic, myoclonic, absence, and atonic. Seizures may be induced by hyperventilation or seeing flashes/strobes of light. Patients may experience auras, unnatural emotions, and strange sensations just before a seizure occurs. Some medical professionals use Generalized Seizure Disorder interchangeably with Epilepsy; however, not
all types of Epilepsy result in full body convulsions. Approximately 1 out of 131 individuals have Epilepsy, and of those 5% have Photosensitive Epilepsy (3-30 Hz is a trigger). Photosensitive Epilepsy is more common in children than adults and is less commonly diagnosed after the age of 20. Filtering lenses have helped decrease the number of seizures induced by bright lights.

Case Summary: BM, a 5-year-old male, was examined at Southern College of Optometry on March 16, 2012 following a neurology referral from LeBonheur Children’s Hospital. He complained of extreme photophobia and also experienced significant itching, watering, and burning in both eyes when not wearing his current cobalt blue filters. He had been taking anti-seizure medications since 2010 for generalized seizure disorder. He also had a service animal trained in the detection of impending seizure activity, in addition to the cobalt lenses. BM’s seizures were associated with aura and complete loss of consciousness. Examination findings included mild refractive error (mixed astigmatism), mild head movement on extraocular motility testing, and extreme photophobia, which was worse binocularly.

Discussion: Photophobia and other visual symptoms associated with seizure disorder or epilepsy are often very difficult to assess and treat. This case will discuss the implications of adjusting testing procedures to minimize photophobia, as well as options for treatment, including filters and lenses. In addition, the phenomenon of sensory overload will be addressed as it pertains to the case.

VISUAL PERCEPTUAL TECHNIQUES ADDRESSED BY ONLINE GAMES

Author: Pamela H. Schnell, OD, FAAO
Assistant Professor, Southern College of Optometry
Co-Authors: Elena Lopez, 2nd year Intern, SCO; Stephanie McLin, OD; Shannon Brown, OD

Background: Several home-based vision therapy systems exist which utilize computer activities to supplement training. These range in effectiveness, from some which have shown no benefit, to some which are highly effective when properly monitored and used in conjunction with office-based vision therapy. Due to the popularity of online gaming, however, patients may benefit from additional methods of addressing visual deficiencies, particularly in the area of visual perceptual skills. To that end, several free online games were evaluated as to their usefulness in addressing various areas of visual perception.

Methods: The authors evaluated 5 of the most popular games on each of several major web-based gaming sites and categorized them according to the visual perceptual skills most addressed, using the subtests of the Test of Visual Perceptual Skills (TVPS) as a categorizing method. Games were limited to those which could be played online without cost to the patient, as long as an internet connection was available. The results were collated into a spreadsheet format, which can be distributed to parents for home use or incorporated into an office-based vision therapy program. Major web sites utilized were MSN, AOL, and Yahoo; additional sites will be added to the spreadsheet as they gain popularity. The spreadsheet can be updated at individual offices to reflect changes in popularity of individual games.

Discussion/Conclusion: Of the most popular games identified, many were categorized as either “puzzle” or “word.” Among the visual perceptual skills addressed were visual discrimination, visual memory, and visual-spatial relationships, as well as laterality and directionality. Although the latter is not strictly a subtest of the TVPS, enough games utilized this skill so as to make it worthwhile to include in the categorization. It is the hope of the authors that the collated spreadsheet will enable providers to expand their options for home activities during the course of their currently-implemented office-based therapy, and provide an easily accessible resource for parents and patients.

OPTOMETRIC MANAGEMENT OF NYSTAGMUS AND ANXIETY WITH YOKED PRISM

Author: Kelly Meehan, Clinical Assistant Professor, Midwestern Arizona College of Optometry
Co-Author: Alicia Feis OD, Midwestern Arizona College of Optometry

Background: Congenital nystagmus is a condition of involuntary bilateral conjugate oscillation of the eyes developing within the first six months of life. Optometric treatment options such as spectacle, contact lenses, and yoked prism may be used to enhance cosmesis, and improve visual function.

Methods/Case Summary: Ocular history was positive for congenital nystagmus and strabismus
OS. Current medications included Gabapentin, Cymbalta, and Ambien. Last eye exam was 4 months prior with ophthalmology where a PAL spectacle Rx was given. Snellen acuities were taken through the patient’s habitual PAL Rx with a +10.00 lens to avoid iatrogenic reduction of acuity due to latent nystagmus. Visual acuities were 20/40 OD, OS and 20/25 OU at distance. Cover test revealed a 10Δ CLET and a 10Δ CLHyperT. On gross observation a slight head turn to the right was noted. EOM’s revealed jerk like nystagmus with a null point in left gaze and an increase in nystagmus frequency was noted in all right gazes. No significant changes from the habitual Rx were found on manifest refraction. Ocular health examination was unremarkable. Due to the longstanding nature of the patient’s condition a referral to neurology was not completed. A single vision Rx was released for computer use with yoked prism to position the eyes at the null point. The patient was also recommended to use a document holder to the right of her computer screen while entering in the needed serial numbers. The patient presented for follow up 2 weeks later where she reported no double vision, decrease in mistakes, and a decrease in anxiety while in the workplace. She was able to quit counseling and resume her duties in the operating room.

Discussion/Conclusion: Conventional treatments of congenital nystagmus include pharmalogical agents such as GABA agonists or inhibitors to increase foveation time. Activities of daily living are often affected in these patients and optometrists have a unique skill set that may be used to improve their quality of life. Knowledge of appropriate lenses and prism treatment options are critical for these patients.

OPTOMETRIST COMFORT IN DISCUSSING PATIENT HEALTH ISSUES

Author: Lekha Samuel, BS, 3rd year student, Southern College of Optometry
Co-Authors: Susan Evans, Southern College of Optometry; Marc B. Taub OD, MS, FAAO, FCOVD-Southern College of Optometry; Jan Gryczynski, MA, PhD, COG Analytics

Background: Recent research has suggested that physicians’ personal characteristics influence communication with patients about health concerns. This study aimed to characterize optometrists’ attitudes and behaviors regarding the provision of behavioral health counseling services in the areas of smoking, weight/nutrition/exercise, stress reduction, and hypertension/diabetes.

Methods: A self-administered questionnaire was electronically mailed to 3000 optometric physicians in May 2012. Email addresses were obtained from two sources: the Optometric Extension Program Foundation and the Blue Book of Optometrists. The survey included twenty Likert scale questions, five each in the areas of smoking, weight/nutrition/exercise, stress and diabetes/hypertension. For each of the behavioral health domains, the survey examined perceived provider comfort in addressing the issue with patients, actual provider behavior in addressing the issue, attitudes towards prioritizing the issue, perceived behavior of optometrist peers, and perceived adequacy of professional training in preparing them to address the issue. There was no compensation for participation in this survey. The current study reports findings from the initial early returns of the survey (n=205).

Results: Most respondents reported they were comfortable discussing smoking (67.2%) and agreed that smoking cessation counseling should be a priority in optometric practice (57.6%). However, respondents underestimated the behavior of their peers in prioritizing smoking cessation. Only 18.5% thought that other optometrists prioritized smoking cessation with their patients, while approximately half of the sample reported actually addressing smoking cessation regularly (49.8%).

For weight/nutrition/exercise, 54.6% agreed they were comfortable discussing these issues with patients and 44% agreed they talk to patients regularly about weight, nutrition, and exercise. Most agreed that weight, nutrition, and exercise counseling should be a priority for optometrists (50.8%), but only 14.7% thought other optometrists place a priority on weight, nutrition, and exercise counseling.

Most respondents reported being comfortable with talking to patients about stress (61.0%), 42.9% agreed that they talked to patients regularly about stress, and 35.6% felt that stress reduction counseling should be a priority in optometric practice. Only 12.2% felt other optometrists addressed stress reduction issues.

Hypertension/Diabetes was the behavioral health domain with the highest degree of comfort and acceptability among respondents. The majority of respondents agreed they were comfortable with discussing hypertension/diabetes (95.6%), 93.2%
reported talking about hypertension/diabetes with their patients regularly, and 94.2% thought that doing so should be a clinical priority. Most respondents agreed that other optometrists place a priority on hypertension/diabetes (81.5%), although like for the other behavioral health domains, perceived behavior of peers was lower than actual behavior as reported by the sample.

Perceived preparation from professional training was low for addressing patient smoking, weight/nutrition/exercise, and stress, with over 50% disagreeing that their professional training adequately prepared them for addressing these issues.

**Conclusion:** Over the past thirty years, the profession of optometry has increasingly moved in a medical direction. Optometrists now practice as part of multidisciplinary teams and even in the same offices as medical doctors, not only ophthalmologists. They are expected to treat a greater number of conditions and delve into patient history in greater depth than ever before. This study provides data as to whether this is actually happening in offices across the United States. Not surprisingly, comfort related to hypertension/diabetes is the highest. Optometry programs and those providing continuing education must do a better job at educating their audiences of the importance of smoking, weight/nutrition/exercise, and stress on visual health.

**DEVELOPMENTAL OUTCOMES OF SHAKEN BABY SYNDROME: A CASE REPORT**

**Author:** Karen A. Kehbein, OD,
Instructor, Southern College of Optometry

**Co-Authors:** Nicholas Czinder –Michigan College of Optometry; Katie Sutter- Michigan College of Optometry

**Background:** Shaken baby syndrome is a form of non-accidental trauma caused from violently shaking a child. The classic triad of findings include retinal hemorrhages, subdural hemorrhages, and encephalopathy. In addition to these symptoms, many longterm outcomes are related to physical disabilities, cognitive impairments, behavior disorders, and visual processing disorders.

**Case Summary:** An eleven-year-old African American male presented for a comprehensive eye examination with the complaint of an eye turn. The patient suffered from shaken baby syndrome as an infant, which resulted in swelling of his right optic nerve. As a result, the patient has right optic nerve atrophy, a constant right exotropia, myopic anisometropia, and decreased best corrected visual acuity. A new glasses prescription was written, and the parents were informed of the importance of regular comprehensive eye exams and possibilities for visual aids/therapy to help with his activities of daily living.

**Discussion:** Developmental outcomes related to shaken baby syndrome can include many visual and behavioral disorders. This patient has a history of shaken baby syndrome, which is believed to have caused the right optic nerve atrophy. This then may have resulted in the large refractive error difference between the two eyes, which is likely now causing the reduced acuity. Additionally, patients with a history of shaken baby syndrome typically show problems with visual memory, cognitive impairment, and behavioral disorders.

**TREATING FUNCTIONAL ANOMALIES ASSOCIATED WITH ORGANIC DISEASE**

**Author:** Dominick M. Maino, OD, MEd, FAAO, FCVD-A, Professor of Pediatrics/Binocular Vision Illinois College of Optometry/Illinois Eye Institute

**Co-Authors:** Darrell Schlange, OD, DOS, FAAO, Associate Professor Illinois College of Optometry/Illinois Eye Institute

**Introduction:** Individuals with organic pathology often exhibit functional overlays that are frequently ignored by health care providers. This case report presents the diagnosis and treatment of an adult with suspected Multiple Sclerosis (MS)/neurological disease, various ocular pathologies and a number of functional vision anomalies.

**Case Report:** DL is a 42 y/o African American (AA) female who was first seen in 2012. Over the preceding years she was followed for possible MS/unknown neurological disease, hypertension, and diabetes. DL had numerous complaints that included headache, blurred vision, diplopia and symptomology associated with allergies and dry eye. She also exhibited a binocular vision dysfunction with the Visagraph demonstrating oculomotor abnormalities that showed issues with fixations, regression, average span of recognition, reading rate, and saccade abnormalities. A Test of Variables Attention (TOVA) noted an ADHD score of -5.81 as well. After 25 in-office optometric therapy visits
all symptoms associated with the binocular vision, oculomotor dysfunction and attentional issues were resolved. The symptoms associated with dry eye and allergies persisted however, even though artificial tears, Restasis and other commonly used therapies were utilized. Once punctual plugs were inserted, the discomfort previously noted was eliminated. All neurological signs and neuro-anatomical changes as seen on various scans were stable with the specific neurological disease still undiagnosed. DL was able to return to work free of all symptoms that initially made her quality of life almost unendurable.

**Discussion:** This case illustrates how remediating the functional vision disorders that overlay pathological/organic disease, as well as treatment of ocular-surface disease can significantly improve the patient’s quality of life. Up until this time, all other doctors she was working with tended to ignore or minimize her subjective complaints with at least one health care provider suggesting she needed psychiatric intervention. She has returned to a quality of life that now allows her to work and recreate without pain. It is important for all health care professional to remember that functional overlays often accompany pathological disease and that these dysfunctions can be treated successfully.

**EVIDENCE OF FAMILIAL LINK IN VISION PROCESSING DISORDERS**

**Author:** Sarah Hinkley, OD, Associate Professor, Chief of Vision Rehabilitation Services, Michigan College of Optometry at Ferris State University  
**Co-Author:** Paula Smith, OD, Illinois College of Optometry

**Background:** Visual information processing is the visual-cognitive ability to extract, organize, manipulate, integrate and process visual input. Visual processing disorders can have a significant impact on school performance. While many clinicians have observed a trend of visual processing disorders within the same family, there is little research in this area. The possible association between the heritability of visual processing disorders and hair color in this family was also investigated.

**Methods/Case Summary:** The study included a family of two parents and eight qualifying children with suspected vision processing disorders. Subjects ranged from five years old to 45 years old at the time of testing. All were given a Vision Information Processing Assessment, consisting of 11 common visual-perceptual tests and checked for persistent primitive reflexes, specifically, the Moro and Asymmetric Tonic Neck Reflexes. Scores were recorded for all areas, and subjects were grouped by sex and light or dark hair color to draw significant associations for each test and overall.

**Results:** All subjects except one demonstrated persistent primitive reflexes, indicating delayed gross motor development. All subjects scored within the age-expected ranges for the Peabody Picture Vocabulary Test, but results were varied across all other testing. In general, the dark-haired males had lower averages for visual information processing tests when compared to the light-haired individuals.

**Discussion/Conclusion:** There appears to be dramatic associations between the scores of family members on visual processing tests, however, the role of environment cannot be ruled out as a factor. Dark-haired male children produced similarly poor vision information processing test results when compared to light-haired children, all but one being female. There is need for more research in the area of heritability of visual processing, especially as it relates to gender and hair color.

**ARE DOCTORS AFFILIATED WITH OEP MORE COMFORTABLE IN DISCUSSING PATIENTS HEALTH ISSUES?**

**Author:** Susan Evans, 3rd Year Student, Southern College of Optometry  
**Co-Authors:** Lekha Samuel, BS, Southern College of Optometry; Marc B. Taub, OD, MS, FAAO, FCVO, Southern College of Optometry; Jan Gryczynski, MA PhD, COG Analytics

**Background:** Doctors that consider themselves developmental or behavioral optometrists differ from their medically oriented colleagues in philosophy of treatment of many refractive conditions, perceptual dysfunction and strabismic/non-strabismic binocular conditions. This study aimed to determine whether attitudes and behaviors regarding the provision of behavioral health counseling services in the areas of smoking, weight/nutrition/exercise, stress reduction, and hypertension/diabetes differed based on provider affiliation with the Optometric Extension Program (OEP).
Methods: A self-administered questionnaire was electronically mailed to 3000 optometric physicians in May 2012. Email addresses were obtained from two sources: the Optometric Extension Program Foundation and Blue Book of Optometrists. The survey was made up of twenty Likert scale questions, five each in the areas of smoking, weight/nutrition/exercise, stress and diabetes/hypertension. For each of the behavioral health domains, using a series of Likert-style agreement scales, the survey examined perceived provider comfort in addressing the issue with patients, actual provider behavior in addressing the issue, attitudes towards the importance of prioritizing the issue, perceived behavior of optometrist peers, and perceived adequacy of professional training in preparing them to address the issue. There was no compensation for participation in this survey. The current study reports findings from the initial early returns of the survey (n=205).

Results: Eighty-seven of the respondents (42.4%) were affiliated with OEP. OEP-affiliated optometrists did not significantly differ from their non-OEP counterparts in their comfort in addressing issues with patients, actual provider behavior, the importance of prioritizing and perceptions of other optometrists’ prioritization of counseling patients regarding smoking, weight/nutrition/exercise, stress, or hypertension or diabetes. There were also no differences between OEP-affiliated and non-OEP optometrists in perceived adequacy of their professional training in preparing them to address any of the behavioral health issues examined.

There were significant differences between OEP-affiliated and non-OEP optometrists in attitudes and behaviors surrounding the behavioral health domain of patient stress. Compared to their non-OEP counterparts, OEP-affiliated optometrists perceived greater comfort in addressing patient stress (p < .001), reported higher frequency of talking with their patients about stress (p < .001), and were more likely to think that optometrists should prioritize stress counseling in clinical practice (p < .001).

Conclusion: Optometrists affiliated with OEP are more concerned about stress and the effects of stress on the visual system. This should not come as a surprise as stress (systemic or visual) is one of the foundations of the organization’s teachings. On the other hand, attitudes and behaviors related to the other behavioral domains studied did not show the same relationship. This is an indication that optometrists affiliated with OEP are just as capable and likely to deal with these behavioral domains while also addressing stress and its impact on the visual system.

Can out of phoropter binocular findings be substituted for phoropter findings?

Author: Lauren Krawczyk, BS, 4th Year Student, Southern College of Optometry
Co-Authors: W.C. Maples, OD, MS, FAAO, FACBO, FCOVD, Professor Emeritus, NSUCO; Marc B. Taub, OD, MS, FAAO, FCOVD, Southern College of Optometry; Jan Gryczynski, MA, PhD-COG Analytics

Background: Many optometrists typically rely on phoropter-based testing, while most behavioral optometrist rely on a combination of both phoropter and free-space based testing. Investigative research was conducted to determine the efficiency and consistency of free-space versus phoropter testing. The goal was to assess if free-space testing differed from the phoropter data collections.

Methods: Forty subjects were tested twice with a two-week intermission. The following tests were selected to compare between free-space and the phoropter: cover test at distance and near, NPC, Howell card at distance and near, modified Thorington, vergence in and out of phoropter at distance and near, associated phoria using the Saladin card, fixation disparity in and out of phoropter using the Saladin card, phoria in and out of phoropter. The COVD check list, visual acuity, and stereo tests were also completed. The tests were randomized to control for fatigue. Statistical analyses were conducted using a generalized linear mixed modeling approach for repeated measures.

Results: Significant differences were found between the phoropter and free-space based tests for 9 out of the 19 variables (p=0.021 to <0.001). Scores were more exophoric by 1.05Δ with the near cover test compared to near phorias. For BI recovery and BO break and recovery at distance, scores on the phoropter were 1.45, 2.72, and 3.86Δ, higher respectively, than on the corresponding free-space tests. Relative to the free-space test, the phoropter yielded lower scores on BI break at near by 1.49Δ, but higher scores on BI recovery at near by 1.90Δ and higher scores on BO blur at near by 5.91Δ. The largest difference between the phoropter and free-space measures was observed for BO break at near (phoropter scores 9.70Δ higher than...
free-space scores) and BO recovery at near (phoropter 

scores 11.41Δ higher than free-space scores). No 
significant interaction effects were identified between 
measurement type and COVD checklist scores or 
stereo acuity. Thus, the magnitude of the differences 
between the phoropter- and free-space-based tests do 
not differ appreciably as a function of patient COVD 
checklist scores or stereo acuity.

Conclusion: Of the 9 differences found in this 
analysis, 8 were found in comparing free-space and 
phoropter vergence testing. As there are established 
norms for each testing type, examiners must use the 
appropriate standards when assessing patients, and 
comparisons cannot be made between them. While 
comparisons of cover test at distance, Howell card 
at distance and near, modified Thorington at near, 
associated phoria, and fixation disparity to their 
respective in-phoropter counterparts did not reveal 
differences, it is still recommended that clinicians 
avoid randomly switching between the tests as this in 
theory adds unneeded variability.

RE-LEARNING BINOCULAR VISION AFTER 
SEVERE MONOCULAR TRAUMA

Author: Shephali Patel, OD, MS, 
Optometry Resident Northport VAMC 
Co-Authors: Jessica Fulmer, OD, Northport 
VA Medical Center: Primary Eye Care, Vision 
Rehabilitation, and Low Vision; Hanna Kim, OD, 
Northport VA Medical Center: Primary Eye Care, 
Vision Rehabilitation, and Low Vision; Hanna 
Kim, OD, Northport VA Medical Center: Primary 
Eye Care, Vision Rehabilitation

Background: The loss and restoration of 
binocular vision in adulthood is a prime example of 
neuroplasticity. Despite obtaining stereopsis during 
the critical period, adults that experience monocular 
trauma may have a disruption or demonstrate severe 
binocular vision difficulties irrespective of their final 
level of acuity. The disruption of binocularity in these 
patients involves both sensory and motor issues. Also, 
it is likely that the prolonged monocular deprivation 
can lead to loss of fusion and a poorer prognosis.

Methods/Case Summary: Patient WD is a 49 
year old white male who presented to the Northport 
VAMC Orthoptics clinic complaining of intermittent 
oblique diplopia following a transcleral IOL surgery 
OD. WD had a history of an eye injury OD 25 years 
prior, after which he was aphakic. Since WD was 
intolerant of CLs, he was essentially monocular for 
many years, and noted that he felt that he used OS 
for all tasks, but did use OD for “peripheral vision.” 
Post-surgically WD noted vision OD had improved 
significantly and BCVA OD was 20/25-2+2, and 
BCVA OS was 20/20. However, he noted he was still 
not using both eyes simultaneously most of the time. 
He reported when using both eyes at the same time, he 
experienced oblique diplopia with overlapping images 
and the image OD was approximately 30% smaller. 
With 3Δ BO and 3Δ BD OD, WD was able to fuse 
images, felt comfortable, and noted intermittent 
fusion in the distance. New spectacles were ordered 
and was to return in 3 months for a re-evaluation and 
to assess near vision tasks.

Three months later, WD noted there was an 
improvement in his distance binocular vision and 
was able to wear spectacles for an extended amount 
of time. Because of the aniseikonia, WD was trialed 
with an unequal ADD, and noted clear, single, 
comfortable binocular near and intermediate vision 
without prism. WD was scheduled for a 3 month 
follow up after use of the near and intermediate 
spectacles. Three months later, WD returned noting 
better comfort with distance, intermediate, and near 
vision however his depth perception and “stereopsis” 
remained fleeting. WD did report he was viewing 
binocularly for longer periods of time, but was unable 
to control fusion. WD was able to appreciate luster 
with current correction, but was fragile and showed 
an eso posture. WD was educated on the use of Brock 
string for gaze stabilization, appreciated physiologic 
diplopia, and was educated on anti-suppression 
techniques including using red acetate over OS. WD 
was encouraged to pursue in-office therapy, but at 
present was unable to commit to weekly sessions. WD 
will return every 2-3 months to learn new techniques 
and monitor progress.

Discussion/Conclusion: It has been previously 
postulated that the longer the period of reduced 
vision, the poorer the prognosis of binocularity. This 
case report demonstrates that with the proper tools 
and motivation, it is possible to regain binocular 
vision, even after years of monocular deprivation. 
With the use of common aids within our arsenal 
including prisms and unequal ADDs to provide equal 
input from corresponding retinal points, it is possible 
to gain the tools necessary to obtain binocular vision. 
Binocular stability can be further enhanced and 
reinforced with orthoptic therapy techniques.
MANAGEMENT OF ANISOMETROPIC MYOPIC AMBLYOPIA WITH SOFT CONTACT LENSES IN A 6 YEAR OLD

Author: Alicia Feis, OD, Clinical Assistant Professor, Midwestern University
Co-Author: Tina Esposito

Background: It has been traditionally believed that anisometropia of greater than 3.5 D constitutes a barrier for fusion. High degrees of anisometropia results in aniseikonia and possibly amblyopia from blur and/or abnormal binocular input to the brain. Optometric treatment options such as spectacles, contact lenses, patching and atropine are the most commonly used to improve visual function in these patients.

Methods/Case Summary: A 6 year old, female presented for her first eye examination. Ocular history was positive for an AXT that was first noted at age 3 with no intervention or treatment. Family ocular history was positive for amblyopia (father) and strabismus (uncle). Uncorrected snellen acuities were 20/400 OD, 20/200 OS at distance and 20/200 OD, 20/80 OS at near. Cover test revealed 25Δ CRXT with an A pattern at distance and 18Δ CRXT with an A pattern of greater magnitude at near. Global stereo was negative. Dry Retinoscopy showed -7.50-2.25x120 OD and -2.50-2.00x018 OS and cycloplegic retinoscopy showed -7.25-2.00x120 OD and -2.00-2.00x018 OS. BCVA with cyclo ret was 20/50 OD, OS. Ocular health examination was unremarkable. The patient was prescribed glasses for FTW. The patient presented for many subsequent follow up visits with poor to moderate compliance of full time glasses wear mainly due to cosmesis and patching which was initiated on the third follow visit. Due to poor compliance with glasses and patching and significant aniseikonia, soft contact lenses were prescribed for FTW. After 6 weeks of FT contact lens wear corrected snellen acuities were 20/30+2 OD, OS, OU at distance and near. Cover test showed a 14XP at near. All other entrance tests were unremarkable. Manifest refraction revealed -0.25-0.25 x 073OD and plano-0.25 x 052 OS with 20/20 VA OD, OS, OU at distance and near. Patient was prescribed the full cycloplegic refraction which reduced her diplopic symptoms at near and follow up was scheduled.

Discussion/Conclusion: Conventional treatments of amblyopia mainly focus on the optimal prescription to increase foveation time. Anisometropic myopes have a less common presentation of amblyopia. Contact lenses should still be considered as an option for our young myopic amblyopes when conventional treatment strategies aren’t working.

ONSET OF ACCOMMODATIVE ESOTROPIA IN ADULT PATIENT FOLLOWING LASIK PROCEDURE FOR ANTIMETROPIA

Author: Kaila M. Osmotherly, OD, Clinical Assistant Professor Midwestern University, Arizona College of Optometry

Background: Accommodative esotropia is a condition which typically presents in the developmental years secondary to high refractive error or a high AC/A ratio. Prognosis is favorable with early intervention including, but not limited to, optical treatment and vision therapy.

Methods/Case Summary: A 37-year-old female presented with complaints of fatigue and diplopia after short periods of near work. Onset of these symptoms began soon after undergoing a bilateral laser in situ keratomileusis (LASIK) procedure to compensate for refractive error. Prior to this procedure, the patient’s ocular history was positive for antimetropia (myopia OD, hyperopia OS). There was no history of amblyopia or strabismus prior to refractive surgery. Current medications include Cymbalta for depression. Unaided Snellen acuities were 20/20 OD, OS, OU at distance and near. Stereoacuity was negative for both global and local stereopsis. Cover test showed a 24Δ constant left esotropia at near. All other entrance tests were unremarkable. Manifest refraction revealed -0.25-0.25 x 073OD and plano-0.25 x 052 OS with 20/20 VA OD,OS, OU at distance and near, however the patient did show excessive plus acceptance during near testing. Her BCC results were +2.25 D; cover test was repeated through this lens which reduced the esotropia to 8Δ. The patient was dilated and a cycloplegic refraction was performed which exposed latent hyperopia of +2.25-0.50 x 075 OD and +2.00-0.75 x 060 OS with 20/20 DVA OD, OS, OU. Ocular health examination was unremarkable. The patient was prescribed the full cycloplegic refraction which reduced her diplopic symptoms at near and follow up was scheduled.
Building a School-Based Vision Clinic in Chicago: Our Experience After the First 18 Months

Author: Sandra S. Block, OD, MEd, Medical Director, School-based Vision Clinic, Illinois College of Optometry
Co-Authors: Melissa A. Suckow, OD, FAAO; Kathleen O’Leary, OD, Illinois College of Optometry

Background: The Illinois Eye Institute at Princeton Elementary School-Based Vision Clinic (Clinic) opened as a year round clinic in January 2011. It was born of a partnership between the Illinois College of Optometry (ICO) and the Chicago Public Schools (CPS). The objective was to provide eyecare to the children in CPS who were unable to access eyecare services due to lack of insurance or lack of follow through after recommendation from the school. The clinic is open to any child in Chicago regardless of ability to pay.

Methods: The Clinic is open Monday-Friday in the mornings. A CPS liaison schedules schools for each day school is in session. ICO schedules 3rd and 4th year students to provide eyecare in one of the 13 lanes. Four preceptors oversee the care. Walk-ins are available early each morning. Data from the exams are maintained to provide metrics as to the needs of the patients seen. One goal is to demonstrate the magnitude of vision problems found in children in CPS.

Results: Over 50% of the participants reported major or vast improvement in the areas of eyestrain reduction and reading persistence. 32% reported a reduction in headaches. 85% were still wearing the filters after four years.

Discussion/Conclusion: The results show that precision tinted lenses reduces visual discomfort in a subset of photo sensitive students. The most common symptom of those reporting vast improvement with the Neurovisual filters was fluorescent light sensitivity. Many participants reported better reading fluency, comfort, and comprehension. More recently using fMRI, Dr. Jie Haung of Michigan State University, demonstrated how precision tinted lenses decreased the hyperexcitability with migraine sufferers in the visual cortex V2. This new research empowers and impels optometrist to consider precision tints in the management of migraine headaches as well as asthenopia.

Asthenoia and Migraine Headache Symptom Reduction with Application of Precision Tints/Filter

Author: Doug Major O.D. FAAO, FCOVD, Private Practice

Background: It has been known for centuries that colored lenses/filters can reduce visual discomfort for the wearer. At the 1991 American Academy of Optometry meeting, Dr. Jack Richman encouraged Optometrists to develop their own tinting/filtering techniques, research, and treatments. Responding to this challenge, Neurovisual filters were developed at Cal Poly, San Luis Obispo, California. Neurovisual filters reduce visible light based on human photopigment spectral sensitivity. The filters alter the responsivity of the wavelengths most sensitive to the human eye. Other precision tinting systems of subjective color choice are based on hue and saturation, using the whole visible spectrum.

Methods: 200 students identified with asthenopic symptoms were chosen at random at Cal Poly’s Learning Center to receive treatment with the most comfortable Neurovisual filter. This cohort was given a symptoms survey consisting of 11 visual related and headache symptoms.

Results: Over 50% of the participants reported major or vast improvement in the areas of eyestrain reduction and reading persistence. 32% reported a reduction in headaches. 85% were still wearing the filters after four years.

Discussion/Conclusion: The results show that precision tinted lenses reduces visual discomfort in a subset of photo sensitive students. The most common symptom of those reporting vast improvement with the Neurovisual filters was fluorescent light sensitivity. Many participants reported better reading fluency, comfort, and comprehension. More recently using fMRI, Dr. Jie Haung of Michigan State University, demonstrated how precision tinted lenses decreased the hyperexcitability with migraine sufferers in the visual cortex V2. This new research empowers and impels optometrist to consider precision tints in the management of migraine headaches as well as asthenopia.