

COLLEGE OF OPTOMETRISTS IN VISION DEVELOPMENT 2009

PAPERS AND POSTERS

The following papers and posters were presented during the 2009 COVD 39th Annual Meeting in Denver, Colorado.

COVD Papers

LONG TERM RESULTS OF TREATMENT OF CONVERGENCE INSUFFICIENCY IN CHILDREN

Mithell Scheiman, OD, FCOVD;
CITT Investigator Group

Purpose: To assess the long-term stability of improvements in symptoms and signs in 9- to 17-year-old children enrolled in the Convergence Insufficiency Treatment Trial who were asymptomatic after treatment for convergence insufficiency (CI). **Methods:** Seventy-nine patients who were asymptomatic after a 12-week therapy program for CI were followed for 1 year [33/60 in office-based vergence/accommodative therapy (OBVAT), 18/54 in home-based pencil push-ups (HBPP), 12/57 in home-based computer vergence/accommodative therapy and pencil push-ups (HBCVAT+), and 16/54 in office-based placebo therapy (OBPT)]. Outcome measures were the mean change on the CI Symptom Survey (CISS), near point of convergence (NPC), positive fusional vergence at near (PFV), and proportions of patients who remained asymptomatic or who were classified as successful or improved based on a composite measure of CISS, NPC, and PFV. **Results:** One-year follow-up visit completion rate was 89% with no significant differences between groups ($p=0.26$). There were no significant changes in the CISS in any treatment group during the 1-year follow-up. The percentage who remained asymptomatic in each group was 84.4% (27/32) for OBVAT, 66.7% (10/15) for HBPP, 80% (8/10) for HBCVAT+, and 76.9% (10/13) for OBPT. The percentage who remained either successful or improved 1-year post-treatment was 87.5% (28/32) for OBVAT, 66.6% (10/15) for HBPP, 80% (8/10) for HBCVAT+, and 69.3% (9/13) for OBPT. **Conclusions:** Most

children aged 9 to 17 years who were asymptomatic after a 12-week treatment program of OBVAT for CI maintained their improvements in symptoms and signs for at least 1 year after discontinuing treatment.

DETECTION OF VISUAL EFFICIENCY PROBLEMS USING VERA SCHOOL SCREENING SOFTWARE

Michael Gallaway, OD, FCOVD, FFAO;
G. Lynn Mitchell, MS, FFAO

Problem: Most visual skill disorders among school children are not detectable using conventional school vision screening protocols. VERA (Visual Efficiency Rating) is a two-tiered software program designed for school nurses to do both routine screening for visual acuity and hyperopia as well as screen for accommodative, vergence and ocular motor problems that can affect reading and learning. The current study assesses the effectiveness of VERA, and discusses how it can be implemented in a community setting. **Methods:** One hundred fifty four children between 9 and 13 years of age received visual evaluations that included cover test, NPC, BI/BO step vergence, vergence facility, DEM and accommodative amplitude and facility. They also received the VERA screening and completed the Convergence Insufficiency Symptom Survey (CISS) along with 2 standardized reading tests. As part of a separate pilot study, 2 school districts were recruited to use the VERA in their evaluations of children with learning problems. **Results:** VERA was able to detect visual skill problems with 83% specificity and 45% sensitivity. Sensitivity increased to 59% when the VERA findings were combined with the CISS. Analysis of a smaller group of children ($N=30$) with reading delays and an elevated symptom score increased specificity to 91%, with sensitivity of 56%. Over the course of one school year, one of the districts reported improved reading scores in each of 11 children that VERA referred and who subsequently underwent optometric vision therapy. **Implications:** The VERA is reasonably effective in detecting visual skill problems in a school setting, and is able to

provide qualified referrals to optometric offices that offer vision therapy. VERA has become part of 2 school districts' testing of children being evaluated for special education services, and after 3 years of use in the 2 school districts, acceptance of the VERA protocol among nurses, teachers and administrators is quite high.

Michael Gallaway does not have any conflicts of interest.

Lynn Mitchell is a paid statistical consultant to VTA, the company that developed VERA.

ACQUIRED BRAIN INJURY: EACH CASE IS A SNOWFLAKE

Tressa F. Eubank, OD;

Tyler Roberts, 2nd Year Student

Problem: Patients presenting with vision sequelae secondary to cerebral vascular accident (CVA) (stroke) may pose a challenge for the primary care practitioner. Due to the optometrist's insight into the arena of functional vision, he/she should be included in initial health care provided as part of the multidisciplinary rehabilitation team. Many undiagnosed and misdiagnosed vision conditions, such as visual neglect vs. homonymous hemianopsia and saccadic dysfunction will have a dramatic influence on the duration and effectiveness of OT, PT, and Speech & Language rehabilitation. **Method:** A case series will be presented which will provide the diagnostic and vision therapy management used at the Vision Rehabilitation Service (VRS) at Southern College of Optometry. **Case 1:** A 63 yo male, presented due to his continual 'bumping into objects' on his left side since his stroke in July, 2008. He would consistently omit the words on the left side of his reading material and he also complained of 'blurred' vision despite using reading glasses. This case will demonstrate how effective yoked prisms can be used to differentiate and alleviate spatial neglect. **Case 2:** A 70 yo female, presented in September, 2008 with the chief complaint of missing things on her left side since her stroke in October, 2003. This presentation will demonstrate that optometric intervention with yoked prism spectacles and traditional vision therapy can be dramatically effective, even 5 years post CVA incident. **Case 3:** A 29 yo female, presented in October, 2008 subsequent to a stroke on 2 months prior, which caused sudden vision loss, weakness on her right side, short term memory loss, inability to do math, and difficulty

reading. She also complained of double vision, difficulty with 'finding' and reaching for objects, and noticing objects located on her lower right side. This case will demonstrate the extreme functional vision implications and impact of traditional vision ocular motor and visual processing therapies to enhance activities of daily living. **Conclusion:** While each patient with an acquired brain injury is as unique as a snowflake, there are common findings among found in this population. Several were shared by all patients presented in this case series: visual field disruption; saccadic dysfunction; short-term memory; and finally attention and timing. Traditional ocular-motor and visual processing therapy, including rhythm and music during many activities, has allowed each person to regain and attain the quality of life experienced prior to CVA.

A COMPARISON OF SHORT AND LONG READING PASSAGES IN SYMPTOMATIC VS. ASYMPTOMATIC SUBJECTS

Dustin Dixon, MS; Marc B. Taub, OD, FAAO, FCOVD; W.C. Maples, OD, FCOVD, FAAO, FACBO

Background: The Readalyzer is an electronic recording system used to measure eye movements while reading. Long passages of 800 words have recently been introduced as a tool to access the efficiency of one's reading eye movements. Until this point, short passages of 100 words have been used exclusively. This project was aimed at determining whether or not passage length would influence the quality of reading eye movements. **Methods:** Optometry students (n=22) at Southern College of Optometry were separated into two equal groups (symptomatic vs. asymptomatic) based on COVD Quality of Life (COVD-QOL) questionnaire score. As score greater than 20 has been shown to indicate the presence of a visual efficiency dysfunction. Each subject then performed two reading passages with the Readalyzer. A short passage was shown and the procedure was described initially to reduce the learning curve. A long and a short passage were read and the order was alternated to reduce fatigue effects. Data was collected based on the ratio of fixations to regressions and statistical Paired t-tests were performed. **Results:** The statistical testing showed there was no statistical difference ($p=0.4930$) between the fixation/regression ratio of short vs. long passages of the low scoring students (asymptomatic group); however, there was

statistical significance ($p= 0.0174$) in the difference between the fixation/regression ratio of short vs. long passages of the high scoring students (symptomatic group). **Conclusion:** This information indicates that patients with binocular vision problems will have more difficulty on longer reading passages. This finding calls into question the use of shorter length reading tests to determine a diagnosis of ocular motor dysfunction.

COVID Posters

TREATMENT OF A POST-TRAUMATIC 4TH NERVE PALSY: SYMPTOMATIC DIPLOPIA RESULTS FROM CATARACT REMOVAL 24 YEARS AFTER INJURY

Jennifer S. Simonson, OD, FCOVD

A 53-year-old Caucasian Male presented 2 months following cataract surgery of the left eye with symptoms of constant diplopia, eye strain, a head tilt, and the need to close his left eye. Trauma from impact with a tree in 1984 resulted in a 4th nerve palsy and traumatic cataract formation in his left eye. The patient was functionally monocular for 24 years. Cataract removal and intraocular lens implant was performed on 4/18/08 to improve visual acuity. Examination findings included a non-comitant left constant hypertropia, exotropia, and cyclotropia. In primary gaze, the deviation was 19 pd CLHT, 14 pd CLXT, and variable cyclorotation up to 60 degrees. The patient had developed a significant left eye squint and compensating head tilt to the right shoulder. With the addition of compensating prism, the patient was able to fuse 200" of contour stereopsis. Refractive testing showed OD +0.25 DS, OS +0.50-1.00x 102 with a +2.00 add OU for 20/20 acuities OD and OS at both distance and near. The patient was diagnosed with: 4th Nerve Palsy OS, diplopia, Asthenopia, and pseudophakia OS. Surgical options and vision therapy treatment options were discussed with the goals of decreased diplopia, improved fusion, and improved cosmesis. The patient decided to begin weekly office therapy with home therapy practice. Therapy training included oculomotor and binocular skills development including the rotoscope, variable prism Bernelloscope, vectograms, aperture ruler, free space fusion activities, Brock string, the Vision Builder and HTS computer programs, and prism training exercises. After 14 sessions of therapy, the patient had an excellent

outcome of single vision, depth perception (especially noted when night driving and downhill skiing), and improved head posture. Retesting at this point resulted in measurements of 70" contour stereopsis and 100" of random dot stereopsis in primary gaze. Fusional ranges were: distance BO: x/35/18, BI: x/4/2, and near BO: x/22/19, BI: x/26/24, BD OS: 8/6 and BU OS: 1.5/.5. He had a NPC of 6 inches, an associated phoria of ortho horizontally and vertically, a dissociated horizontal phoria of orthophoria with a vertical phoria of 2 pd left hyperphoria at distance, and 8 pd exophoria with 4 pd left hyperphoria at near. The patient surpassed all initial therapy goals; successfully seeing magic eye pictures and gaining the ability to maintain fusion even with his head tilted to the left.

PHOTOGRAPHIC LEUKOCORIA WITH CONCOMITANT ANISOMETROPIC AMBLYOPIA IN A PEDIATRIC PATIENT: CASE REPORT

Lisa W. T. Christian, BSc, OD

Background: The presentation of leukocoria in the pediatric population requires immediate medical attention. Leukocoria is often associated with abnormalities in the lens (cataract), vitreous (hemorrhage) or retina (retinoblastoma), and may be the initial manifestation of a wide spectrum of intraocular and systemic disease. In addition to the common causes of leukocoria, a patient may present with an optically induced pseudo-leukocoria secondary to anisometropic amblyopia. **Case Report:** A three year old Caucasian male was seen for his first eye examination based on an emergency referral from his general practitioner, due to the appearance of a left white pupil as seen in photographs. Case history was unremarkable for any visual and/or ocular concerns as per the patient's parents, and all developmental milestones were met. Visual acuity revealed significant decrease in vision in the left eye (20/70 OS versus 20/15 OD), while ocular health findings were unremarkable. Based on these exam findings, the patient was diagnosed with photographic leukocoria with concomitant anisometropic amblyopia in the left eye. The appropriate treatment and management for the amblyopia was prescribed. **Conclusion:** When seen in children, leukocoria is a significant sign of underlying pathology that either threatens life or causes permanent visual disability. One must always

perform a thorough oculo-visual assessment to rule out all possible differential diagnosis that may be the cause of the white pupil. In the absence of any ocular pathology, patients that present with photographically induced leukocoria, should be suspected to have anisometropic amblyopia. Appropriate work-up, treatment and management for amblyopia must then be undertaken.

OPTOMETRIC REMEDIATION OF AMBLYOPIA POST UNILATERAL CATARACT EXTRACTION

Hadassa Rutman, OD; Audra Steiner, OD

Background Information: A congenital cataract is a rare condition that can result in childhood blindness if left untreated. Numerous research studies have demonstrated that in cases of congenital cataracts, early extraction and early treatment can minimize the chances of developing deprivation amblyopia. Conventional treatment focuses on improving the visual acuity of the amblyopic eye through patching with nearwork. Vision therapy can also be incorporated in attempt to improve both the visual acuity and binocularity after cataract extraction is performed.

Case study: A 5 year old white female presented to UOC with a history of a unilateral cataract of the left eye with subsequent extraction at 4 weeks of age. Patching with nearwork in the past did not improve the visual acuity of the aphakic eye. This case was also compounded by the presence of a left hypo-exotropia. Vision therapy was recommended in conjunction with patching and nearwork. A monocular progressive lens for the left eye was also prescribed. The patient was not compliant with patching for the first 1.5 months, however, she remained compliant with wearing her glasses and nearwork therapy. There was a two line improvement in her visual acuity during this time. Her vision remained stable once patching was initiated, however, there was no additional improvement in her visual acuity. **Conclusion:** This case demonstrates an alternative treatment option rather than conventional patching for treatment of amblyopia in aphakes. It is well known that yoked prisms have beneficial effects in improving the vision of those persons who have a hemianopsia and those that demonstrate the Midline Shift Syndrome. Yoked prisms are also used in vision therapy to encourage laterality, directionality, attention, visual perception, coordination, posture

improvement and balance. It is speculated that the yoked prism effect is the product of changes in the magnocellular input. It changes where in space things appear, in relation to the person wearing the yoked prisms. It has further been speculated that these effects are present even under closed eye conditions. The proposed explanation of this phenomenon is that enough ambient light enters through the closed eye lids to allow the brain to process the change in visual direction caused by the yoked prism. In an attempt to verify this, subjects were tested under three closed eye conditions: Plano lenses; 8[^] yoked prism base right; 8[^] yoked prism base right with a blindfold. Each of 31 adult subjects were asked to listen carefully to the location of a sound and then to mark with a felt tipped marker on their individual sheet of poster paper, the exact perceived location of the sound. Each of the three conditions used a different color marker. Markers were held in both hands and they were encouraged to use their right hand for the right side, dominant hand for the middle and their left hand to mark the left side. Each position and each condition was given three different trials and the horizontal displacement from the actual position of the sound was then measured, averaged and that number was used as the data point for that condition. Each of these conditions was randomly selected to be tested. We found no significant difference between the closed eye conditions of the plano lenses and the yoked prisms. There was an unexplained difference between the yoked prism and blindfold condition in the expected direction of deflection of the yoked prism. The yoked prism with blindfold was significantly different for each of the other conditions and the left position was significantly more distorted than was the other two positions. Further research is needed to verify if this is an artifact of testing, even though the testing was carefully designed and executed or if this is a true but unexplained perceptual phenomenon.

PRISMATIC EFFECTS UNDER CLOSED EYE CONDITIONS

**W. C. Maples, OD, FAAO, FCOVD, FACBO;
Murray S. Pratt, 3rd Year Student**

It is well known that yoked prisms have beneficial effects in improving the vision of those persons who have a hemianopsia and those that demonstrate the Midline Shift Syndrome. Yoked prisms are also used in vision therapy to encourage laterality, directionality,

attention, visual perception, coordination, posture improvement and balance. It is speculated that the yoked prism effect is the product of changes in the magnocellular input. It changes where in space things appear, in relation to the person wearing the yoked prisms. It has further been speculated that these effects are present even under closed eye conditions. The proposed explanation of this phenomenon is that enough ambient light enters through the closed eye lids to allow the brain to process the change in visual direction caused by the yoked prism. In an attempt to verify this, subjects were tested under three closed eye conditions: Plano lenses; 8^Δ yoked prism base right; 8^Δ yoked prism base right with a blindfold. Each of 31 adult subjects were asked to listen carefully to the location of a sound and then to mark with a felt tipped marker on their individual sheet of poster paper, the exact perceived location of the sound. Each of the three conditions used a different color marker. Markers were held in both hands and they were encouraged to use their right hand for the right side, dominant hand for the middle and their left hand to mark the left side. Each position and each condition was given three different trials and the horizontal displacement from the actual position of the sound was then measured, averaged and that number was used as the data point for that condition. Each of these conditions was randomly selected to be tested. We found no significant difference between the closed eye conditions of the plano lenses and the yoked prisms. There was an unexplained difference between the yoked prism and blindfold condition in the expected direction of deflection of the yoked prism. The yoked prism with blindfold was significantly different for each of the other conditions and the left position was significantly more distorted than was the other two positions. Further research is needed to verify if this is an artifact of testing, even though the testing was carefully designed and executed or if this is a true but unexplained perceptual phenomenon.

DIAGNOSING EXTRAOCULAR MUSCLE DYSFUNCTION IN CLINIC: COMPARING COMPUTERIZED HESS ANALYSIS, PARK'S 3-STEP TEST & A NOVEL 3-STEP TEST

**Dr. Patrick Quaid, BSc(Hons)Optom, MCOptom, PhD;
Dr. Andrew Hamilton-Wright, PhD**

Background: Determining the primary under-acting or overacting extraocular muscle (EOM) or

muscle pair in cases of ocular mis-alignment cases can frequently be challenging to eye care practitioners, especially if the mis-alignment is bilateral or longstanding in nature. **Purpose:** To compare the results of a commercially available computerized Hess Lancaster test to a proposed novel 3-step test and to the commonly used Park's 3-step test. **Methods:** 10 patients with both recent onset and longstanding EOM dysfunction were seen for a binocular vision evaluation. In addition to a complete eye examination and binocular vision work-up, which included Park's 3-step test, all patients were examined using both a commercially available computerized Hess Lancaster test and the proposed novel 3-step method with the aim of diagnosing the primary affected EOM(s). No mechanical restriction cases were included in the patient sample. **Results:** In all 10 cases, which comprised of both longstanding and recent onset deviations, the dysfunction indicated using the novel 3-step method agreed well with the EOM(s) identified using computerized Hess-Lancaster testing, including cases of bilateral deviations. Park's 3-step test did not prove useful in any of the presented longstanding or recent onset cases as it relies heavily on a vertical mis-alignment being present. **Conclusions:** Results attained using established computerized Hess Lancaster testing agreed well with results attained using a novel 3-step test. In the absence of Hess Lancaster testing, the proposed 3-step test appears to be a viable alternative in arriving at a potential diagnosis of the primary underacting and overacting EOM(s). Park's 3-step did not prove useful in any of the presented cases as they were either bilateral or had no significant vertical deviation or change in vertical deviation in dextroversion or levoversion. The proposed novel 3-step test appears preferable over Park's 3-step test as it also detects bilateral and / or longstanding deviations that have undergone a spread of comitance.

ASSOCIATION OF VISUAL PERCEPTUAL DEFICITS IN A PATIENT WITH RADIATION TREATMENT

Mary Bartuccio, OD, FAAO

Background: Children with Acute Lymphoblastic Leukemia (ALL) undergo an aggressive regimen of radiation and chemotherapy to treat this deadly disease. Survivors of this aggressive treatment do experience impairment in cognitive functions. A recent literature search illustrates post-treatment brain

function impairments of these survivors. A case of a child ALL survivor is presented to illustrate the visual and cognitive effect of her treatment. **Case Report:** GL is an 11-year-old WF referred by a school psychologist for a visual perceptual evaluation. She presented with complaints of having trouble reading, difficulty with word recognition, having frequent letter reversals when copying assignments and difficulty recognizing words with similar beginnings and endings. She also used her finger to read and often lost her place when reading. These symptoms were present since she was in first grade and she continued to struggle in school despite academic interventions. Her medical history was remarkable for radiation treatment for ALL diagnosed at 3 years old. GL's initial unaided visual acuity was 20/20 in both eyes at distance and near. However, her fixation, pursuits and saccades were inadequate. No ocular misalignment was noted with adequate stereopsis, vergence ranges and facility. Her accommodative function was adequate with good amplitudes and facility. Visual perceptual testing noted poor recognition of reversals on the Gardner Reversal Frequency Recognition test. She performed at a 5-year-old level on the Piaget Right-Left Awareness test. Her performance on the Berry Visual Motor Integration and Word Sentence Copy tests were below age level, with noted difficulty crossing the midline. Visual analysis testing revealed reduced visual memory and visual sequential memory on the TVPS. In addition, her tracking skills were inadequate with poor results on the DEM test, including many errors and increased time on horizontal versus vertical sections. She was diagnosed with ocular motor dysfunction, and visual perceptual deficiencies in the areas of laterality/ directionality, visual memory, visual sequential memory and visual motor integration. GL completed her 7-month VT program to address these issues. GL showed remarkable improvements in all areas of visual perception and eye tracking. **Conclusion:** Visual perceptual testing is warranted in all survivors of ALL. These patients need to be carefully monitored for cognitive impairment many years after their radiation treatment and can overcome difficulties if managed appropriately.

VALIDATION OF THE VISION PRINT SYSTEM AND COMPARISON TO THE NSUCO TEST OF SACCADES IN CHILDREN

Janna Iyer, BS, 3rd Year Student; Marc Taub, OD, FAAO, FCOVD; W. C. Maples, OD, FAAO, FCOVD, FACBO

Purpose: A pilot study was conducted to determine if the Visionprint System (VPS), which was shown to be reliable in evaluating head versus eye movement in adults, would also be reliable for children, since the majority of those in a vision therapy program are children. Results from the VPS were then compared to the NSUCO-Test of Saccades, a reliable, validated diagnostic procedure used to measure gross ocular motor function, to determine if the VPS could be useful in diagnosing ocular motor dysfunction. **Methods:** 10 subjects currently enrolled in a vision therapy program at the Southern College of Optometry were recruited provided the following criteria were met: participants must be between the ages of 6-13 years with no diagnosis of strabismus or amblyopia. Each subject was instructed on how to perform the NSUCO-Test of Saccades and VPS. On the VPS, a head/eye ratio (H/E) of .01 indicates the subject is an "eye mover" while a ratio of 1.0 signifies a "head mover." Two weeks following the first VPS recording, a re-test was done on 6 of 10 subjects to determine reliability. **Results:** No significant difference was found between the two readings for the VPS when analyzed with a paired t test ($p=0.35$). Additionally, regression analysis showed an R value of -0.89188 when comparing the NSUCO-Test of Saccades to the VPS. **Conclusions:** The lack of significant difference between the test and re-test findings from the VPS showed it is reliable in determining head vs. eye movements in children. The regression analysis showed a strong correlation between the NSUCO-Test of Saccades and the VPS. Subjects with higher scores on the NSUCO-Test of Saccades, generally showed lower H/E ratios on the VPS, meaning they were "eye movers", while those with lower scores on the NSUCO-Test of Saccades, showed higher H/E ratios on the VPS, indicating these subjects were "head movers." The strong correlation between the NSUCO-Test of Saccades and the VPS shows that the VPS could be used as an effective objective procedure to measure gross ocular motor function in children.

IMPROVEMENTS IN ACADEMIC BEHAVIORS FOLLOWING SUCCESSFUL TREATMENT OF CONVERGENCE INSUFFICIENCY?

Eric Borsting, OD, MS, FCOVD; Michael W. Rouse, OD; Gladys Mitchell; Marjean Taylor Kulp, OD; Mitchell M. Scheiman, OD, FCOVD; Susan Cotter, OD, FCOVD; CITT Study Group

Purpose: To determine the short and long term impact of successful treatment of Convergence Insufficiency (CI) on the parents' perceptions of the frequency of problem behaviors that their child may exhibit when reading or performing schoolwork (such as: difficulty completing work, avoidance, and inattention) as measured by the Academic Behavior Survey (ABS). **Methods:** The ABS was administered at baseline and after 12 weeks of treatment to the parents of 221 children ages 9-17 years with symptomatic CI, who were enrolled in the Convergence Insufficiency Treatment Trial and randomized into one of four treatment groups. The ABS is a 6-item survey and the frequency of behaviors are scored on an ordinal scale from 0 (Never) to 4 (Always) with a total score ranging from 0 to 24. Participants were classified into successful, improved, or non-responder at the completion of 12 weeks of treatment using a composite measure of the CI Symptom Survey, near point of convergence, and positive fusional vergence. Successfully treated CI children were followed for 1 year after completion of treatment. **Results:** The mean ABS for the entire group at baseline was 12.85 (SD=6.3). The mean ABS score after 12 weeks of treatment in those categorized as successful was 8.3 (SD=5.7), compared to 9.6 (SD=5.6) for those who improved and 12.0 (SD=6.0) for non-responders. The improvement in ABS score was significantly related to treatment outcome ($p < 0.0001$) with the successfully treated group showing the largest decrease in score. The ABS scores in the successfully treated CI group at the 1 year follow showed a further decrease to 6.7. **Conclusion:** Significant improvements in CI signs and symptoms reported by children with CI with treatment were associated with improvements in school work behaviors as reported by parents on the ABS. Further improvements in the successfully treated group were seen at the 1 year follow up examination.

SUCCESS OF INCORPORATING AMBLYOPIA iNET PROGRAM WITH ANISOMETROPIC AMBLYOPIA

Ilana Gelfond-Polnariiev, OD, FCOVD

Four year old patient (CT) presented for an eye exam after failing school screening. Refraction revealed + 2.50 OD and + 6.00-5.00x180 OS with best visual acuity 20/30 and 20/80 respectively using Allen picture chart. There was no strabismus present. CT was compliant with glasses and began using 1% atropine twice per week for one month; follow up visit showed improved visual acuity 20/30 OD, 20/60 OS. Amblyopia iNet Program was added to her treatment. After one year using the program utilizing both modes, monocular (41 sessions) and Monocular Fixation in a Binocular Field (16 sessions), resulted in visual acuity 20/20 OD and 20/25 OS. Motivated parents and patient; as well as utilization of technology, can be incorporated in the treatment of refractive amblyopia when in-office vision therapy is not an option.

AGENESIS OF THE CORPUS CALLOSUM AND VISUAL FUNCTION

Ashley Schuelke, OD; Karen Kehbein, OD

Background: Agenesis of the corpus callosum, the structure of the brain that connects the left and right hemisphere, can result in many functional challenges including: delayed motor development, large head size, difficulty with balance and bimanual movements, poor muscle tone, reduced pain perception, poor depth perception, an increased proportion of left handedness and difficulty sleeping. The time taken to process visual information and respond can be delayed in patients with this congenital brain malformation. The social behaviors associated with this condition mimic those on the autism spectrum and misdiagnosis can occur. **Case:** A ten year-old male presented with complaints of difficulty in school. The patient was in special education classes and his mother wished to address any issues that may help him function more successfully in school. The diagnosis of agenesis of the corpus callosum was made when the child was four years old. An extensive neuropsychological evaluation was performed at 9 years, 8 months demonstrating generalized cognitive impairment, fine motor dysgraphia, verbal and visual memory impairments and visual perceptual deficits. Upon visual examination, oculomotor dysfunction was diagnosed

and an updated full-time glasses prescription was written. A perceptual vision evaluation was performed one month later noting deficiencies in visual motor integration, laterality/directionality, visual motor skills and automaticity of language. A vision therapy program was recommended to improve his perceptual and visual skills so that he may process and organize information more rapidly and efficiently in a learning environment. **Conclusions:** This case demonstrates the challenges faced by patients with congenital brain disorders and what role structural abnormality has in their ability to process visual information.

DOES PERFORMANCE ON THE READALYZER CORRELATE WITH PERFORMANCE ON FLASH FOCUS "SYMBOL CHECK" ACTIVITY FOR THE NINTENDO DS

Erik M. Romsdahl, 4th Year Student; Marc Taub, OD, FAAO, FCOVD

Purpose: A pilot study was conducted to assess the validity of claims that the Nintendo DS game Flashfocus could "train your vision in minutes a day". Visual skills which are included in this claim include eye movements, visual memory, hand-eye coordination, dynamic visual acuity, and peripheral vision. Due to the variety and complexity of the tasks the FlashFocus games involve, a single relevant activity was selected. Scores from a FlashFocus task called Symbol Check, which focuses on training eye movements, were compared to results of Readalyzer analysis to determine if a relationship existed. **Methods:** 33 subjects from the student population of the Southern College of Optometry were recruited and allowed to participate based on a set of minimum vision criteria: at least 20/25 acuity, 25 seconds of arc stereopsis, and no diagnosed binocular issues. Each subject was instructed on use of the FlashFocus task Symbol Check, and the Readalyzer. Two trials from each task were performed to remove a learning curve. Subjects alternated which task was performed first. Data from each final trial were then compared through regression analysis. **Results:** Regression analysis of fixations on the Readalyzer versus total score on Symbol Check task for 33 normal subjects after learning- bias removal demonstrated an R value of 0.227, and an R-squared value of 0.051. ANOVA variance analysis showed a significance of 0.205. **Conclusions:** Based on the data collected, regression analysis shows a very weak correlation, if

any, which is supported by the R-squared value. The variance between the values obtained from each task is largely due other factors, suggesting that many possible outside forces are contributing to the data, as demonstrated by the significance level. It seems that no correlation exists that one can draw significant conclusions from, though a greater level of confidence in the data could be obtained with a larger study.

DEVELOPMENTAL EYE MOVEMENT (DEM) SCORES FOR A PORTUGUESE SPEAKING POPULATION

António Manuel Goncalves Baptista, OD, PhD; Carla Cristina de Morais Guerra Casal, Student; Rui Jorge Ramoa Marques, Student; Raul Alberto Ribeiro Correia de Sousa, OD; Carlos Silva, OD

The purpose of this work was to compare the Developmental Eye Movement (DEM) scores for a Portuguese speaking population with the DEM scores and norms obtained in previous works for English and Spanish speaking populations. A standard DEM test was used in 695 young students from the region of Braga, Portugal and from ages 6 to 13 years. Each age and grade group was composed approximately of equal number of males and females. This population was chosen to be similar in all parameters to the english-speaking norm population. The mean scores for vertical time, adjusted horizontal time, errors and ratio were computed and compared against the respective published data from English and Spanish speaking populations. The data obtained in the present study has significant differences from the English and Spanish speaking population, suggesting that DEM is a language-dependent test.

DEVELOPMENT OF DTVP-2 SCORES IN JAPANESE CHILDREN – A PILOT STUDY

Tomohito Okumura, MSOptom-Med, FCOVD; Eiji Wakamiya, MD, PhD; Hannu Laukkanen, OD, Med, FAAO; Hiroshi Tamai, MD PhD

Problem: The Developmental Test of Visual Perception (DTVP-2) is a comprehensive visual perception test that assesses visual-cognitive and visual-motor performance. The DTVP-2 is known to discriminate between children with and without learning disabilities on the variables of visual perception. DTVP-2 was originally standardized and normed for an English speaking population. However,

there are a few normative study for native speakers of non-alphabetical-languages, such as Japanese. The present pilot study is aimed at investigating DTVP-2 performance for a Japanese speaking sample, and comparing those results with published values from previous studies for English speaking populations. **Method:** 269 elementary school students served as the subjects for this study. The children ranged in age from 6 to 10 years, with a corresponding placement of 1st to 4th grade in the Japanese education system. All testing was administered on school premises in a relatively quiet room with good illumination. Instructions of DTVP-2 were translated into Japanese by an external translator. 7 subtests; Eye-hand Coordination, Position in Space, Copying, Figure-Ground, Spatial Relations, Visual Closure, Visual-Motor Speed were administered and analyzed on the subjects. Form Constancy was not able to be administered because of the time limitation. **Results:** Age differences were found to be significant in all subtests. There were no statistical differences in the test scores in gender except on Position in Space, Spatial Relations, Visual Closure. The DTVP-2 test scores in Japanese children were slightly better than that in English speaking populations. **Implications:** Those data indicated that a need of Japanese normative study for use of DTVP-2 in Japanese children.

THE VISION THERAPY SERVICE OF THE SOUTHERN COLLEGE OF OPTOMETRY: WHO, WHAT, AND HOW

Stephanie A. McLin, BS; Marc B. Taub, OD, FAAO, FCOVD

Purpose: The Eye Center at the Southern College of Optometry is a full service primary eye care center. The vision therapy department joins other departments such as contact lens, low vision, ocular disease, primary care, and pediatrics in providing tens of thousands patients, vision care every year. Vision therapy is staffed by seven doctors who work with residents, and both 3rd and 4th years students to provide approximately 1000 visual therapy evaluations and 3000 vision therapy sessions every year. **Methods:** The charts of all (n=281) evaluations scheduled in the vision therapy service between January 1, 2009 and March 31, 2009 were examined. The following data points were recorded from each chart: age, referring department, primary diagnosis(es), and treatment recommendation(s). **Results:** Referral rates based on department were as follows: pediatrics

department-72.6%, adult primary care-16.4%, stroke-1.1%, ocular disease-0.7%, low vision-0.4%, contact lens-0.4%, unknown-8.2%. Over 54% of patients were 6-10 years of age and 24.6% were 11-15 years of age. These were the dominant age groups seen for initial vision therapy exams. Other age groups were as follows: 2-5 years- 6.8%, 16-20 years- 4.6%, 21-29 years-3.9%, ≥30 years: 6.0%. The show rate for evaluations in the service was 62.6%. Vision therapy was recommended to 61.9% of patients. Vision therapy was not recommended to 17.0% of patients. Other recommended treatments included patching therapy-3.4%, a visual perceptual exam-4.0%, home vision therapy-1.7%, a perceptual exam and vision therapy-1.7%, and follow up examination at a later date-8.5%. The most common diagnoses found were ocular motor deficiency-17.1%, exotropia-15.4%, accommodative dysfunction-11.8% and convergence insufficiency-10.0%. **Conclusion:** Evaluation of the referral data showed that pediatrics department referred more often than other departments. This was further represented by the distribution of patient ages. Based on the data collected regarding recommendations for vision therapy, it can be concluded that a majority of referrals were valid and these patients could often be assisted by vision therapy. The decreased amount of referrals from other departments within the clinic indicates that there were many more patients in need of care. The vision therapy department must better educate its colleagues on proper referrals and ensure that this message is transferred down to the student level.

INSTRUCTION OF VISION THERAPY LABORATORY AT SOUTHERN COLLEGE OF OPTOMETRY

Janette D. Dumas, OD

Introduction: Teaching one how to administer and understand vision therapy is a difficult task. The theories and concepts are not difficult to comprehend, but it is the nuances of vision therapy that make it perhaps one of the more difficult courses to teach. The vision therapy laboratory, at Southern College of Optometry serves as an adjunct to the didactic course to review core concepts taught in class, master the techniques and ultimately, interweave the two for solid learning outcomes.

Body: The Laboratory is structured according to the building blocks of binocularity. In the beginning,

a review of case analysis with reference to Morgan's norms is utilized along with communication guidelines on how to address vision therapy to potential patients. Next the foundations of binocularity are addressed: oculomotor and accommodative skills. Once the groundwork is laid, anti-suppression, monocular fixation in a binocular field, and bi-ocular techniques are presented. To bring it all together, vergence therapy is introduced. Because binocularity has been addressed, then computer therapy and sports vision therapy are introduced to give variations to the core techniques that have been taught. The lab course is completed with a thorough review of visual perception evaluation and treatment. **Assessment:** Learning is assessed two ways: by the written learning objectives that are completed and by the short answer quizzes given at the end of each lab period. The course also requires a written midterm and an end of semester oral practical. **Conclusion:** Vision therapy laboratory is fundamental for the teaching of the course material. Therefore, the lab is structured to facilitate learning through repetitive exposure to techniques and concepts and hands on participation.

DOES PERFORMANCE ON THE TEST OF VISUAL PERCEPTIONAL SKILLS 3RD EDITION VARY BETWEEN OCCUPATIONS?

Jalyn Johnson, Student; Jessica Condie, Student; Christine Allison, OD, FCOVD

Problem: Good visual perceptual skills are often an important factor in a student's overall ability to do well in academics. The better the skills in these areas, the easier it is for children and young adults to often succeed in certain areas of academics. The question then can be asked, "Do our abilities or inabilities in

certain areas of visual perceptual processing contribute to our overall academic and career paths?" The Test of Visual Perceptual Skills, third edition (TVPS-3), is a commonly used test to determine the visual perceptual skills in children and young adults. Thus the TVPS-3 was used in this pilot study to determine if there was any difference in subtest and overall scores of students training for different occupations.

Methods: The TVPS-3 was performed on 2 groups of students in different occupational fields. The test was scored for the highest age level of the test since the subjects ranged in age from 19 – 28. The entire test was performed in one sitting for each subject, and the test was performed in a non-distracting atmosphere for each subject. The test was scored as directed in the test manual. Nine optometry students and 4 non-optometry students (3 art and 1 engineering) were given the TVPS-3.

Results: The initial data of this pilot study shows there is a difference in visual perceptual skills between the two groups. While both groups outscored the average, the art and engineering students tested higher than the optometry students on all of the TVPS-3 subtests, as well as significantly higher in overall, basic, complex processing and sequencing.

Implication: While only a pilot study, there seems to be a relationship between an individual's visual perceptual processing skills and their choice of occupation. Thus, testing with the TVPS-3 may be important to help with overall career planning. This information could also be used in visual perceptual therapy to improve the chances of success in an individual's desired career choice, much as sports based visual training can improve an athlete's chances of success. Further research in this area is warranted based on the results of this study.



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