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BINOCULAR VISION & StrabOLOGY Quarterly

.05

, Simms-romano's

right eye fixing, see pages 110-13

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SECOND Quarter, 2011
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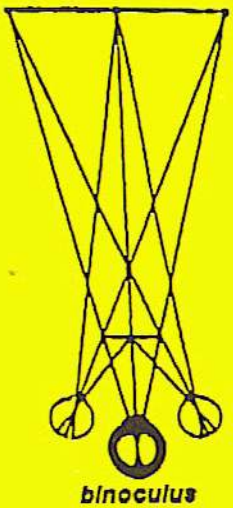

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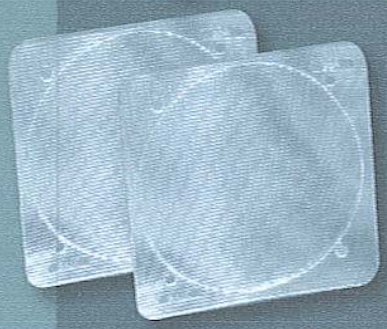

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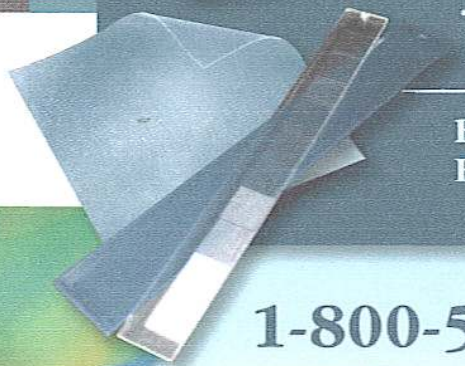

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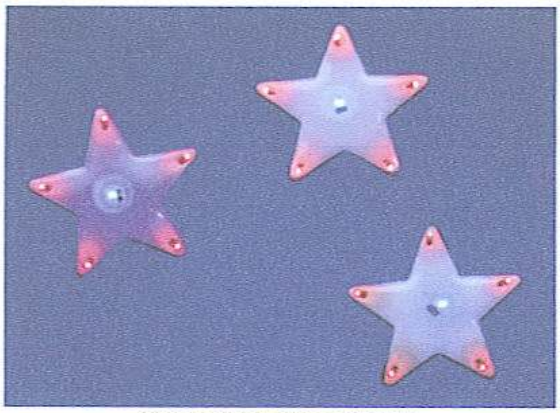

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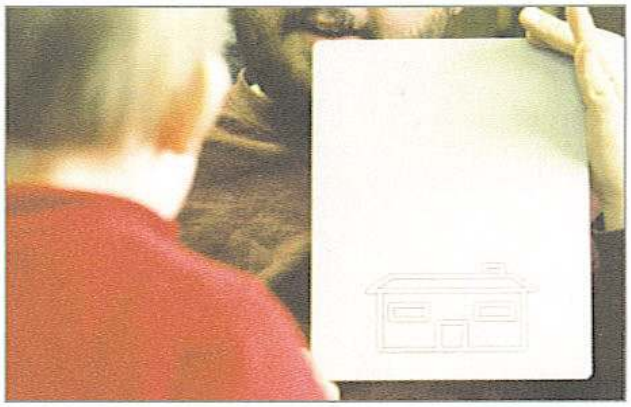

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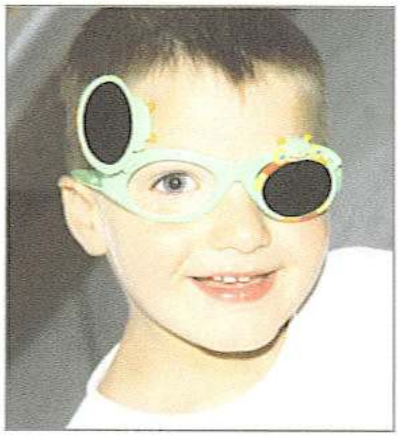

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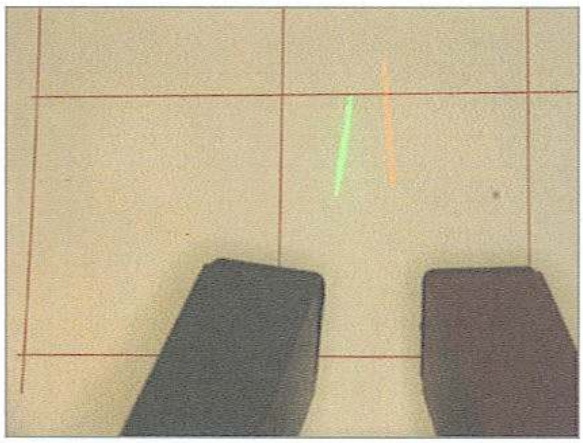

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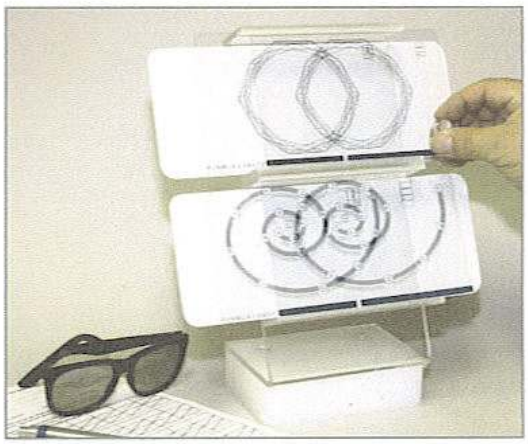

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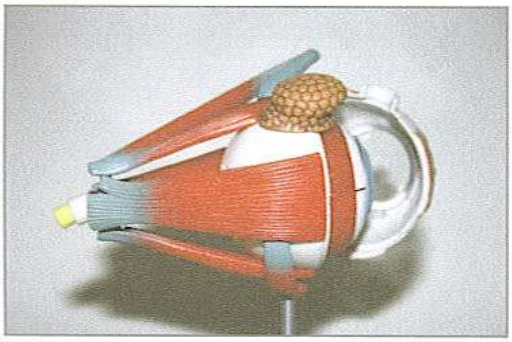

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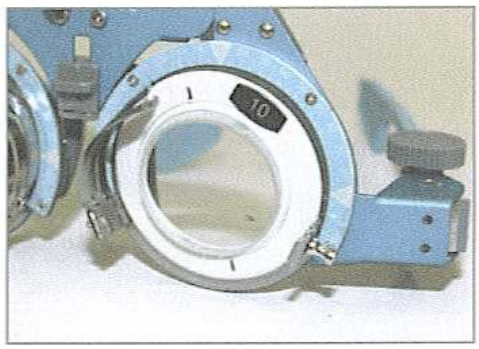

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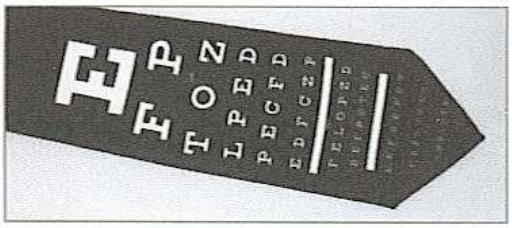

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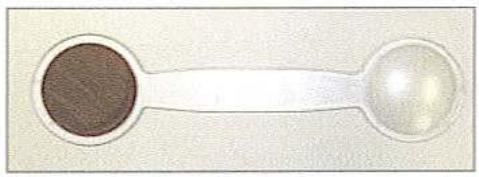

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Comp.Adverisement: Co-Authors and Strabismus Surgeons David Coats, left, and Scott Olitsky Summit Mount Kilimanjaro, highest peak in Africa (5895 M) to promote their Springer text, "Strabismus Surgery and its Complications", circa 2009.

BINOCULAR VISION & STRABOLOGY QUARTERLY, Simms-Romano's: Print Version **ISSN 2160-5351** formerly most recently 1088-628 (LIMITED PRINT version for libraries), since 2007 addition of identical electronic Internet ONLINE version, **ISSN 2160-5904**,

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Webmaster: Ryan Soderberg, Webez.net Internet Services, Dillon, Colorado. Official publication date of this issue April 1, 2011 Distribution date by June 30,2011. This is a Simms-Romano Enterprise (Simms is the maiden name of the founder's mother,R.N., a Daughter of the American Revolution, (DAR), honored here as the laudable custom in many other world cultures; his father was Battalion Surgeon for the 33rd Infantry Division in World War II, serving from 1942-1945, in the Pacific; scheduled to invade Japan, when Hiroshima saved his life and those of many other Americans and Japanese.).

EDITORIAL OFFICE / MANUSCRIPTS: Please send by email to the **Editor, Binocular Vision & Strabology Quarterly**, at perxbvq@colorado.net, with a copy to judyatbv@vail.net. Instructions for Authors may be found on the website (binocularvision.net) or by contacting judyatbv@vail.net and a PDF will be sent to you. **Letters to the Editor** are considered "for publication" unless otherwise indicated and may be edited and condensed as space dictates.

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The designation of individual issues is by the quarter, not the season, because seasons are never the same, but opposite, in the Northern and Southern hemispheres. The seasons are however designated on the cover with the Northern season on the top and, inverted below, the current season in the Southern hemisphere.

BINOCULAR VISION & STRABOLOGY
Quarterly, Simms-romano's

"... the belief that one's view of reality is the only reality is the most dangerous of all delusions ..."
-Watzlawick, 1976

EDITOR **SECOND Quarter of 2011**
Paul E. Romano, M.D., M.S.O **TABLE OF CONTENTS** **Volume 26, Number 2**
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Information for Authors can be found on the web site (binocularvision.net) or by sending an email to judyatbv@vail.net and a PDF copy will be sent to you.

***** ORIGINAL "EVIDENCE-BASED" SCIENTIFIC ARTICLE *****

***** CASE REPORTS *****

OBITUARY

Zoran Georgievski, **Orthoptist**,

Associate Professor, Department of Clinical Vision Sciences, La Trobe University, Melbourne, Australia. 3rd September 1970 - 7th April 2011.

Zoran is well known throughout the international strabismus community for his passion and infectious enthusiasm in all things related to orthoptics and its value in strabology. His sudden and unexpected death from a vascular event has left his peers worldwide staring into a vacuum that remains inconceivable to fill. There are those who sat with him during the meetings of the International Orthoptic Association of which he was Deputy President, Orthoptics Australia – Past President, and countless local bodies, to enjoy his humour and pragmatism. He was the master of ideas and strategy and propelled his agendas through warmth and humour as a method preferable to antagonism. His vision was fully futuristic of the welfare of the strabismus patient, the expertise of the clinician, the expansion in the skills and utility of the orthoptist and the education, both tertiary and continuing, of the orthoptic and ophthalmic student.

Zoran did indeed blaze a trail for others to follow. His early career saw him as recipient of both the J. Ringland Anderson and the Emmie Russell prizes as well as the Sir Edmund Herring Memorial scholarship. He established in 2008, the inaugural conjoint position between La Trobe University, being Head of Department, and the Royal Victorian Eye and Ear Hospital, becoming the Manager of orthoptics and diagnostic services. This confluence of academia and clinical services allowed Zoran the appropriate insight and intellect to develop the Masters program in Orthoptics – the pioneering degree in Victoria. While teaching, studying for his doctorate in public health, publishing and presenting over 200 papers, performing clinical work, meeting with federal and state government health officials and devising expanding workplace strategies, Zoran was always accessible.

Every orthoptist has a Zoran story of motivation – from his early lecturers who watched his expert eye on microtropia in his Honours year in 1992 and immediately invited him onto staff; to his peers lauding his presentations of his unique invention, The Torsionometer; to his ophthalmic registrars having the sensory binocular system made relevant; to his students being inducted into publication; and to the patients who felt sound in the knowledge that they were in the care of an expert in strabology. Zoran's published work spanned exotropia and its controlling mechanisms, amblyopia, stereopsis, vergences and fusional disparity, vision screening, torsion, evidence based practice, peer review educational models, infantile esotropia, diabetic retinopathy, refraction, orbital fractures, and neurological EOM disorders.

Zoran is survived by his loving partner Frank, his parents Spase and Menka and his brother Tom. He is also survived by the entire international orthoptic community. We thank him for his legacy.

Julie Green, PhD Orthoptist

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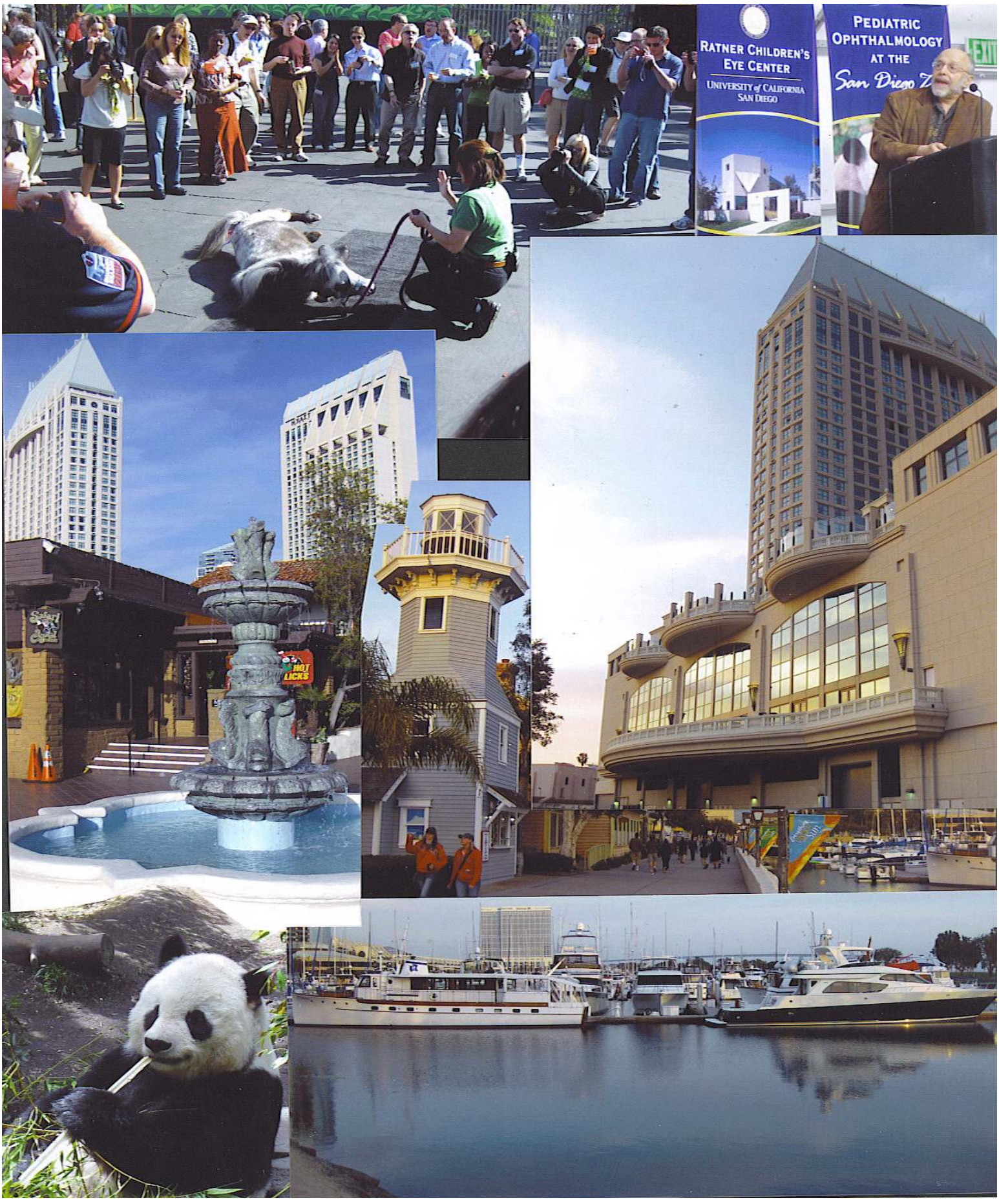

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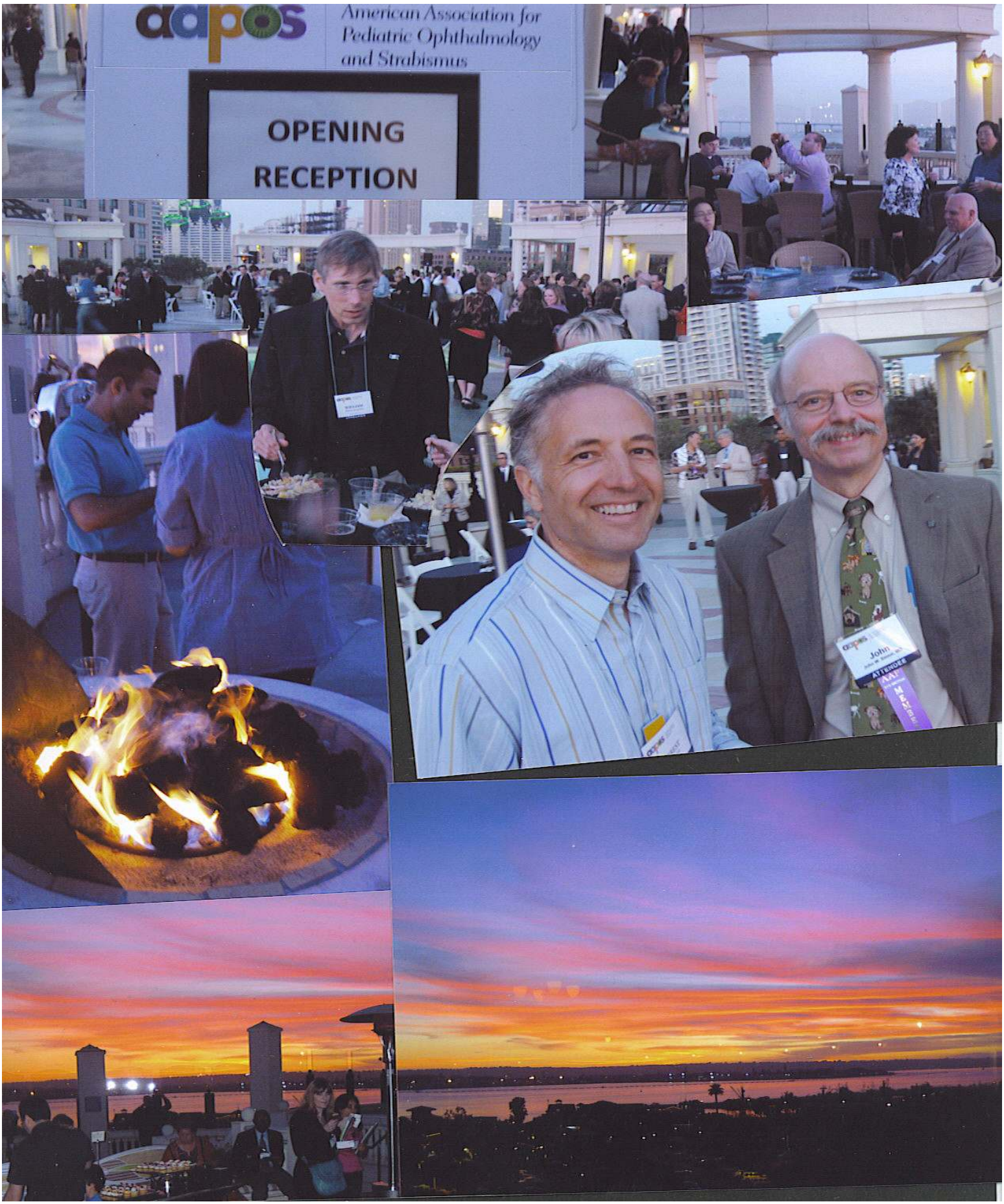

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The [extraordinary] Strabology Report of the AAPOS San Diego Meeting with Editorial commentary, both, by the Guest Editor, James L. Mims III, MD, who also supplied all the above photos, starts on the next page *-per.*

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EDITORIAL: Exotropia Replaces Esotropia as most Common Form of Strabismus; HIV and CPEO; Zoo Paperes; EOM Innervation Innovation And Strabology Report of the 37th Annual AAPOS Meeting, San Diego, California. James L. Mims III, M.D.

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EDITORIAL: Exotropia Replaces Esotropia as most Common Form of Strabismus; HIV and CPEO; Zoo Papers; EOM Innervation Innovation.

And Strabology Report of the 37th Annual Meeting of the American Association for Pediatric Ophthalmology & Strabismus.

JAMES L. MIMS, III, MD.

[Editorial comments are by the guest editor/author James L. Mims III, MD, and are in italics.]

The meeting was held at the Manchester Hyatt Hotel, San Diego, California

Scientific Program Chair: R. Michael Siatkowski, M.D.
President: David A. Plager, M.D.
Scientific Meeting Coordinator: Maria A. Schweers, CO

It's All Happening at the Zoo!

After the new officers and mentioning the named lectures, (neither of which were about strabismus), this report will detail exciting and genuinely new understanding of many things you thought you already understood, starting with the exciting papers presented at the Pediatric Ophthalmology at the (San Diego) Zoo meeting held just prior to the main event and produced by David Granet MD, Shira Robbins MD, and Scott McClatchey MD. After a description of what happened at the zoo, *spectacular clinically significant details of a new understanding of the innervation of the EOM (ExtraOcular Muscles) presented in a workshop* by Joseph L. Demer MD PhD, Robert A. Clark MD, and Yoward Ying MD PhD will follow. After that we shall continue our tradition of grouping summaries of the scientific papers, posters, and workshops per-taining to strabismus and strabology according to the type of strabismus.

New Officers

The new President of AAPOS, starting July 1, 2011, will be Steven E. Rubin MD. The previous Vice-President Elect, Michael R. Redmond MD, would have stepped up to Vice-President, but, sadly, he has resigned due to illness. We wish him well. The new Vice-President has been chosen by the Board to be K. David Epley MD. The new Vice-President Elect will be Sharon Freedman MD. Robert E. Wiggins, Jr. MD continues as the Secretary-Treasurer. The new Secretary for Program and the Scientific Program Committee Chair will Stephen P. Christiansen MD. Christie L. Morse MD continues as our Executive Vice President. Previous Directors-At-Large who will remain in their positions include Mary Louise Z. Collins MD and Oscar A. Cruz MD. The one new Director-At-Large is R. Michael Siatkowski MD.

Costenbader and Knapp Lectures

The Costenbader Lecture was given by ex AAPOS President Susan H Day MD. She was especially qualified to provide a lecture entitled "Tomorrow's Physicians: How Will They Be Educated?", since her first career (prior to Medical School) was as an Elementary School teacher, and she is presently Chair and Residency Program Director for Ophthalmology at Pacific Medical Center. The Apt Lecturers were Carol L. Shields MD "Pediatric Intraocular Tumors: What I have learned over the past 25 years" and Jerry A. Shields MD "The Expanding Spectrum of Retinal Vasoproliferative Tumors in Childhood." Leonard Apt MD, himself, made a

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cameo appearance.

As an extra, Jerry Shields, MD also gave an outstanding summary of how to distinguish between Coats's Disease and Retinoblastoma *that should be made available to every ophthalmologist*.

.Happening at the Zoo!

David Granet MD, Shira Robbins MD, and Scott McClatchey MD assembled thought-provoking and dynamic speakers who presented in a giant rich-people's tent at the party pavilion at the largest zoo in the world, the San Diego Zoo, on Wednesday, March 30. Burton Kushner MD's "slant on insertion slanting procedures" was that they don't work by the mechanisms advertised. He pointed out for V pattern ET, the Simonsz/von Graefe Method advocates recession of the superior end of the MR insertion more than the inferior end of the recession and that the Bietti Method (10 publications) advocates recessing the inferior end of the insertion more than the superior end of the insertion. *How can these opposite recommendations both be correct?* Kushner concludes that for V pattern ET, sarcomeric reorganization would promptly negate any special effects from slanting the insertions. Kushner then charitably allowed for the possibility that both types of slanting insertions might work, but with different mechanisms in each case. Alan Scott MD assisted with a detailed analysis using Orbit® that showed a minimal theoretical effect from the Simonz/von Graefe Method of about 6 Diopters of pattern collapse, due to a downward shift in the average point of insertion, similar to infraplacement of the medial rectus nuscles in V pattern ET. *Orbit® does predict the usual effects of traditional supraplacement and infraplacement of the horizontal rectus muscles to collapse A and V patterns in the ways that Knapp presented in his AOS thesis fifty years ago*. As for the Bietti Method [*which, given that the 10 publications by a variety of surgeon-authors might actually have some validity*], Kushner hypothesized that the only way this could have a pattern collapse effect would be if the superior and inferior sides of the horizontal rectus muscles were differently innervated, *PRECISELY WHAT DEMER AND CLARK DEMONSTRATED in their spectacular workshop given only two days later! (See below: "The Nerve of That Muscle.")*.

All of the presentations following at the Zoo meeting *were valuable and memorable;* only four others presented new ideas about strabismus. Michael C. Brodsky MD described the neuroanatomy of the accessory optic systems and proposed that just as in lateral-eyed animals for whom this system is prominent, in humans who fail to develop binocular vision, this system may reactivate and provide a subcortical neuroanatomical substrate for the "dissociated" visuo-vestibular eye movements that accompany infantile strabismus.

Andrea Molinari MD, of Quito, Equador, presented *fascinating* details of the early history of the earliest strabismus surgery, the tenotomy, first published in 1839 by Diefffenbach. By the end of 1841, over 3800 procedures had been done by 6 different surgeons in continental Europe. *[I am hoping to display several volumes from my historical book collection next year at the AAPOS meeting in San Antonio, and they reveal that in Great Britain and the United States that hundreds more tenotomies had been performed for strabismus patients by 1845.]* She pointed out that general anesthesia was not used until 1847 and this allowed for slower procedures that could then be demonstrated to other surgeons. She then promoted David Granet MD's list-serve. [Contact him at dgranet@ucsd.edu if you want to join.] And she pointed out that Eugene Helveston's extensive work on the Orbis Cyber-Sight web site, including especially the 48 lectures in the E-learning section of this web site, were a most helpful introduction to strabismus for residents.

Joseph Demer MD PhD *convinced most of us attending the meeting* that Sagging Eye Syndrome (SES) due to age-related involutional atrophy of the ligament connecting the superior rectus and the lateral rectus is a common cause of adult strabismus, with a distinct set of clinical findings, including patient being over 40 y.o., a history of blepharoplasty or bepharoptosis, an elevated and deep upper eyelid crease, lower eyelid bags, and adult onset esotropia with a larger deviation with distance fixation (in bilateral, symmetrical SES) or a hypertropia (in unilateral or markedly asymmetrical SES). He has found that this type of "low AC/A esotropia" is well treated with bilateral medial rectus recessions using

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about double the "standard" tables, and that the hypertropia is well treated with a weakening procedure of the contralateral inferior rectus. *This same mechanism has been well described in cases of high axial myopia with severe esotropia and hypotropia, nicely treated by the "Yokohama procedure", which is the placement of a non-absorbable suture ligature between the lateral and superior rectus muscle bellies 8 mm posterior to their insertions to replace the absent ligament that connects the SR and the LR.* Andrea Molinari MD asked the *reasonable question* from the floor as to why this age-related, involutional deterioration of the SR-LR ligament was more pronounced than a similar deterioration of the SR-MR ligament. Demer pointed out that the orbital layer of the IO actually partially inserts on the LR pulley and is pulling downward all throughout life, and nothing similar is happening on the medial side of the globe. [At various times as speakers giving papers or workshops or sitting on panels, David Guyton MD and Steven Archer MD also each individually strongly recommended larger-than-usual bilateral medial rectus recessions to treat convergence insufficiency esotropia in elderly adults.]

Eileen E. Birch, PhD asked the provocative question, "Is stereopsis critical for anything besides a 3-D TV? Birch receives referrals from 16 Pediatric Ophthalmologists in the greater Fort Worth/Dallas metroplex area. Aware that *for most of us the visual acuity and binocular alignment are the primary outcomes we measure and value because fine stereopsis is so rarely achieved in infantile esotropes, she felt compelled to choose* "coarse" stereopsis as an outcome to be correlated with final visual acuities in the non-dominant eye and need for re-operation. She defined coarse stereopsis as 100 to 800 arc sec as defined by the Randot. (She pointed out that the classic Titmus® stereoacuity test has such secondary cues that the circles labeled 1 through 4 are easily guessed monocularly, *as an older paper by Romano et al confirms.*) Birch found that coarse stereo is present in 60%–85% of children receiving successful surgery by age 6 mos vs only 25% – 40% of similar early onset infantile ET's who had surgery at 7 – 12 months. She then found that children with at least coarse stereoacuity, compared with children who had nil stereoacuity, had fewer surgeries and lower rates of recurrent esotropia requiring hyperopic spectacle correction. Those with at least coarse stereoacuity had lower risk for amblyopia and lower risk for residual amblyopia following treatment for amblyopia. *This was a new study and firmly establishes coarse stereoacuity as a proper goal of treatment for infantile esotropia of early onset*. Her previous studies established that 3 months duration is the critical point at which stereopsis starts to deteriorate. All of this, she pointed out, is in the context of the PEDIG criteria for performing early surgery for infantile ET, including a constant (not intermittent) deviation of 40 ET' or more and at least 4 – 5 mos of age. Demer asked if she had only demonstrated correlation and not cause and effect. She responded that the children with coarse stereopsis appeared initially to be identical to those who did not develop coarse stereopsis except for the age at surgery and the duration of the esotropia prior to surgery.

Birch encouraged everyone to watch for a paper be given the next day by a group at Moorfields who had documented impaired development of hand-eye coordination in children with strabismus and amblyopia. John J. Sloper DPhil,FRCOphth, Catherine M Suttle BScPhD, AlisonL Finey BSc PhD, Dean R Melmoth BScPhD, and Simon Grant BScPhD collaborated in comparing 21 children ages 4-8 yrs with different degrees of amblyopia or absent stereopsis, comparing them to 15 normal children of similar ages. Impairments were the most severe in children with the poorest stereoacuity.

Most Spectacularly Clinically Significant New Basic Science Award:

"The Nerve of that Muscle!"

In a workshop, so named, significant for the presentation of basic science information of clinical importance rivaling Demer's earlier pioneering characterization of the pulleys, Joseph L Demer MD PhD, Robert A Clark MD, and Howard Ying MD PhD *truly* gave us a new understanding of the extraocular muscles in ocular motility and strabismus. *[Do print out the 22-page handout from the AAPOS web site. Kushner said it was too many pages for him to print out and bring to the meeting, so I went to the Business Center in the hotel and made him a copy of mine before the workshop. O.K. I did have to replace the toner on my printer at home.]*

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EDITORIAL: Exotropia Replaces Esotropia as most Common Form of Strabismus; HIV and CPEO; Zoo Paperes; EOM Innervation Innovation And Strabology Report of the 37th Annual AAPOS Meeting, San Diego, California.
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The first piece of *blockbuster* information was that the inferior and the superior halves of the lateral rectus are separately innervated. Demer showed *beautiful computer simulations of* the arborizations of the upper and lower trunks of the 6th cranial nerve as it innervates the lateral rectus muscle. Clark then presented functional evidence for compartmentalization by MRI imaging in Duane's and in superior oblique palsy. He elaborated on how he uses both the increase in maximum EOM cross-sectional area and the shift of EOM volume posteriorly as markers for EOM contractility.

In esoDuane's the upper compartment is normal or hypoplastic and the lower compartment is the one that receives the aberrant innervation from the medial rectus division of the inferior division of the 3rd cranial nerve.[This explains why almost all cases of esoDuane's have much smaller face turns in reading downgaze than in the primary position for distance, why the single binocular field in most cases of esoDuane's is more centralized with better abduction of the Duane's eye in down gaze, and perhaps why Earl Crouch reported in a poster in 2007 and David Hunter MD PhD and colleagues reported at this meeting, success in treating esoDuane's with a combination of MR recession and lateral transposition of the SR (ONLY) with improvement in abduction of the Duane's eye and no induction of hypertropia, in spite of not doing a lateral transposition of the inferior rectus simultaneous with the lateral transposition of the inferior rectus. (Please see **Duane's**, below.]

To study impaired ocular counter-rolling in superior oblique palsy, Clark and Demer performed surface coil enhanced MRI in 6 normal and 9 patients with unilateral SO palsy confirmed by significant SO atrophy on MRI. On 90º head tilts to the right and left, the inferior compartment of the LR in the higher eye (extorsion) contracted but the superior compartment of the LR did not in the 6 normals. In the patients with SOP, no such increased activity in the inferior compartment of the LR was observed on the ipsilesional side when the head was tilted to the opposite side. *Does this mean that Bielschowsky was incorrect in his analysis? Probably not, and Jampolsky would say the inferior compartment of the LR was simply "taking up the slack" in normals and not taking up the slack in SOP patients because of the dysfunction of the paretic LR.* Clark and Demer only claim a secondary roll for this mechanism.

In another poster by Ayman M Elghonemy MD FRCS, and Fadia S Attia CO of the Magrabi Eye and Ear hospital in Jeddah, Saudi Arabia, a positive Bielschowsky head tilt test was found in 84/85 cases of comitant exotropia, with mean difference in right and left head tilt of 11.5 prism diopters. They showed a *convincing* movie of this phenomenon. [A right SO Palsy would classically have a right hypertropia worse on right head tilt. On right head tilt the contractured *(and hyperinnervated?)* left LR would be doing its usual *(we now know)* thing and producing extorsion on head tilt to the opposite side, but would be exerting more force than normal and have an increased extorsion and *depression* effect, thus making the RHT more on right head tilt. The mirror image of this example would work for left head tilt. *Thus, the finding by Clark and Demer detailed in their workshop and a poster that the inferior compartment of the LR is involved in producing extorsion in head tilt to the opposite side neatly explains why exotropes would demonstrate a positive Bielschowsky (hypertopia of the lower eye on head tilt). [Further proof of this idea could be obtained if patients with unilateral exotropia of disuse were found to have a hypertopia only when the head is tilted towards the involved eye.]*

Also, the demonstration of separate innervation to the superior and inferior halves of the lateral rectus may give some support to the notion that slanted insertions can augment correction of A and V patterns.

Finally, *as reported (only) in last year's Strabology report*, Robert Gordon MD of New Orleans was about to report a series of patients whose DVD was nicely corrected by splitting the LR about 8 mm back, disinserting the inferior half, and infraplacing it substantially. (He lost the records in Katrina.) *As Clark pointed out in the workshop, a "split LR might be used to correct torsion." [The DVD eye is, of course, extorted and hypertropic.)*

Exotropia

In previous strabology reports, we have usually put esotropia as the first strabismus category

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to be discussed. Now that exotropia has become the most common form of strabismus that pediatric ophthalmologists treat in every part of the world except Europe and North Central and Northeastern USA, the time has clearly come to change this tradition and put exotropia first. (See forthcoming **J AAPOS** publication by David Weakley MD et al on the changing demographics of pediatric strabismus patients and their most common forms of strabismus.)

Seong-Joon Kim MD, Jin Choi MD, and Ji Woong Chang MD of Seoul, Korea, studied the long term survival analysis of bilateral recess LROU vs unilateral recession-resection for intermittent exotropia. Among 149 patients with 2-yr follow-up, 43/60 (72%) in the bilateral recess LROU and 48/89 (63%) in the recession-resection group were still 10ET to 10XT. *I asked the lead author whether they used the "Korean protocol" for the number of mm for the bilateral lateral rectus recessions, and was amazed to hear that they were using "the numbers that Ken Wright taught me." [As much as I genuinely respect and like Ken Wright MD – I had a delightful lunch with him and a few other colleagues at the meeting – the Korean protocol published in **J AAPOS** around 2006 is definitely better for patients with near deviations of 10 XT' or more or with deviations that are at least 50% of the distance deviation. The Koreans (at least some Koreans) do more mm of bilateral LR recession for basic XT's and their success rates are higher than "standard" amounts of bilateral lateral rectus recession.]* The mean follow-up was 3.6 years in the recess LROU group and 4 years in the R&R group. By the last follow-up, 63% in the bilateral LR recess group and 27% in the R&R group retained a satisfactory outcome. *[Was there a selection bias in the original choice of surgery? It is well known that basic XT's have a more frequent need for second surgeries no matter what surgery is done the first time. If R&R's were done more frequently for basic XT's and recess LROU's were done more frequently for divergence excess XT's, then this could partially explain these dramatic results. I strongly suspect that the difference in long term success rates would have been even more dramatic had they used the "Korean" protocol to choose the number of mm for their recess LROU's.*

*As regular readers of this strabology report already know, I think it is really well established that recession of ONE lateral rectus 9 mm in children ages 18 mos to 6 years with deviations less than 22XT has a 20% lifetime success rate, and in the 20% requiring a second surgery for recurrent XT, the most successful surgery is an 8.5 mm recession of the other lateral rectus. For the rare child who needs a third surgery who had a 9 mm recession of one lateral rectus as the first surgery, resection of one medial rectus 5 mm works well. (For the really rare consecutive ET in this protocol (less than 1%), recession of one MR 5 mm works well. BUT IF THE CHILD HAS BEEN NEGLECTED TO THE POINT THAT THE DEVIATION IS LARGER than 21 XT and/or the near deviation is more than 10XT' or larger than half the distance deviation, then the best you can do is a bilateral lateral rectus recession using the table published in **J AAPOS** in 2006 known as the "Korean" protocol.*

In the context of the preceding paragraph, the reader will understand my disdain for any study "assessing control in intermittent exotropia" no matter how much I respect the authors and their insitution, such as Sarah Hatt MD, Laura Liebermann MD, David A Leske MD, Brian G Mohney MD and Jonathan M Holmes MD of the Mayo clinic. The child with exotropia needs your help as soon as possible. These wonderful Mayo folks have demonstrated that their long term 50% success rate in intermittent exotropia is associated with an increased chance for a psychiatric diagnosis and a generally miserable life! *The simple fact is that, given current technology, the long term cure rate for X(T) should be 100% (even if it takes more than one surgery in a minority of cases).*

William McSwain MD, David Morrison MD, and Sean Donahue MD studied the influence of A or V pattern on postoperative drift after surgery for intermittent exotropia. In general, they confirmed that patients with A or V pattern exotropia are more likely to maintain their initial postoperative binocular alignment than comitant patients. In the comitant group (N=46), 9/46 had no change at one year post-op, 6/46 had an eso change, and 31 had a exo shift, with a mean exoshift of 6.4. In the pattern group (N = 19), 8/19 had no change, 3/19 had an eso shift, and exoshifts occurred in 8/19. The absence of postoperative drift was more common in children

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with pattern exotropia (p =0.045, Fisher exact test).

LukeW. Deitz MD, Stacey l. Pineles MD, and Federico Velez MD revisited the old question of whether the amount of immediate post-operative esotropia after recess LROU predicts for later binocular alignment. *Surprisingly, they concluded it did not.*

Paul Foeller MS, Agnes Wong MD,PhD and Lawrence Tychsen MD have developed a primate model of intermittent exotropia. *[It's difficult enough to examine a crying two-year-old; imagine the difficulties examining a monkey who wants to escape and to bite you!]* Binocular search coil ocular motor recordings were used to record strabismus patterns, liquid crystal goggles were used for cover testing, and SSVEP's were used for visual acuity testing. Two monkeys with onset of XT at age 6 mos to 2 yrs have been studied. *Twice in the abstract these authors repeated the erroneous statement that "intermittent exotropia is less common than esotropia in non-human primates, as in humans" (sic). Haven't they got the word? Intermittent exotropia is now the most common strabismus in the USA and in the world.*

In the workshop titled "New Strabismus Surgical Techniques" Alan B. Scott extended his previously reported work using bupivacaine to permanently strengthen EOM sometimes with simultaneous botulinum to weaken the antagonist. *The most impressive detail is that there is a permanent hypertrophy of the injected muscle after bupivacaine injection. The length of the BP injected muscle appears to be determined by eye position during regeneration, so a small dose of Botox® in the antagonist really helps a lot.* In one dramatic case depicted, Scott was able to permanently reduce a 50XT to ortho with only two such paired injections. *[If you are interested in this technique, print out the handout from the AAPOS web site, get the proper equipment, and PLEASE make these injections under EMG guidance.]*

In the first paper given at AAPOS on this technique by other authors, Matthew E Josephson BS and Stephen A Mathias MD treated 11 patients with intermittent exotropia af the convergence insufficiency type with average X(T)' 12.6 with bupivicaine injections into one medial rectus (without simultaneous use of botulinum into the antagonist). Assessed at one year after the injection(s), 9 of 11 patients so treated had adequate relief of symptoms without need for prism glasses, one was happy with a small prism, and one proceeded to bilateral lateral rectus recession. In most of the successfully treated patients, a second injection was given 8 to 12 weeks after the first.

Esotropia

Michael S. Abrams MD, Candace L. Duncan CO, and Ryan McMurtney CO used Bangerter foils (0.1 occlusive density) over the dominant eye in glasses 4 hours daily in 46 children whose strabismic amblyopia was 20/60 or better and whose residual esophoria was less than 20 E' and found that 28/46 (61%) developed motor fusion after a minimum of 2 years of using the foil. *[I worry that these children with what I call a "loose monofixational cure status" would have developed "motor fusion" with the simple passage of time without the use of the Bangerter foils. This was, after all, an uncontrolled study. Frequently a Resident in clinic would be seeing a patient at age 5 yrs after a previously "successful" bilateral medial rectus recession and would do an alternate cover test on a child with 7 or even 10 ET', reveal a phoric measurement (alternate cover test) of up to 20ET', and want to schedule a surgery. I would always tell the Resident that this child would "outgrow" the residual small ET' by age 8 or 10 years with no further surgery.]*

This natural decrease in accommodative convergence is also well known in children whose residual high AC/A ET is being managed with a bifocal; they eventually can have the bifocal tapered so they are out of the bifocal in most cases by age 10 or 12 years. This well-recognized phenomenon was once again verified by Brian G Mohney MD, Chrystia C Lilley MD, and Nancy N Diehl MD in a ten-year *(!)* long-term follow-up study of 65 children with high AC/A accommodative esotropia. They found that 2 of 3 could eliminate their bifocal without surgery. Those who had received a previous bilateral medial rectus recession were more likely to drop the bifocal without further surgery. *[Note: Bifocals are very expensive, may not preserve stereopsis, and are not well*

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accepted by most parents and children. The best surgery for recurrent high AC/A ET is to resect one LR 7.5 mm. 60 cases from Wills Eye Hospital in one series!]

Michael E Gray MD, W. Walker Motley MS MD, Andrew Melson BA, and Shelia Salisbury PhD confirmed the previously well-known fact that children with esotropia and Down's syndrome do quite well with standard dose-response curves for esotropia. They compared 16 esotropic children with Down's Syndrome and 16 esotropic children without Down's Syndrome. *[Pet peeve: I shall continue to use "Down's Syndrome" rather than the supposedly more politically correct "Down Syndrome", which I personally consider to be an insult to many of my more delightful patients. Don't get me started on the similarly ludicrous "Duane Syndrome". We should all continue to honor one of our most important pioneers in strabology and use the term Duane's Syndrome. (Duane also named the stages of deterioration of pediatric exotropia, the "divergence excess, basic, and convergence insufficiency" that we use today.)]* ***[The Editor of BV&SQ strongly agrees whole heartedly with this author!]***

Pulleys

For at least 6 years I have been measuring what I thought was the anterior end of the pulleys with a long Scott ruler when I dissect medial rectus muscles. I wasn't certain that I was merely recording how far back I was dissecting, but two presentations at this meeting have emboldened me to continue this measurement (at least for the fun of it).

Dominique A Thouvenin MD, Oliver Norbert MD and Eric Chapotot MD of Toulouse, France, measured the distance between the scleral insertion of the medial rectus and the anterior part of the pulley in 194 patients. Their intraoperative photos *nicely demonstrated* that if you dissect through the pulley you start seeing orbital fat, which may or not prolapse. They found that the median location of the anterior part of the pulley was 12.03 mm from the scleral insertion, varying from 8 to 15 mm. *My median for this same measurement is 12 mm!! I had not attempted to correlate this measurement with anything else in particular, but they have.* They found a very strong correlation with the pre-operative angle ($p<<0.0010$) and a reasonably strong correlation with the refraction ($p<0.01$). *Medial rectus muscle pulleys tend to be more anterior in larger angles of esotropia and with larger amounts of hyperopia. [I can't wait to try this with my own data.]*

In the **New Strabismus Surgical Techniques** workshop Robert Clark MD had clear intraoperative photos of his technique of attaching the anterior end of the pulley to the dorsal surface of the MR as a replacement for scleral sutures for a Posterior Fixation Suture. He has used this mainly for high AC/A esotropia. *[I have not yet seen a controlled series comparing this with simply increasing the amount of bilateral medial recession (or doing it for the near deviation or the maximum motor fusion test, my publication in* ***J AAPOS****).]*

Superior Oblique

For many years, I taught Residents the "Caputo test" for distinguishing superior oblique palsy (SOP) from spasm of the sternocleidomastoid in children with a head tilt who are too young to allow precise measurements of his or her hypertropia in 9 cardinal positions and with right and left passive head tilt. You simply sit the child down in front of you with the legs outstretched, hold the hands with the arms outstretched, and lower the child to the floor (into the supine position). If the head tilt is due to a SOP rather than spasm of the sternocleidomastoid, the child will straighten the head in relation to the plane of the shoulders as you lower the child to the floor, and the head tilt returns as you pull the child back into a sitting (upright) position. Neuro-ophthalmologist Agnes Wong MD confirmed that this test is a indeed valid in that context. Dr. Wong and Linda Colpa MD measured the hypertropia (HT) in adults, 22 with skew deviation, 58 with SOP, 42 with HT from other causes, and 20 controls [probably Residents]. They found that the HT reduced by 75% typically in 18/22 patients with skew deviation, but the HT stayed the same (upright vs supine position) in all other persons studied. They recommended that "if the upright-supine test is positive, neuroimaging should be considered to rule out skew deviation." *Criticism from the floor included the fact that these deviations were really small in the primary position tested (generally 5 HT or less), and the observations*

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were unmasked. Other signs of skew deviation, such as tilt of both fundi towards the direction of the head tilt, should also be looked for.

Kelly A. Mackenzie and John P Lee of Moorfields reported three patients with traumatically avused SO tendons which they were able to repair surgically. They found the tendon attached to the sclera nasal to the SR muscle. Two of 3 required additional rectus muscle surgery. *[We miss John Lee and Art Rosenbaum; both passed away this last year.]*

Joseph L Demer MD PhD, Robert A Clark MD, and Jennifer Kung BA wondered if the 3-step test or any other clinical feature would predict the finding of SO atrophy on MRI. (For Demer, if he doesn't find SO atrophy on MRI, it is a "masquerade syndrome" and not a true SO palsy. They concluded that (1) no clinical test can predict SO atrophy as seen on MRI and (2) abnormal pulley shift and IO relaxation can masquerade as SO palsy, "giving a positive 3-step test in half the cases." *[Demer feels the masquerade syndrome will not have a floppy tendon on the Plager test and without a floppy tendon and a classic Type II Knapp pattern he won't tuck the SO. Sooo, he recesses the ipsilateral IO, the ipsilateral SR (a little) or the contralateral IR pretty much according to my flow chart published in BVQ.]* See Mims JL III. The triple forced duction test(s) for the diagnosis and treatment of superior oblique palsy with an updated flow chart for unilateral superior oblique palsy. **Binocul Vis Strabismus Q** 2003; 18(1):15-24.

Daniel Brooks MD, Sean Donahue MD, and David G. Morrison MD evaluated the efficacy of superior oblique Z tenotomy in the treatment of OASO with the goals of normalization of A pattern strabismus and normalization of versions. A monopolar electrode microdissection needle *(scarey!)* was used to make two horizontal 50 to 75% width tenotomies in opposite directions 8 mm apart. In 25 patients, "success rate" for pattern collapse was 84.6% and resolution of overdepression in adduction was 65%. *[I prefer Rosenbaum posterior tenectomies, a more controlled procedure.* The original series was 22 cases with 21/22 successful. *A confirmatory series of 14 was presented by John Bishop MD of Corpus Christi several years ago at the Texas Society for Pediatric Ophthalmology and Strabismus. He was happy with 13 of 14 cases.]*

In the early 1990's, Linda Christiansen MD presented a series of SO tendon advancements for SOP. This was the time that Canada was transitioning totally to a national single-payor system, just prior to the time she decided that to send her kids through college she was going to have to change her subspecialty to Ophthalmic Plastic Surgery. Once, I called her on the phone about this series, and it was never published. [This was about the time that Canada lost almost all their Pediatric Ophthalmologists. They returned to Canada after the Provinces (like our states) agreed to pay 100% of their overhead and/or the children's hospitals in Canada decided to hire Pediatric Ophthalmologists.]

Irene H. Ludwig MD *has taken up this banner and* in her workshop nicely showed how to advance the SO tendon for SOP. Prior to starting surgery with the patient under a general anesthesia, she performs a *torsional* traction test. Normal is the ability to tort the eye ball 60-70 degrees. With a lax SO tendon, you can tort the eye 80-90 degrees, she says. After a non-absorbable suture is placed into the tendon its advanced 3-6 mm ***circumferentially***. A double crossed-swords technique is used, with the anterior spatulated needle passing in an antero-posterior direction, and the posterior spatulated needle passing nasally to temporally. This plus a central locking bite reconstructs the normal 90-degree curvature of the SO insertion. She then repeats the forced duction test and may recess or advance the tendon if the forced duction test is not satisfactory.

Duane's *(NOT "Duane")* Syndrome

Reshma A Mehendale MD, Linda R Dagi MD, Carolyn Wu MD, Danielle Ledoux MD, Suzanne Johnston MD, and David G Hunter MD PhD laterally transposed the SR and recessed the MR on an adjustable suture in 5 patients with esoDuane's and limited abduction of the Duane's eye. They improved the face turn and enhanced abduction of the Duane's eye without inducing a hypertropia in any of the 5 patients. *[As discussed above, their satisfactory results, obtained without simultaneous lateral transposition of the IR, and without inducing any hypertropias, could be due to these patients having an*

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intact or even hyperinnervated inferior compartment of the Duane's lateral rectus with an atrophied superior compartment. The upward pull of the laterally transposed SR could be compensated by the downward pull of the inferior compartment of the Duane's lateral rectus.] David Guyton MD, reviewer, was skeptical that the SR was doing much and attributed the benefits entirely to the recession of the Duane's medial rectus.

Jessica K Laursen MD, Federico G Velez MD, Ramesh Kekkunnaya, and Stacy L Pineles MD reviewed the records of 51 Duane's patients who had received lateral transposition of the Duane's eye ("Vertical Rectus Transposition"=VRT). They compared 14 overcorrected (XT post-op) with 37 who were orthotropic or ET after VRT. Those with consecutive XT after VRT were younger, had less restriction on abduction, had significantly less esotropia at near in the primary position and in adduction. Reviewer David Guyton MD commended their efforts to identify which patients would be overcorrected after VRT. He cautioned against a "one size fits all" approach to Duane's, suggested that if the co-contraction signs were minimal a very small resection [2-3mm] of the Duane's lateral rectus added to a modest recession of the Duane's medial rectus [4.5 mm] would work as well or better than VRT in many cases of esoDuane's. *[See Morad, Kraft, Mims in **J AAPOS**. Six of the nine cases of R&R for esoDuane's in their series were mine, and I have performed a modest R&R in over 23 cases of esoDuane's. Certainly, there are cases of esoDuane's for which VRT with Scott Foster lateral fixation sutures can be really helpful. In general, you should follow Scott Foster MD's advice and don't recess the medial rectus when you perform a lateral transposition of the vertical rectus muscles with lateral fixation sutures. In a recent case there was limited forced ductions in both directions, thus indicating a Scott Foster lateral transposition of the vertical rectus muscles and also indicating some modest weakening procedure of the Duane's medial rectus. I used a Ken Wright grooved retractor and tenotomized only the central 2 mm of the MR tendon under direct visualization. Fortunately, the child has done well, with no under or overcorrection and a large and centralized single binocular vision field.]*

Overcorrection and Consecutive City

Richard Saunders MD in the Difficult Problems in Strabismus workshop chaired by Jane C Edmond MD presented a case of probably straightforward consecutive ET after bilateral LR re-recessions of 3 mm. Advancement of a slightly slipped LR all the way to the insertion did not work; only subsequent modest MROU relieved the diplopia and converted the consecutive ET with diplopia to a nicely fused 6-8 exophoria. From the floor John Simon MD, simply stated that consecutive ET after recess LROU is best treated by recession of one MR [generally 5 mm, *my experience exactly]* and that advancement of one LR to the insertion generally does not work for long *[also my experience, as well]*.

Jane Edmond MD and her panel reminded everyone that adjustable sutures usually lead to large overcorrections when used for recessions of the IR in thyroid eye disease.

Steven Archer MD presented a SOP case for whom he had performed IO myotomy and a 3 mm recession of the SR on a hang-back, resulting in a large hypotropic overcorrection with a pattern similar to Brown's Syndrome *(NOT Brown Syndrome)*. Richard Saunders MD criticized the use of IO myotomy. *[For the last ten years I have recessed the IO 14 mm along its natural path, performed a triangular myectomy of the posterior insertional fibers, and reattached the anterior insertional fibers 5 mm posterior to the lateral end of the IR. This is reliable and has no complications. It is perfect for recessing the IO for SOP.]* Archer then re-explored the SR he had placed on hang back *["suspension operation"-ed]* and found that he had imbricated the anterior fibers of the SO. Once these were freed, the patient no longer had a large overcorrection. *[Brave man to show us his complication so we would be certain to avoid a similar mistake. I would NEVER hang back (i.e.; suspend -ed) a superior rectus; adherance to the globe can be interfered with by the SO tendon insertion. Never.]*

Miho Sato MD of Japan presented a gross overcorrection sent to her after the Yocohama

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procedure, a suture connecting the lower border of the SR and the upper border of the LR 8 mm posterior to the insertions of these muscles and indicated for large ET and hypoT due to herniation of the back of the globe between the superior and lateral rectus muscles. This overcorrecton was apparently due to tightness of the LR which had been previously resected. Simply cutting the suture wasn't enough; she had to go back and position the SR and LR correctly after clearing a lot of scar tissue. She covered a conjunctival defect with amniotic membrane. After this demonstration of *her considerable surgical skills*, she invited us all to the ISA meeting in Tokyo to be held in the Fall of 2014 in Kyoto, Japan!

A New Cause of CPEO?

Today, more than 1 million patients in the United States are infected with HIV and are effectively treated in the long term with highly active antiretroviral therapy (HAART). Federico G Velez MD *[son of Columbia's Guillermo Velez MD]*, Joseph L Demer MD, Gary N Holland MD, Laura Bonelli MD, Susan Ransome MD, and Stacy Pineles MD described 3 adult patients with bilateral external ophthalmoplegia and blepharoptosis who had been on HAART for many years. MRI showed "spongiform" bright signal inside the extraocular muscles that had retained their normal volume. Autosomal dominant congenital external ophthalmoplegia (CPEO) is a condition due to damage of mitochondrial DNA polymerase gamma, and has a "spongiform" appearance in the cross sections of the EOM on MRI. The medications in HAART may cause a similar mitochondrial myopathy, and long term HIV treatment may cause a CPEO-like disorder. *[Federico Velez MD came up with this idea and this correlation. He told me he had to really expand his horizons and read difficult papers in molecular biology to make this connection. Congratulations on a truly new idea!]*

New Ways to Test Visual Acuity in Preverbal Children

Many experienced Pediatric Ophthalmologists gain an impression of visual acuity from OKN drum responses. Is this valid? Can it be quantitated? Irene Anteby MD, Hadas Mechoulam MD, Claudia Yahalom MD, Karen Hendler MD, Evelyne Cohen, MD, Ilana Karahai MD, and Joshua Kruger MD have devised and evaluated a vertical OKN video device that uses vertically moving cartoon targets of smaller and smaller sizes. A favorable association was found between the scores of the OKN tool and the distance visual acuities determined by Teller cards, Lea symbols, or printed letters in 38 children.

Reporting Author's Contribution in San Diego. *-per*

In orthotropic children with previous infantile and acquired esotropia it would be useful to have a test to predict which child will need patching for residual amblyopia when they are older and able to perform on a reliable visual acuity test. The test should be rapid, innocuous for a two-year-old, and should not demand much performance by the patient

. James L. Mims III MD (yours truly) has devised and validated just such a test.

In 1980 Mims presented (with the permission of Otis Paul MD, the program chairman that year) the first scientific poster ever displayed at an AAPOS meeting. The subject was the use of a muted head light to provide a convenient source for the Hirschberg Corneal Light Reflection Test, leaving both hands free, one hand to hold the occluder paddle, and the other to hold a prism for a cover test.

The muted head light has now allowed another test, the 20-Diopter Base-In prism with muted headlight test. This test is completely different from tests requiring two re-fixations (sustained interest in a toy), such as the 12-Diopter base-down prism test. The parameter being recorded by the observer is simply which eye appears to be fixating when first the base-in prism is placed before the right eye and then a moment later is placed before the left eye.

If the eye behind the prism is the fixating eye, then the other eye is probably amblyopic. Unique among all studies of preferred fixation tests, Mims' study was of two-year-old children with notoriously short attention spans. He couldn't know their visual acuities until they were four years old and could perform on a standardized visual acuity test, such as the HOTV matching test. Thus, he was a blind observer. All other studies of fixation preference tests have been done on children four years old and older, children with much longer attention spans than two

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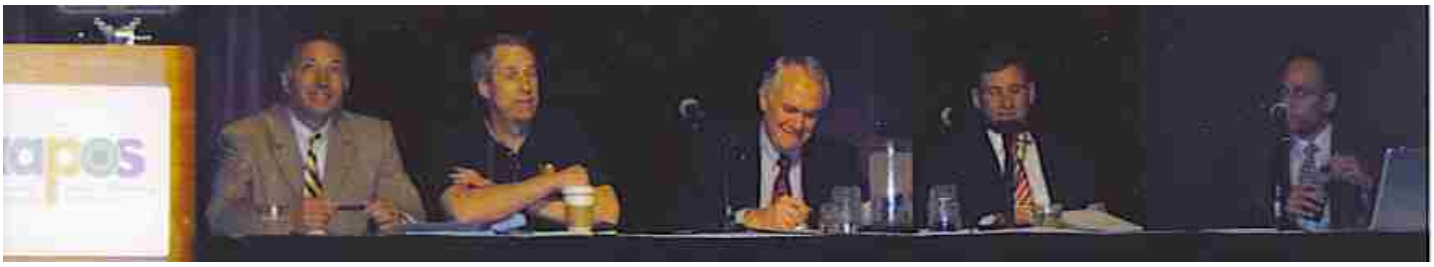

year old preverbal children who are the target population for which such tests are done. The other studies were typically done all at the same visit, so the visual acuities could be definitively measured at the same visit as the test being "validated."

This 20-Diopter Base-In prism test with muted headlight proved to be 91% sensitive with a 92% negative predictive value, but was only 72% specific. Mims then ordered (ranked) various tests according to sensitivity and specificity. He had also done the objection to occlusion test and found it to be only 59% sensitive but 91% specific. Another test known to have low sensitivity but high specificity is the 12-Diopter base-down prism test. Thus, if Mims gets a "negative" result (no amblyopia), he is 92% certain that the child will not need patching (negative predictive value). If the eye behind the prism is the fixing eye then the other eye is probably amblyopic, but there is a 28% chance that it is not amblyopic

. Mims then proceeds to two other tests with high specificity, the objection-to-occlusion test, and the 12 Diopter Base-Down prism test. If both of these are positive, patching is almost certainly needed. If one or both of these more specific tests are negative after an initial positive 20-Diopter Base-in prism test with muted headlight, then he simply tries again a few months later. [Note: This is not the same as the 20-Diopter Base-In prism test of Barbara Cassin CO who published such a test 30 years ago with a motor end point, not a test with an almost instantaneous visual parameter like this one.]

Bienvenidos a San Antonio!

Next year, 2012, the AAPOS Annual Meeting will begin on Saturday, March 24 and finish the morning of Wednesday, March 28. As usual, the largest meeting of Pediatric Ophthalmologists anywhere in the world will be the main attraction. *San Antonio does have more than one unique attraction. Once you have seen and been disappointed by the Alamo (almost everyone is), you will be ready for some real fun. San Antonio has the world's largest Sea World, with pools so large that the whales haven't been motivated to kill their trainers. It really is a fun day for the whole family.* On Saturday morning the Texas Society for Pediatric Ophthalmology and Strabismus will be running a bus from the hotel to Sea World. If you have board or committee meetings on Saturday, come a day or two early; Sea World is open Thursday through Sunday at that time of year. *If incarcerated (though happy) whales aren't your thing, then consider a visit to Mission San Jose, Queen of the Missions, and gain an understanding of how the more nearly benign missions actually functioned and why the local Native American hunter-gatherer tribes were willing to live in the missions.* The descendants of those who lived within the mission walls still come to church there and farm the surrounding fields using water from the oldest functioning irrigation canals in the Western Hemisphere. Do walk the river walk to La Villita, and Mims has promised to lead a 4K walk up the new northern extension of the River Walk to see the famous giant sunfish glowing from within and hanging below an expressway bridge. (In South Austin, there are T-shirts, posters and caps that say, "Keep Austin Weird." San Antonio is 70 miles south of Austin.)

Next Meeting: Grand Hyatt, San Antonio, Texas. March 24-28, 2012.

DISCLAIMER: While the reporter has endeavored to be as accurate as possible in reporting the presentations at this meeting, the reader is strongly advised to confirm any information in this report before acting on it or applying it to patients.

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Strabometry Precision: Intra-Examiner Repeatability and Agreement in Measuring the Magnitude of the Angle of Latent Binocular Ocular Deviations (Heterophorias or Latent Strabismus)

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ABSTRACT : ***Background and Purpose:*** This study was designed to compare heterophoria measurements obtained using the methods: prisms cover test (prism alternate cover test), von Graefe technique, Maddox rod test and modified Thorington test. Given the different methodological features of these tests, our working hypothesis was that these tests would not be interchangeable and repeatability would vary.

Methods: Horizontal deviation measurements were made at: "far" distance (six meters and "near" distance (40 centimeters) on two occasions in 61 young subjects of mean age 19.7 years (range 18 -32 years), with essentially normal eyes and vision, who were not familiar with the methods used. Statistical repeatability and agreement were determined using the Bland and Altman method.

Results: **Repeatability:** No difference between the results of the various heterophoria tests was "statistically significant". Coefficients of repeatability (COR) were always best when the tests were conducted at "far", the cover test being the most repeatable. **Agreement:** Mean differences between absolute values ranged from 1.7 prism diopters to 5.1 prism diopters for measurements at "far" and from 2.1prism diopters to 3.4 prism diopters at "near".

Conclusions: The alternating prism cover test was the most repeatable test for measuring latent horizontal deviations. Among the subjective tests, the modified Thorington test was the most repeatable. The low level of agreement observed between the different tests makes their interchangeable use in clinical practice **not** recommended.

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INTRODUCTION

For normal binocular vision, the eyes must be correctly aligned and this is achieved through motor and sensory fusion mechanisms. Heterophoria or phoria is defined as a tendency of the lines of sight to deviate with respect to the position needed to maintain single binocular vision for a given fixation distance. Phoria depends on tonic, proximal and voluntary convergence as well as accommodative response and vergence adaptation (1). Valid diagnosis depends on accurate phoria measurement at near and far distances. To measure ocular deviation, prisms (diasporameter, prism bar or loose prisms) or graded scales may be used. The amount of deviation is expressed in prism diopters (△).

The methods generally used to measure ocular deviation usually require that the eyes be dissociated. This condition already exists in tropias, but in phorias fusion needs to be broken.

Dissociation may be achieved in many ways:

- Covering one eye, such as in the cover test;
- Producing diplopia using a prism, such as in the von Graefe technique;
- Or by -Distorting an image using a Maddox rod for example; and
- Presenting each eye with a different image such as when a stereoscope is used.

Stereoscopes are frequently used for screening large populations but are not usually used to measure deviations in routine clinical practice and have accordingly not been included in this study.

When measuring phorias, it is expected that the longer the patient's eyes remain dissociated, the lesser the extent of vergence adaptation (2). Other factors could also affect measurements such as the luminance level, accommodation control, convergence levels, quantification method (estimate, prism or graduated scales) or the objectivity of the examiner.

It is known that tonic vergence remains relatively stable during measurements (3). The same cannot be said, however, about proximal convergence. For example, some authors have speculated that the penlight used to measure deviation using the Maddox rod does not adequately inform of the apparent target distance when compared to the von Graefe or Thorington techniques (4). The type of fixation card used should also be controlled using targets appropriate for the level of accommodation required (5).

The prism cover test is an objective method while the remaining tests examined here are subjective. The cover test is highly valued by many experienced clinicians and provides qualitative and quantitative information on deviation, making it an essential test in any eye examination. Subjective tests do not distinguish between manifest deviations (heterotropias) and latent deviations (heterophorias) and fail to provide information about the re-fixation speed in the case of phorias, as a useful measure of the quality of fusion. In clinical practice, subjective evaluation of deviation is most often undertaken in patients with heterophorias, in whom deviation values are generally small and difficult to detect using the cover test.

The cover test has been shown to show excellent intra-examiner and inter-examiner repeatability (6). In contrast, there are many methods available that will subjectively estimate deviation. The results of most studies conducted on the subjective measurement of phorias have differed in terms of the repeatability of the available techniques. For example, several studies have shown that the modified Thorington test shows improved repeatability over the Maddox rod or von Graefe techniques (5, 7, 8).

The present study was designed to establish in patients with heterophorias, the repeatability of some common ocular deviation tests used in optometry clinics. The results of the tests were also compared to establish agreement among the different methods. An interesting contribution of this investigation has been the comparison of the cover test, as objective technique, with the subjective methods of measure of ocular deviation.

METHODS

Study population

The study population was comprised of 61 subjects aged 18 to 32 years (mean 19.74, SD 2.5 years) randomly recruited after an explanatory discussion from the first year students at the School of Optics, Universidad Complutense of Madrid, Madrid, Spain. Having recently been admitted, the subjects selected were unaccustomed to the type of tests performed. The results of this study could therefore be extrapolated to a random clinical population of this

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age group with similar near work demands. The study protocol fulfilled the tenets of the Declaration of Helsinki. Subjects gave their consent to participate after the nature of the study had been explained to them. The clinical criteria for inclusion were:

1. A corrected visual acuity (VA) greater or equal to 0.9 decimal visual acuity of Snellen (20/22) in each eye at distance and near.

2. No history of eye disease, refractive surgery, strabismus, nystagmus or amblyopia.

3. No medication or disease that could affect accommodation, fusional vergences or ocularmotility.

4.Asymptomatic subjects without accommodative or vergence alterations. The criteria used to diagnose these dysfunctions were those used in the integrative analysis approach of Scheiman and Wick (9).

Test procedures

The subjects were first required to complete a questionnaire to record their age, sex and eye history. Next, the optometric characteristics of each subject were determined in the following tests:

- Monocular and binocular visual acuity (VA) with and without correction, using Snellen optotypes projected for measurements at far (6 m) and printed, at near (40 cm). Habitual correction was also recorded.

- Keratometry and objective refraction were determined using a Shin-Nippon SRW-5000 autorefractometer-keratometer. Subjective refraction was determined with Snellen optotypes projected at 6 m and a manual phoropter. Subjective refraction was determined by a monocular fogging method with cross-cylinders, followed by binocular balancing to a standard endpoint of maximum plus lenses for best visual acuity (10) .

- Binocular vision test. Horizontal phorias were measured at distance and near using the Von Graefe technique; horizontal vergence amplitudes were determined at near. Stereoacuity was evaluated using the Randot & TNO tests. All these measurements were made with the individual's correction.

According to Bland and Altman (11), the best way of assessing the repeatability of an instrument test is to take several measurements in a series of subjects. Thus, measurements were taken on two occasions separated b a time interval of at least 24 hours. At each first visit, the objectives were described to each subject.

There were four examiners, one for each technique. Each test was administered by the same examiner who was masked to the ocular deviation measurements obtained using the other methods. The tests in the two sessions were undertaken by the same examiner to determine intra-examiner repeatability. The results of the first set of measurements were not visible during the second session, to avoid any possible influence of these on the examiner. Each subject had all the tests for one session on the same day.

Exodeviations were assigned a negative sign and esodeviations a positive sign. For each subject, we calculated differences and the absolute value of the differences between deviations determined in the two sessions. Given the nature of the data (eso-positive and exo-negative), we also worked with the mean of the absolute value of the differences so that negative and positive signs would not cancel each other out.

The SpecificTests

Several different horizontal binocular ocular deviation measurement tests were used (**see Table 1 BELOW**): 4 tests conducted at near (40 cm) and three at far (6 m). All measurements were undertaken in primary viewing position.

The prisms cover test was first undertaken by one examiner (at far and near) and subjective measurements then taken (all tests were first performed at far and then at near) by another examiner who was blind to the cover test results, so that the results of one examiner were not influenced by the results of the other. The order of application of the

Table 1. Tests used to measure ocular deviation

AT FAR	AT NEAR
- Prisms cover test - Von Graefe technique - Maddox rod test	- Prisms cover test - Von Graefe technique - Maddox rod test - Modified Thorington test

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subjective tests was randomly established by extracting numbered balls from a bag. This ensures the results are not substantially influenced by the learning effect or subject fatigue. No indication was given of whether the replies of the subjects were correct or incorrect. A rest period of at least 15 seconds was allowed between each test during which the subjects fixed their sight at far (6 m) to minimize the effects of prism adaptation (12).
Measurements were made by expert paediatric optometrists with a large clinical experience.

The following protocols were followed for the different tests:

1. **Simultaneous prism cover test at far and near:** [*Ed Note: This is not the same test as the "simultaneous prism and cover test" which Eye M.D. strabologists may use when examining very small binocular deviations. See the following very precise description which the Eye M.D.s term the "PACT" or "prism alternate cover test". -per*]

The fixation stimulus was a single row of letters corresponding to a VA of 0.8. For measurements at far, the test was projected at 6 m and for near, a card was held by the subject at 40 cm. During measurements, room and refraction column lights were left on. The subject wore his/her distance correction in the test frames. The test lenses used were metal-framed large-diameter lenses or the subject used his/her own spectacles if the prescription was correct. The subject was directed to look at a single letter on the card situated at primary gaze position and to try to keep the image clear during the measurement time. The [*single*] cover test was then performed covering the left eye using the usual method to determine the direction of the phoria movement (13) (i.e., esophoric or exophoric) Next, a prism bar with powers of 1, 2, 4 and 20 prism diopters in 2△ steps and powers of 25 to 40 prism diopters in 5△ steps was placed in front of the right eye (RE) to objectively neutralize the observed horizontal deviation.

The result of this test was recorded as the power and orientation of the prism that managed to offset the movement of both eyes when conducting the [*Ed: prism* -] alternating cover test (neutralization point). In subjects in whom no initial phoria movement was observed (orthophoria), the results were recorded as "zero".

2. **Von Graefe technique at far and near:** As the fixation target, a single column of letters corresponding to a VA of 0.8 was used. The test was projected at 6 m for measurements at far, and the test card was placed at 40 cm on the phoropter rod for those at near. During measurements, room lighting was left on and refraction column lighting was added for the near measurements. The correction of the subject was placed in the phoropter and the interpupillary distance of the photopter adjusted appropriately. As a dissociating prism, a 6△ base up prism was placed in the RE diasporameter, [*this is an adjustable"high resolution beam steering or pointing" optical device such as the Risley prim, which has achieved the more technical moniker from the laser industry where it is now commonly employed for a variety of uses.aiming and controlling laser beams -Ed]* dividing the test into two columns of letters: a lower column viewed by the RE and a top column viewed by the LE. The measuring diasporameter was placed before the LE and a starting prism of 12 base in used. Base-in prism power was then slowly (around 2△/s) reduced (or base-out power increased). To avoid discomfort, prism power was adjusted both in the dissociating and measuring diasporameters before placing before the eyes. To minimize accommodative changes (and associated vergence changes), the subject was asked to look at the lower column of letters, seen by the eye using the dissociating prism, and to try to always keep the targets clear. The subject was requested to inform the examiner when the upper column of letters was just above the lower column, and prism power and direction needed were recorded.

3. **Maddox rod test at far and near:** A point light source was used as the fixation target, which was presented at 40 cm for near and at 6 m for distance measurements. During measurements, room lights were dimmed and the refraction column light was switched off. The subject's optical correction was placed in the phoropter and a red Maddox rod was positioned with its horizontal axis before the RE. The subject was directed to look towards the light and if the white spot (viewed by the LE) and vertical red line (viewed by the RE) did not overlap, the diasporameter with 12△ base in was placed before the LE to clearly separate the red line and light spot. Next, base-in prism power was slowly reduced (at around 2△/s)(or

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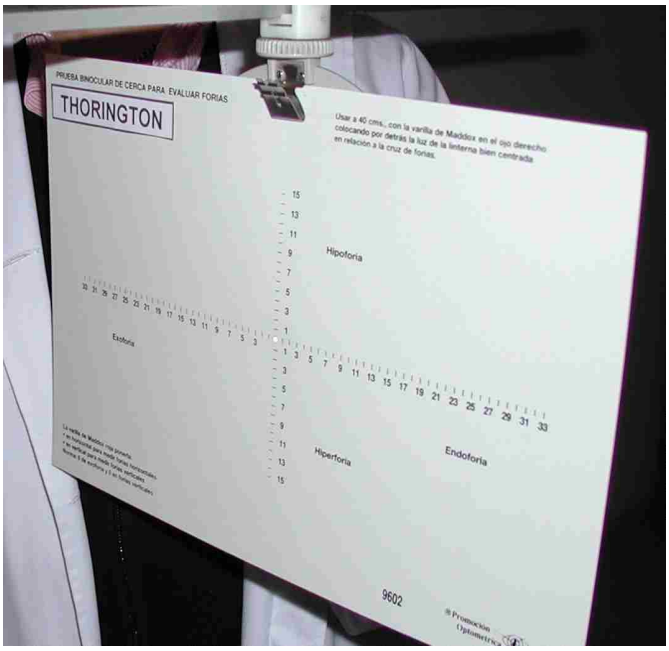
base-out power increased) until the subject indicated overlapping of the red line and light spot. Prism power and deviation direction required were recorded.

4. **Modified Thorington method for near vision:** The fixation target used was the "Thorington" Bernell Near Phoria Test Card (Bernell Corp., South Bend, Indiana). (**see immediately below**)

The card was placed on the phoropter rod at 40 cm



such that the numbers were separated by a distance equivalent to 1△. In the centre of the graded scale there is an orifice through which the light from a penlight was directed toward the subject's face. During the measurements, the room lights were kept at an intermediate level and the refraction column light was switched off. The subject's distance correction was placed in the phoropter and before the RE the horizontal axis of a red Maddox rod was positioned. The subject was instructed to try to keep the numbers on the card clear, to look toward the light on the card centre and to indicate whether the red vertical line viewed by the RE was on the light spot (orthophoria) or to the right (esophoria) or left (exophoria) of the light spot. In these last two situations, the subject indicated the number crossed by the red line. The size (to the nearest 1△ step) and direction of the deviation were noted.

Statistical analyses

Data analysis was performed using the Analyse-it for Microsoft Excel program (Leeds, UK. See http://www.analyse-it.com) and SPSS (v. 11 for Windows, SPSS Inc., Chicago, IL, USA).

The Bland and Altman method was used to determine the degree of repeatability and agreement of the tests (11, 14). From a clinical perspective, the advantage of this method is that agreement among tests is expressed in the same units of measurement as the test itself and allows the clinician to establish his own criteria as to whether or not a difference is significant.

The factors determined were the mean difference, the standard deviation of differences (SD), the coefficient of repeatability (COR = 1.96 x SD) and the limits of agreement at the 95% level (mean difference ± COR). The t-test for paired samples was also used to establish the significance of the differences observed. The level of "statistical significance" was set BY CONVENTION at $p<0.05$. Similarly, we determined coefficients of agreement (COA) among the tests.

Given the sample size, a small difference could be statistically significant yet not clinically significant. For example, for the Cover test differences are considered clinically significant when greater or equal to 2△, i.e. the minimum eye movement that can be detected by a normal observer in the cover test (22, 23) .

Differences from the mean were plotted to establish the limits of agreement at the 95% level and obtain a better idea of the repeatability of the measures. The limits of the agreement interval constitute a threshold for the differences in successive measures that have to be surpassed if the difference indicates that a change in the value has in effect occurred and cannot simply be explained by natural variation among measurements.

RESULTS

Repeatability

TABLE 2 next page, shows the repeatability of the results obtained using the different deviation measurement methods. Mean differences (MD) were equal to or less than 0.7△ for all the measurement methods both at far and near. Mean differences between absolute values were always less than 3.4△. No difference was statistically significant.

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Table 2. Repeatability in measuring horizontal ocular deviation

OCULAR DEVIATION TEST		MEAN (Δ)	SD (Δ)	DIFFERENCES (SIGNS CONSIDERED)		ABSOLUTE DIFFERENCES	
				MD (F-I) (Δ) p(test t)	COR (Δ)	MD (F-I) (Δ)	COR (Δ)
FAR	CT	-0.07	1.15	0.10 (p=0.2)	±1.17	0.20	±1.12
	VG	0.52	2.69	-0.43 (p=0.1)	±3.98	1.44	±2.90
	MD	3.15	3.56	0.53 (p=0.08)	±4.53	1.67	±3.28
NEAR	CT	-0.37	2.39	-0.21 (p=0.3)	±3.18	0.93	±2.63
	VG	-1.09	3.90	-0.70 (p=0.2)	±9.26	3.36	±6.60
	MD	-1.08	4.91	-0.20 (p=0.7)	±8.27	3.15	±5.45
	TH	0.22	3.56	-0.60 (p=0.2)	±6.52	2.20	±5.00

Key: SD = standard deviation, MD = mean difference, COR = coefficient of repeatability, Δ = prism diopters. F = final, I = initial, CT = cover test (alternating), VG = von Graefe technique, MD = Maddox rod test, TH = modified Thorington test

For all the techniques, coefficients of repeatability (COR) were lower when measurements were made at far than at near. COR for differences in absolute values were ±1.12Δ to ±3.28Δ at far and ±2.63Δ to ±6.60Δ at near. All COR increased to some extent when we considered the signs of the measurements obtained, especially of the subjective methods conducted at near. The widest interval of ±9.26Δ was recorded for the von Graefe technique at near. Both for measurements at far and near, best repeatability was provided by the simultaneous prisms/cover test, since this test rendered the lowest MD and narrowest COR interval. When only the subjective methods were considered, the test showing the best repeatability at near, based on its lowest COR, was the modified Thorington test.

Figure 1 (next page) shows Bland-Altman plots constructed for the different ways of measuring horizontal deviation at far and **Figure 2** at near (**next page**, next page overleaf). None of the plots show a tendency for the difference to increase with prism power. That is, the repeatability of the tests does not change with the size of the deviation, at least within the range of phorias recorded in our study population spanning approximately from 8Δ of exophoria to 18Δ of esophoria at far and from 16Δ of exophoria to 16Δ

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Figure 1 (Antona et al): Results:

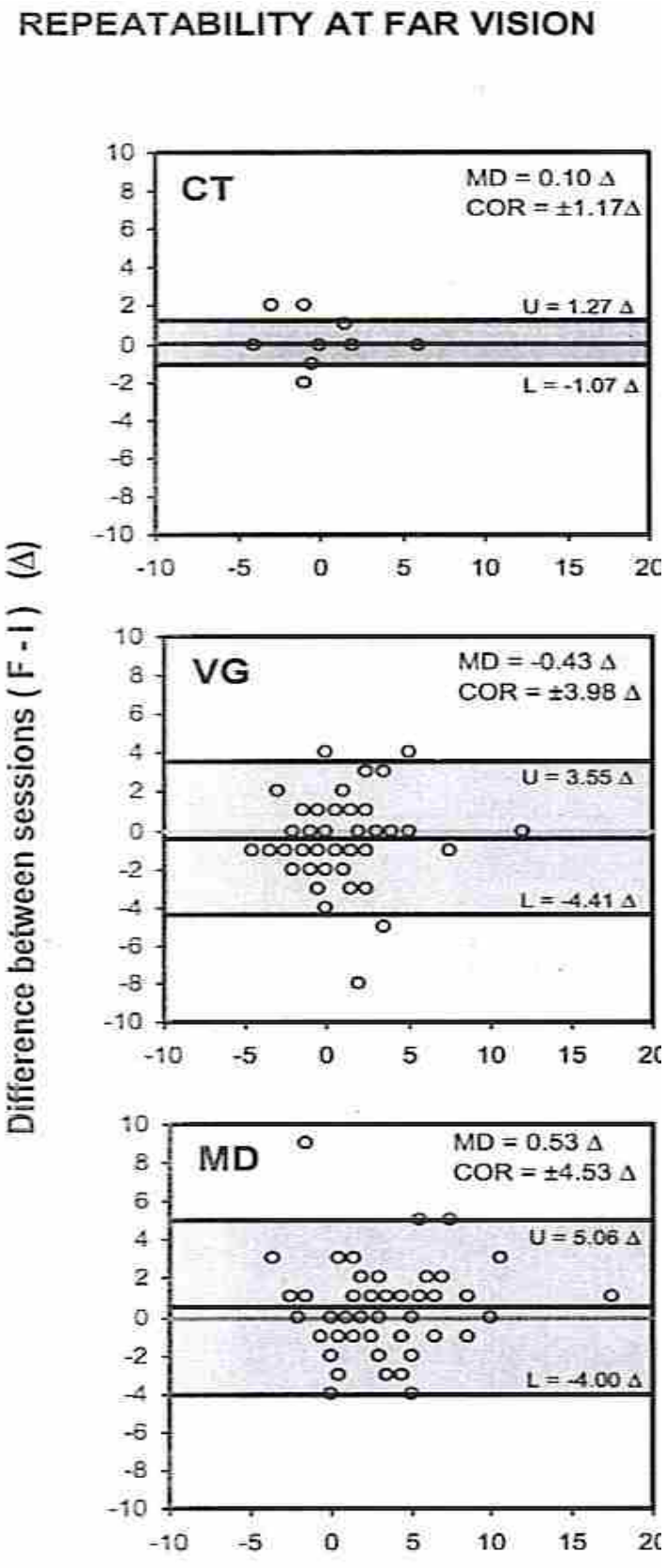

Figure 3 (Antona et al): Results

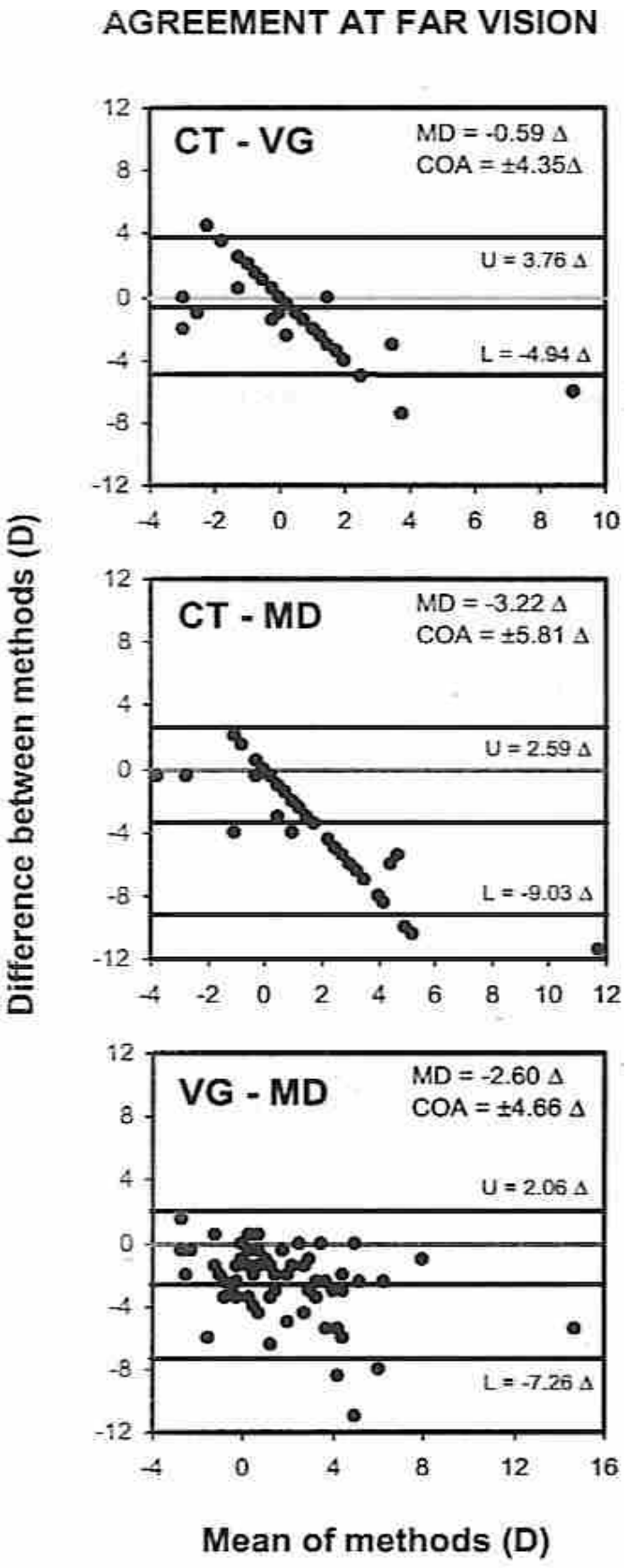

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Figure 1 PRIOR PAGE *(Antona et al): Difference vs. mean plots of repeatability for ocular deviation measurements at far. The central black line represents the averaged difference on the measurements between final session and initial session (mean difference, MD). The U and L lines indicate the upper and the lower 95% limits of agreement (MD 1.96 x SD). By convention, exo-deviations appear to the left with negative values and eso-deviations to the right with positive values.*

Figure 3 PRIOR PAGE *(Antona et al): Bland-Altman plots obtained in the agreement study of the tests used to measure phoria at far (6 m). The central black line indicates the mean difference (MD) between measurements obtained using the different methods. The U and L lines represent the upper and lower limits of the 95% agreement interval (MD 1.96 x SD).*

Figure 2 (Antona et al): Results

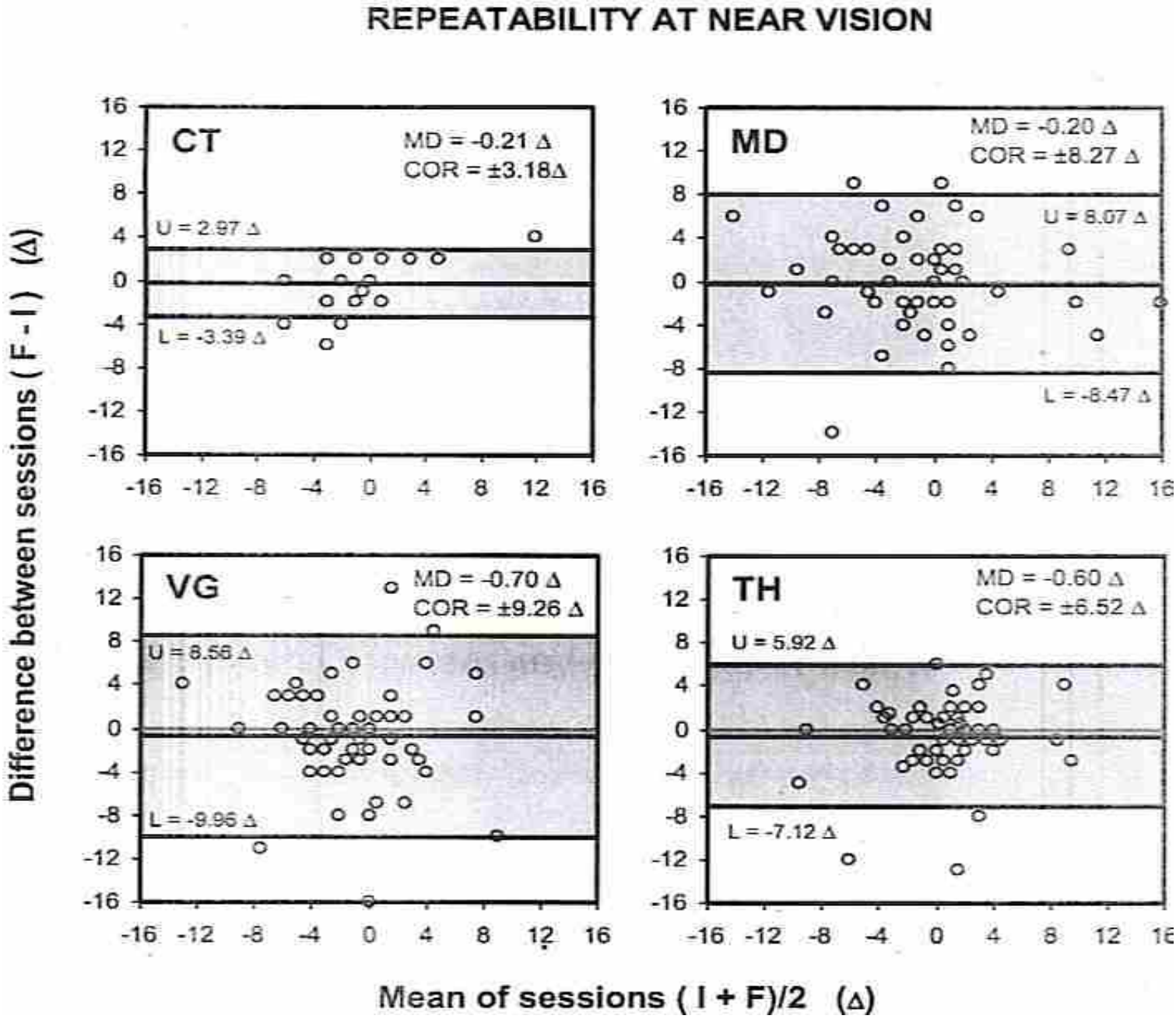

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Figure 2 PRIOR PAGE *(Antona et al:). Difference vs. mean plots of repeatability for ocular deviation measurements at near. The central black line represents the averaged difference on the measurements between final session and initial session (mean difference, MD). The U and L lines indicate the upper and the lower 95% limits of agreement (MD ± 1.96 x SD). By convention, exo-deviations appear to the left with negative values and eso-deviations to the right with positive values.*

(*Text cont'd from page 96*) of esophoria at near. These graphs help compare the degrees of repeatability of the different methods since the lower the MD and narrower the agreement interval, the more repeatable a test will be. Since we used the same scales for the x- and y-axes, the repeatability recorded for the different tests can be easily compared. As may be observed, the 95% limits of agreement intervals were wider for the subjective techniques, indicating greater variation between measurement sessions, or lower repeatability.

Agreement

Table 3 BELOW shows the agreement values

Table 3. Agreement between tests measuring ocular deviation

OCULAR DEVIATION TEST		DIFFERENCES (SIGNS CONSIDERED)		ABSOLUTE DIFFERENCES	
		MD (Δ) p(test t)	COA (Δ)	MD (Δ)	COA (Δ)
FAR	CT - VG	-0.59 (p=0.04)	±4.35	1.72	±2.95
	CT - MD	-3.22 (p<0.0001)	±5.81	3.40	±5.39
	VG - MD	-2.60 (p<0.0001)	±4.66	2.70	±4.66
NEAR	CT - VG	0.72 (p=0.1)	±6.54	2.54	±4.43
	CT - MD	0.71 (p=0.2)	±7.50	2.73	±5.40
	CT - TH	-0.59 (p=0.1)	±5.82	2.35	±3.70
	VG - MD	-0.01 (p=0.9)	±6.41	2.34	±4.44
	VG - TH	-1.31 (p=0.0002)	±4.95	2.10	±3.73
	MD - TH	-1.30 (p=0.0008)	±5.64	2.29	±4.23

Key: MD = mean difference, COA = coefficient of agreement, Δ = prism diopters. CT = cover test (alternating), VG = von Graefe technique, MD = Maddox rod test, TH = modified Thorington test

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recorded among the different horizontal BINocular PHORIA deviation measurement methods. Coefficients of agreement (COA) for differences in absolute values were ±1.8Δ to ±5.4Δ at far and ±2.0Δ to ±5.4Δ at near. All COA appreciably increased when differences with signs were considered, the maximum interval being ±7.5Δ recorded when the prisms cover test was compared to the Maddox rod test at near.

Our agreement results are plotted in **Figure 3 [see three pages previously, page 97]** (for 6 m) and **Figure 4, below** (for 40 cm). Horizontal lines indicate mean differences with signs considered and the limits of agreement between pairs of methods. The different pairs of tests reflect fairly similar

Figure 4 (Antona et al): Results

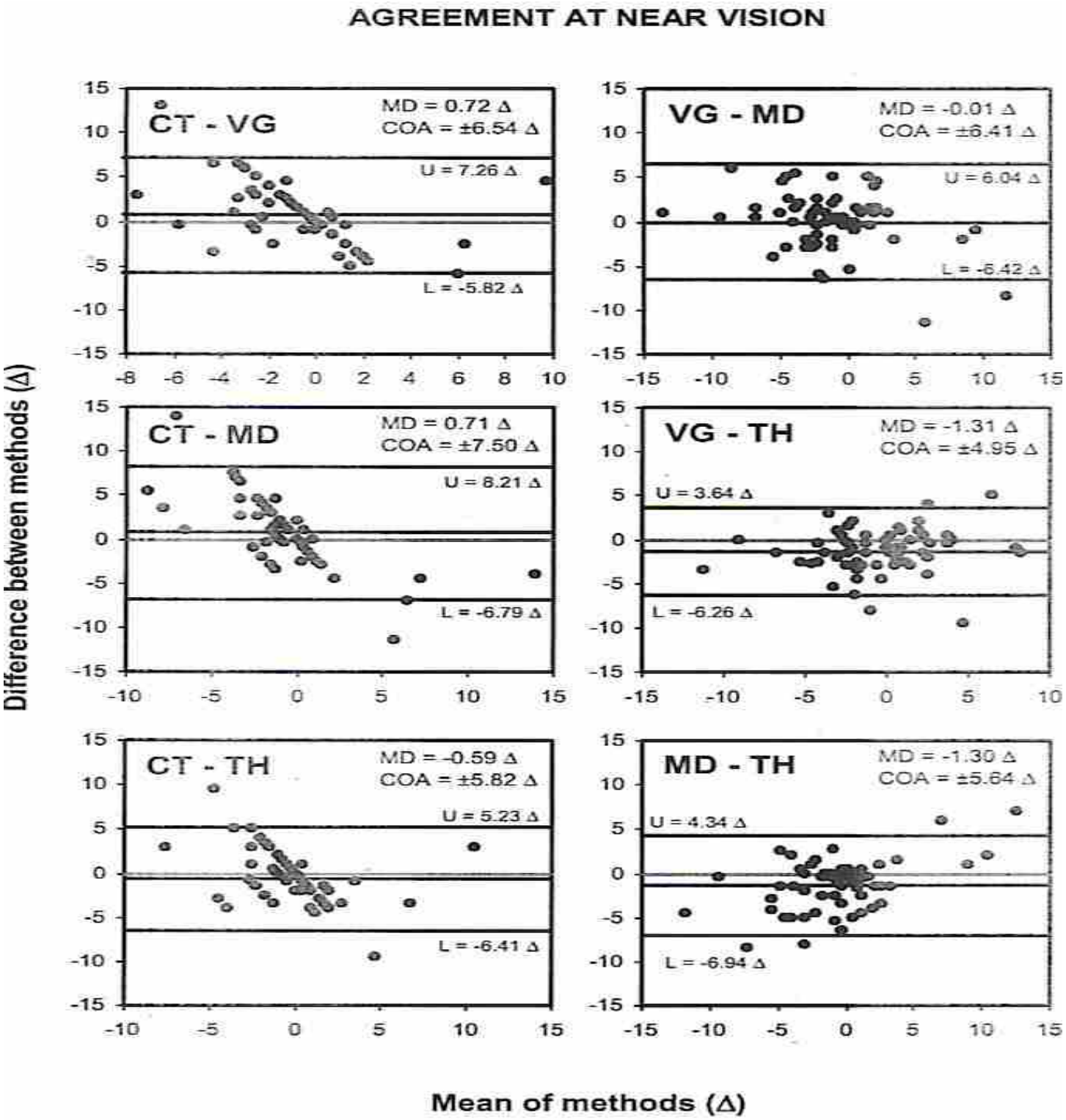

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***Figure 4 PRIOR PAGE** (Antona et al): Bland-Altman plots obtained in the agreement study of the tests used to measure phoria at near (40 cm). The central black line indicates the mean difference (MD) between measurements obtained using the different methods. The U and L lines represent the upper and lower limits of the 95% agreement interval (MD 1.96 x ·SD).*

agreement intervals i.e., no marked differences emerged among levels of agreement among the techniques from the clinical point of view.

Both at far and near, the graphs corresponding to agreement between the objective technique, the cover test (CT) and one of the subjective methods: von Graefe (VG), Maddox rod (MD) or modified Thorington (TH) indicate negative correlation between the mean and difference between methods. This indicates that the difference between methods increases as mean horizontal phoria increases, reflecting the fact that worse agreement between objective and subjective horizontal phoria measurement methods is detected the higher the binocular PHORIA deviation.

DISCUSSION

Repeatability

Over the past 40 years, many studies (15-19) have assessed the repeatability of tests used to measure ocular deviation. More recently in 1996 (8), the conclusion was reached in a review article that not all tests show the same repeatability, besides noting that sometimes even the same test provides different repeatability values depending on the given study. According to Schroeder et (8) these differences could be the outcome of:

- Inter-examiner biases
- Measurement errors
- Poor accommodation control `
- Fatigue of the subject examined

Other authors (20, 21) have suggested further factors that could lead to variation in the measurements obtained:

- Calibration of instruments
- A preference for even over odd numbers
- Effects of initial measurements on subsequent measurements
- Variations in the environment such as colour aberration of prisms or glare

In all these studies, it was observed that measurement variations between sessions were greater for deviation at near than at far, a finding consistent with the present results. The explanation could lie in the relationship between changes in accommodation and convergence. Despite much dispute over the definition of a reasonable agreement interval, authors such as Rainey et al. (7) argue that intervals greater than ±6.7△ would be clinically unacceptable.

The subjects included in our study had normal binocular vision, without strabismus or amblyopia. An elevated phoria is capable of producing asthenopic symptoms making its accurate measurement very important. In our study, the width of the repeatability intervals was similar for both high and low deviation values as it can be seen in **FIGURE 1 and 2.**

Below we discuss the repeatability of each of the tests:

Cover test

For this test, differences are considered clinically significant when greater or equal to 2△, i.e.the minimum eye movement that can be detected by a normal observer in the cover test (22, 23) .

We detected differences under 1△, indicating it is a highly repeatable test. These results are in agreement with those published by Johns et al. (6). Sparks 24 and Clack et al. (25) noted that the position of the examiner when conducting the cover test at near affected the measurements obtained in exophoric subjects. In our case, the examiner's position was always central relative to the subject. Other aspects of the method used here were:

- The examiner had wide clinical experience, optimising the detection of small ocular movements.
- The examiner made a special effort to well dissociate the subjects' BINOCULAR VISION.
- Since the cover test is an objective method,

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intra-examiner repeatability could be biased when the subject remembers the previous measurement. Because of the time between the two measurement sessions and large number of subjects examined, we feel that this factor will not have substantially affected our results.

Von Graefe

Rouse et al. (26) and Rainey et al. (7) respectively examined the intra-examiner and inter-examiner repeatability of the von Graefe technique. From the results obtained they concluded that the repeatability of measurements at near was low with agreement intervals higher than ±6△ recorded, as reflected in our study. The reason for the high variation in the results of this test is unclear, although among the explanations proposed we find the artificial environment produced by the phoropter and the time needed to perform the test, which could allow changes in the subject's level of fusional convergence and thus in the phoria measured reference (8).

Maddox and Thorington tests

Measuring horizontal BINocular phoria deviation using a Maddox rod does not seem to be very recommendable, especially when performed at near due to the artificial environment in which the test is conducted and the abnormal accommodation control produced by a light stimulus. Normally a point light source induces an accommodative response that is significantly lower than that expected for the working distance such that the measurements obtained may be lower for esodeviations and higher for exo-deviations (27).

Some of these problems have been resolved by the modified Thorington test. In this test, the card includes numbers that provide a target for the control of the accommodative response, although some drawbacks of this test have yet to be resolved. The eye behind the Maddox rod perceives a red line. This image is very different to the graded image scale seen by the other eye, which generates a significant binocular rivalry that could affect the accommodative response.

Despite the methodological problems posed by the modified Thorington test, it was the subjective test that showed the best repeatability, confirming previous results (5, 7, 8, 16, 18, 28)

Agreement

Our agreement study revealed appreciably higher COA among the different sets of horizontal deviation measurements if differences WITH signs were considered rather than differences expressed as absolute values (**See TABLE 3**). Based on differences with signs, most tests could not be considered interchangeable since COAs were often high (±2.49△to ±7.50△),especially for measurements at near.

It is difficult to compare the results of studies that have assessed the different tests available to measure phorias, due to differences in clinical protocols, experimental procedures or even statistical analyses. It is also true that correlation coefficients are frequently used instead of agreement values.

The results obtained here indicate that mean values for horizontal phorias revealed greater esophoria for the Maddox rod test, followed by the von Graefe and finally the cover test. At near, the Thorington test showed greatest esophoria, followed by the cover, Maddox and von Graefe tests. These results are in agreement with those reported by authors who have compared subjective methods of measuring BINocular ocular deviation (16, 29, 30).

It could be expected that similar dissociation procedures will give rise to a better agreement. The measurement procedure used for the modified Thorington test was similar to that used for the Maddox rod test. The presence of an accommodative stimulus in the Thorington test would explain its tendency to render more esophoric values when measuring deviation at near. Nevertheless, Lam et al. (31) detected no statistically significant differences between the two methods. It is difficult to find an explanation for the more exophoric results obtained using the von Graefe technique. A possible explanation could be that since the von Graefe test starts with 12△ base-in (BI), the subject could show a vergence disparity response to try to reduce the distance between images, which would make the results more exophoric (32). In an effort to balance this feature of the two tests, the Maddox test was also started by introducing a 12△BI prism.

CONCLUSIONS

Our findings indicate:

- All the tests showed improved repeatability when deviation was measured at far compared to near.

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- Both at near and far, the prisms cover test showed the best repeatability.

- When only the subjective tests were considered, the modified Thorington technique rendered the best repeatability for measurements at near.

- The von Graefe test emerged as the least repeatable subjective test.

- Agreement between objective and subjective methods worsened as the deviation increased. However, further work is needed to better characterize this behaviour.

- All the COA markedly increased when we considered differences with signs rather than absolute differences. If only the latter are considered, it may be stated that agreement among the tests was fairly good considering the large methodological differences among the tests.

- The Maddox rod method tended to yield more eso (less exo) results than the von Graefe technique both at far and near. Used at near, the modified Thorington procedure was the test that tended to give the most eso phoria values.

In summary, our message to the clinicians is that the objective cover test [*i.e., the prism alternate cover test*] is better than subjective methods at both distance and near to measure the binocular heterophoria deviation. In addition, it has the other advantages of better accommodation control, not having the negative influence of dissociating vertical prisms, or retinal rivalry.

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Case Report

Loss of Binocular Vision (Diplopia) and Acute Comitant Esotropia Following Surgical Patch Removal after Unilateral Penetrating Keratoplasty for Keratoconus; Management

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ABSTRACT: ***Purpose:*** To report a case of acute comitant esotropia after monocular penetrating keratoplasty (PKP)

Case Report: We present a 17 year old male patient with bilateral keratoconus who underwent penetrating keratoplasty in his right eye. He experienced diplopia after removal of the patch from the operated eye due to a new comitant esotropia in his left (unoperated) eye. Diplopia was controlled using prism glasses and then botulinum toxin injections until a penetrating keratoplasty was performed in his left eye and binocular vision and fusion returned.

Conclusion: Acute comitant esotropia may occur after loss of binocular vision and fusion due to brief ocular patching in a vulnerable patient. Fusion can be preserved with non-surgical methods until it can be permanently restored.

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INTRODUCTION

Acute comitant esotropia is an alarming condition. The adult patient can remember its exact onset due to the abrupt onset of diplopia. Although comitant strabismus often presents during infancy and childhood, it may occur suddenly in a person with previously normal vision (1,2). The underlying cause of it is not always benign in nature and certain neurologic conditions must be ruled out (2). Acute comitant esotropia not associated with neurological disorders may occur under three different circumstances:

1) Following disruption of fusion such as monocular patching or asymmetric loss of vision (Swan type) (1,2);

2) Severe systemic affliction or a major psychological stress may also lead to acute comitant esotropia (Franceschetti type)(1-4);

3. Acute comitant esotropia may occur in low myopia eyes (Bielschowsky type) secondary to accommodative convergence for focusing on near objects (1-4). This condition must be differentiated from esotropia resulting from high myopia due to medial rectus fibrosis and lateral rectus atrophy secondary to mechanical pressure from the adjacent bones in a large globe (5).

We report a patient with bilateral keratoconus who presented with acute comitant esotropia in one eye following penetrating keratoplasty (PKP) in the fellow eye.

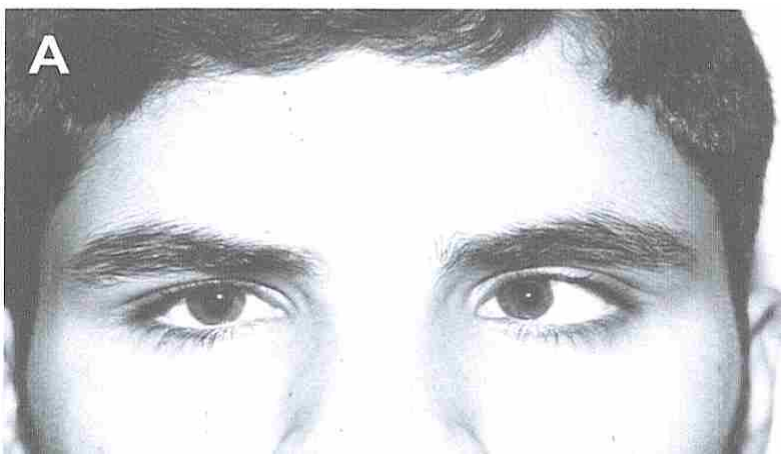
CASE REPORT

A 17 year old male patient with bilateral keratoconus underwent PKP in his right eye due to advanced keratoconus of the right eye which was uncorrectable with contact lenses.

Preoperatively, refraction was not feasible in the right eye and visual acuity was counting fingers at 2 meters. Refraction in the left eye was -6.25 -5.00 x 110° with cycloplegia. Uncorrected and best corrected visual acuity in the left eye was 20/200 and 20/25, respectively with Snellen letters. Immediately before PKP, the contact lens was removed from the left eye and the right eye was patched for 12 hours postoperatively.

The patient developed diplopia following removal of the surgical patch the day after the PKP (**see Figure 1A, below)**. The day after operation, uncorrected visual acuity of the operated right eye had improved from 20/200 to 20/25. External ocular examination revealed intermittent left esotropia of 40 prism diopters (PD) for near and far regardless of wearing the correcting contact lens on that left eye. The deviation was comitant, the same in all gazes, and he had normal ductions and versions.

Figure 1 *(Bagheri et al):* ***A.*** *Acute esotropia, left eye following penetrating keratoplasty and surgical patching for 12 hours of the right eye, after patch removal.*



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The new corneal graft was clear in the right eye and other ocular examinations were unremarkable. He did not have any stereopsis by Titmus test after neutralizing the deviation. The red filter test showed uncrossed diplopia of the same angle as the objective angle in far and near showing normal retinal correspondence. Brain CT Scan and Tensilon test were also normal.

Spectacles with a ground-in base-out prism of 20 PD was prescribed for both eyes which controlled the deviation and eliminated the diplopia (**Figure 1B).** After five months, the patient requested a more desirable treatment; meanwhile the esotropia had increased to 50 PD. He received a 10 unit injection of botulinum toxin type A (Dysport, Berkshire, UK) into the medial rectus of the left eye. Four days after this injection he developed an exotropia **(Figure 1C)** in the left eye which resolved after two months and the eyes remained orthophoric for 6.5 months.

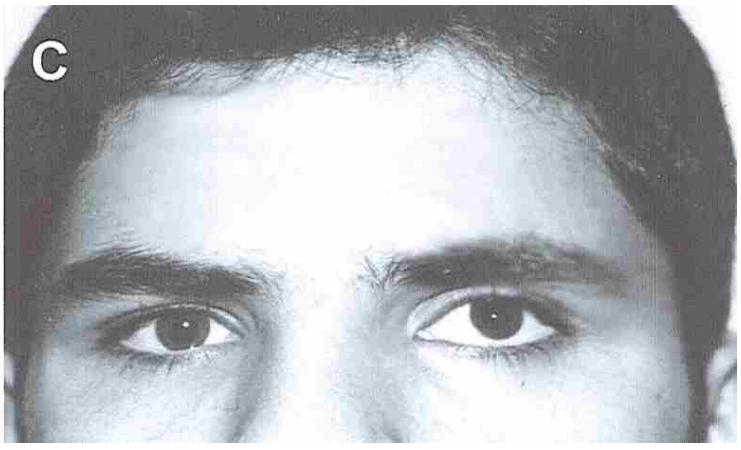
Then, the diplopia recurred and the examination revealed 30 PD esotropia in the left eye with and without contact lens on the left eye. He received a second injection of botulinum toxin type A in the same muscle with the same dose which had previously controlled the deviation and diplopia.

We then recommended that the patient undergo PKP in the left eye because he stated that whenever he delayed or neglected contact lens wear, for his high myopic astigmatism due to keratoconus, he experienced transient diplopia.

The patient underwent PKP in his left eye two months after the second injection, while the eyes were orthotropic preoperatively.

Figure 1 *(Bagheri et al):* ***B.*** *Diplopia was temporarily controlled using these prism glasses.*

BELOW: Figure 1 *(Bagheri et al):* ***C.*** *Left exotropia and hypertropia after botulinum toxin injections in the left medial rectus muscle.*



Postoperatively, the eyes retained the orthotropic condition which remained stable for more than three years (**NEXT PAGE**

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Figure 1D, right) He achieved the best spectacle corrected visual acuity of 20/20 in both eyes. Refraction was +1.50 -5.00 x 40° and Plano -1.50 x 180° at the final followup in the right and left eyes respectively. Titmus test revealed stereopsis of 800 seconds of arc and Worth 4-Dot showed normal fusion for near and far. Four diopter prism base out test ruled out the presence of microtropia.

Figure 1 *(Bagheri et al):* ***D.*** *Final orthotropic binocular alignment state after performing penetrating keratoplasty in the (second) left eye.*

DISCUSSION

Acute comitant esotropia is an unpleasant condition and may be associated with serious afflictions such as brain tumors, Arnold-Chiari Syndrome, hydrocephalus, thalamic lesions, myasthenia gravis and certain types of seizures (1,2). A correct diagnosis and proper treatment are very important in patients with this disorder (1,2). The neurologic mechanisms described for acute comitant esotropia in the above-mentioned conditions include dysfunction of the sixth cranial nerves and damage to the vergence center in the brainstem (1,2). Nystagmus is the characteristic sign in these patients (1,2) which did not exist in our case.

Despite the presence of myopia due to keratoconus, we believe that our patient developed acute comitant esotropia through the Swan type mechanism, because he experienced sudden asymmetric loss of vision due to patching of the operated eye and contact lens discontinuation in the fellow eye which broke the probably labile fusion resulting in overt strabismus.

The clue supporting this view is that the final stereopsis was no more than 800 seconds of arc despite the long term orthotropic status and good visual acuity in both eyes. Other possible factors which may have played a role include decompensated pre-existing esotropia, postoperative anisometropia and aniseikonia hindering fusion as well as major stress of eye surgery in a young subject.

The only reported case of acquired esotropia after corneal surgery was a case of acquired accommodative esotropia secondary to epikeratophakia in a myopic patient, but in contrast to our case, it was incomitant and management was not explained (6).

According to most studies, in non-neurologic cases of acute comitant esotropia (especially Swan and Franceschetti types), binocular vision is so good that patients regain good stereoscopic vision after the operation (1-4). The low final stereopsis in our patient may be due to long-standing keratoconus and significant refractive errors for several years in both eyes and corneal scarring which could have hindered good fusion and better stereopsis.

Our success in restoring orthotropia without strabismus surgery may have been due to the prompt use of prisms for maintaining binocular vision which has been reported to have an important role on the success of subsequent treatments in acquired esotropia (7) and the use of botulinum toxin injections which has been established as an effective treatment for eliminating the need for strabismus surgery in acute acquired esotropia (8). However, some studies have revealed no relationship between early initiation of treatment and final results in terms of fusion and stereoscopic vision (9).

In conclusion, in patients with acute acquired esotropia, recognizing and eliminating the underlying cause is the basis of treatment. However, if the condition persists, non-surgical modalities such as prism glasses and botulinum toxin injections, may eliminate the need for surgery. In case of treatment failure, surgical intervention is usually successful in restoring binocular vision and fusion and stereopsis.

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Binocular Vision & Strabology Quarterly© A Medical Scientific e-Periodical
Transient Reversal of a Face Turn (AHP) due to Manifest Latent Nystagmus, After Eye Muscle Strabismus Surgery for Infantile Esotropia
R. Muralidhar, MD, DNB MCRO, FRCS, D. Vrushali, MBBS, P. Vijayalakshmi P, MS, S.Jeyanthan,DNB
SECOND Quarter of 2011 Volume 26 (No.2) Pages 110-113

Case Report

Transient Reversal of a Face Turn (an Abnormal Head Posture, AHP) due to Manifest Latent Nystagmus, after Eye Muscle Strabismus Surgery for the Associated Infantile Esotropia

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from the Department of Pediatric Ophthalmology, Aravind Eye Hospital, Tamilnadu, India

ABSTRACT: Patients with infantile esotropia and manifest latent nystagmus adopt a face turn towards the fixing eye as a nystagmus dampening mechanism. The surgical plan should aim to correct both the face turn and the strabismus. Reversal of the face turn after surgery for the strabismus can be (i.e. was) distressing for both the surgeon and the patient and has not been reported previously to the best of our knowledge. We report our patient with a transient reversal of face turn after surgery.

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CASE REPORT

A 9 year old boy presented to us with complaints of abnormal head posture, and "squinting" * since infancy. He had a history of delayed milestones. A CT scan at an outside hospital was suggestive of periventricular leucomalacia. On examination he had a 30 degree right face turn with chin elevation, which had been confirmed on four previous occasions. The face turned to the left on covering the right eye as the left eye assumed fixation. The vision (without further correction) was

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6/12 OD (with right face turn of 30^0) and 6/18 OS (with left face turn of 50^0). In primary position there was a binocular large amplitude pendular nystagmus (*video available from author, see email address on title page*). The nystagmus amplitude increased with attempted abduction of the fixing eye. Covering the fixing eye also increased the amplitude and frequency of nystagmus. He had a left esotropia of 40 prism diopters (by Krimsky corneal light reflection test) with left eye suppression on Bagolini Binocular Striated Glasses test. Abduction was restricted (1-) OS. There was no significant refractive error and the remainder of the eye examination was found to be essentially unremarkable.

He underwent conventional eye muscle surgery for his left esotropia: a 5.0 mm medial rectus muscle recession and 7.0 mm lateral rectus muscle resection, OD. On the first postoperative day, he had a *new primary position* left face turn of 50^0 with a *changed, now* fixation preference

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for the left eye and 12 pd (prism diopter) right exotropia (**See the above Figure**).

The pupils were brisk and there was no relative afferent pupillary defect. The disc and posterior pole were normal OU. Ocular motility evaluation showed the operated right eye adduction to be restricted 1 - (minus one). Two weeks later he had a right face turn again, but of only 5^0 now with chin elevation. This improvement in face turn was sustained and the small consecutive exotropia had resolved by four months (*Video from author noted, also* **see the Figure above.)**

The vision at the last follow up was 6/12 OD (with preferred right fixation and right face turn of 5^0 and chin elevation) and 6/18 OS (with left face turn of 50^0 on left fixation). The nystagmus amplitude and frequency in primary position had decreased.

DISCUSSION.....

Our patient had infantile esotropia with manifest latent nystagmus. The nystagmus amplitude in each eye typically decreases in adduction and causes the patient to assume a face turn (an abnormal head posture, AHP) towards the fixing eye. (1) He preferred the right eye because of better vision and smaller face turn.

Fixation in asymmetric adduction has been reported previously (2), but we are not aware of any reports of this unique face turn reversal after strabismus surgery.

A recess-resect procedure was done on the dominant eye because of strong fixation preference. The reason for fixation switch immediately following surgery could have been irritation caused by the conjunctival sutures, reluctance to fix with the operated eye because of discomfort/pain or a transient blurring of vision induced by postoperative medications. Spontaneous correction by the patient of the consecutive new face turn suggests that the etiology was transient.

To summarize, it is important for clinicians to be aware of the possibility of a fixation switch and face turn reversal following a monocular recess resect procedure for infantile esotropia with manifest latent nystagmus. This may perhaps be avoided by using instead a bilateral medial rectus muscle recession with or without posterior fixation myopexy.

As disarming as the reversal of the face turn was initially postoperatively, the outcome to date of our surgical procedure has, however, been quite satisfactory.

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** [Ed note: "squint" is an old and now currently misleading lay medical term, with a primary meaning now of narrowing of the palpebral fissures, as protective defense against discomfort due to intense light, or to effectively reduce the size of the pupil opening to reduce the blurring and to improve the focus in myopia or the depth of field of focus for any focusing problems. I.e. the old term means "strabismus" or a strabismic binocular (ocular) deviation. Using this term ("squint") in public or to lay persons will make them think you don't know what you are talking about as they do not think of crossed eyes as "squinting", if they, in fact, ever did, except perhaps as a euphemism to blunt the obviousness and ugliness of the crossed eyes or other binocular ocular deviation problem.....*

Or maybe closing or "squinting" one eye was what ancient victims of strabismus did in order to hide their deformity, for which ("evil eye") one might even be accused of sorcery or witchcraft and for which one might be burned alive or otherwise cruelly killed. (Romano PE. No More "Squint" Please [correspondence] Invest Ophthalmol Vis Sci 1997; 38(8):1465).

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ABSTRACTS

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Vision / Visual Acuity / Amblyopia

Visual Acuity Development of Children with Infantile Nystagmus Syndrome. Fu VLN, Bilonick RA, Felius J, Hertle RW, Birch EE. Invest Ophthalmol Vis Sci 2011. [Authors Conclusions]

[This] differs among children..., depending on the presence or absence of associated sensory system deficits. Careful characterization of visual system differences in patients with INS is important if visual acuity is an outcome in clinical trials. (Dr.Valeria L.N. Fu fuv@upmc.edu)

ERP Evidence for the Speed of Face Categorization in the Human Brain: Disentangling the Contribution of Low-Level Visual Cues from Pace Perception. Rossion B, Caharel S. [Authors "Highlights"]: •The larger P1 response for faces than cars is also found for phase-scrambled versions of the stimuli.• Sensitivity to f aces on the P1 and N1 (N170) is functionally dissociated.• The P1 face-sensitivity is driven by low-level visual cues. • The N170 face-sensitivity is associated with the perception of a face.*(Inst Psychology, Inst Neuroscience, Universite Catholique de Louvain, Belgium.)*

No More Top-Heavy Bias: Infants and Adults Prefer Upright Faces but Not Top-Heavy Geometric or Face-Like Patterns. Chien SH-L. J Vis 2011
(sarinachien@mail.cmu.edu.tw)

Crowding is Size and Eccentricty Dependent. Gurnsey R., Roddy G, Chanab W 2011ARVO.

Using a novel double-scaling procedure, we show that the non-foveal data in all three tasks can be characterized as shifted versions of the same psychometric function such that different sections of the function characterize data at each eccentricity. This pattern of results can be understood in terms of size-dependent responses to the target and distance-dependent interference from the flankers. The data suggests that the distance-dependent interference increases with eccentricity. *(rick.gurnsey@concordia.ca)*

The Impact of Letter Spacing on Reading: A Test of the Bigram Coding Hypothesis. Vinckler F, Qiao E, Pallier C, Dehaene S, Cohen L. J Vis 2011.
(laurent.cohen@psl.aphp.fr)

Deficient Binocular Combination Reveals Mechanisms of Anisometropic Amblyopia: Signal Attenuation and Interocular Inhibition. Huang C-B, Zhou J, Lue Z-L, Zhou Y. J Vis 2011.
(Zhonglin@usc.edu)

The Therapeutic Impact of Perceptual Learning on Juvenile Amblyopia with or without Previous Patching Treatment. Liu-X-Y, Zhang T, Jia Y-L, Wang N-L, Yu C. Invest Ophthalmol Vis Sci 2011; 52:1531-1538. [Authors Conclusions]

Perceptual learning has a small but significant therapeutic impact on both patching treatment and non-patching treatment juvenile eyes, which is most likely to have clinical values for eyes with mild amblyopia. Early diagnosis and treatment are most important and effective.(Dr. Wang. wningli@vip.163.com)

Binocular Vision

Binocular Summation Improves Performance to Defocus-Induced Blur. Plainis S, Petratou D, Glannakopoulou T, Atchison DA, Tsilimbaris MK. Invest Ophthalmol Vis Sci 2011; 52:2814-2789 [Authors Conclusions]

Both subjective and electrophysiological results show that binocular vision ameliorates the effect of defocus. The increased binocular facilitation observed with retinal blur may be due to the activation of a larger population of neurons

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at close-to-threshold detection under binocular stimulation. *(plainis@med.ouc.gr)*

Preference for Binocular Concordant Visual Input in Early Postnatal Development Remains Despite Prior Monocular Deprivation [in Kittens]. Mitchell DE, Kennie J, Duffy KR. Vision Research 2011; 51:1351-1359. [Authors "Highlights"]• Kittens show a preference for binocular over monocular input in visual development.• We test two models, on monocularly deprived kittens for the preference. • The Template model predicts that these kittens would prefer matched monocular input.
• The Binocular model predicts that a preference for binocular input would remain.• The data fit the predictions of the Binocular model. *(Dr. Mitchell, Dept Psychology, Dalhousie University, Halifax N.S., Canada B3H 4R2)*

Stereopsis

A Matched Comparison of Binocular Rivalry and Depth Perception with fMRI. Buckthought A, Mendola JD. J Vis 2011.

Our results indicate that depth and rivalry are processed in a similar network of cortical areas and are perceived simultaneously by coexisting in different spatial channels. These results place constraints on binocular vision models.
(Athenabuck1@gmail.com)

Matching and Correlation Computations in Stereoscopic Depth Perception. Doi T, Tanabe S, Fujita I. J Vis 2011. [Authors Conclusions]

We conclude that matching computation dominates fine depth perception, while both computations contribute to coarser depth perception. Thus, stereoscopic depth perception recruits different computations depending on the disparity magnitude. *(Ichiro Fujita fujita@fbs.osaka-u.ac.jp)*

Local and Non-Local Effects on Surface-Mediated Stereoscopic Depth. Gillam BJ, Sedgwick HA, Marlow P. J Vis 2011. *(B.gillam@unsw.edu.au)*

Strabismus Pathophysiology

Acquired Infantile Abducens Palsy Associated with Anit-GM2 Antibodies. Smyth KA, Fritzler MJ, Kirton A. Pediatr Neurol 2011; 44:450-462 [Authors Conclusions]

Elevated anti-GM2 ganglioside immunoglobulin M antibodies have previously been reported in Guillain-Barre syndrome variants involving sensory and cranial neuropathies., but never in isolated unilateral cranial nerve VI mononeuropathy. Anti-ganglioside antibodies may play a role in the pathogenesis of post infections isolated abducens palsy in young children. *(Dr. Kirton, Division of Pediatric Neurology, Alberta Children's Hospital; 2888 Shaganappi Trail NW, Calgary, Alberta Canada T3B 6A8)*

Strabismus Outcome

The Long-Term Followup of Accommodative Esotropia in a Population-Based Cohort of Children. Mohney BG, Lilley CC, Green-Simms AE, Diehl NN. Ophthalmology 2011; 118:581-585. [Authors Conclusions]

The majority of children with accommodative esotropia in this population continued to require spectacle correction into their second decade of life. A small proportion of children with fully accommodative required surgical intervention, which was more likely to occur among boys and in those with an earlier age at onset and diagnosis of their deviation. *(Brian G. Mohney, MD, Mayo Clinic, Dept Ophthalmology, 200 First St SW, Rochester MN 55905)*

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HYDE PARK EDITORIAL A:

Strabology Under-represented in Big Eye Literature. In This Issue: Zoran; San Diego Rotogravure and AAPOS Annual Meeting Report; Strabometry; Unique Case Reports; Eye Candy World; Blog Resumes.

First a quote from the current literature:

" **Conclusions**

There are great differences across the specialty of ophthalmology in the subject matter of published literature, probably driven by recent advances in treatments. Medical retina is the subspecialty that is most represented in the literature, with **strabismus being the least represented."... [-Ed bold]** Yes, their survey included

Ophthalmology
Volume 118, Issue 6, June 2011, Pages 1211-1214

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Original article

Subspecialization of the Ophthalmic Literature: A Review of the Publishing Trends of the Top General, Clinical Ophthalmic Journals

Anupma Kumar MRCOphth[a], Robert Cheeseman MB, ChB[a] and Jonathan M. Durnian FRCOphth [a]

[a] St Paul's Eye Unit, Royal Liverpool University Hospital, Liverpool, United

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only seven general ophthalmology journals, no subspecialty journals, such as this publication. But we would conclude that, as we have here proselytized before, the subspecialty of strabology is losing its identity and place among ophthalmology specialities. Or as the great Wilmer chief Ed Maumenee said to me some forty years ago, when I answered "pediatric ophthalmology" to his query as to my plans after finishing at Hopkins and the Wilmer,, "What's that?" That is obviously still the opinion of ophthalmologists in charge of the "big" eye journals.

Following their lead now seems to also be the opinion of American orthoptists, who have recently declared that their annual journal's primary mission and theirs is now "pediatric eye care".. They are literally abandoning their own profession, "orthoptics"! Remember that the "father" of pediatric ophthalmology never personally employed an orthoptist and was opposed to them from the beginning for fear they would follow the optometrists and leave ophthalmology and maybe even take away strabology (?and his pediatric ophthalmology) with them. What will

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American "orthoptists" become now? They could have been Orthoptic technicians or even assistant or "medical"strabologists (i.e., non-surgical) or "Orthoptic strabologists". Or maybe they will now be "American pediatric eye care and adult strabismus physician's assistants".

Yes we know that the medical profession has changed greatly in the recent past and that, with current demands upon all in the profession, including the grossly inadequately and/or totally uncompensated indebtedness and sacrifices we all make, it is most difficult to carry out research and write scientific papers, but we (*BV&SQ*) are now, thanks to the internet in a better position to meet any and all demands for space to publish scientific works and material. To encourage submissions and subscribership, we have not raised our rates in over a decade.

In This Issue

Obituary. ZORAN GEORGIEVSKI. Green J. Binocul Vis Strabolog, Q Simms Romano 2011; 26:72.

Our loss too: He has been a strong supporter of BV&SQ for some time and we have published a number of his contributions. We had, in fact, recently invited him to join our Editorial Board just earlier this year. He demurred because of his position on the IOA Board. He felt joining ours might taint his desire and vote to see us become "an IOA publication".

Exotropia Replaces Esotropia as most Common Form of Strabismus; HIV and CPEO; Zoo Papers; EOM Innervation Innovation AND Strabology Report of the 37th Annual Meeting of the American Association for Pediatric Ophthalmology & Strabismus (Editorial). Mims III, JL. Binocul Vis Strabolog Q Simms Romano.

"RotoGravure" is an old term based on early mass printing on engraved cylinders, which produced those popular slick and glossy photosections in newspapers and magazines. Jim's Report is a record undertaking. He stayed an extra day in San Diego to consolidate and record while fresh in his mine what transpired at the meeting. And he took all those neat pictures of you and your fellow strabologists at the reception too.

Strabometry Precision: Intra-Examiner Repeatability and Agreement in Measuring the Magnitude of the Angle of Latent Binocular Ocular Deviations (Heterophorias or Latent Strabismus). Antona B, Gonzalez E, Barrio A, Barra F, Sanchez I, Cebrian JL. Binocul Vis Strabolog Q Simms Romano 2011; 26:105-109.

No earth shaking discoveries but good basic science and very, very well done and written... This paper may also familiarize us with some of the terms and tests some optometrists use in strabology exams, in case you get a referral report from one of them.....

Loss of Binocular Vision (Diplopia) and Acute Comitant Esotropia Following Surgical Patch Removal after Unilateral Penetrating Keratoplasty for Keratoconus; Management. A Case Report. Bagheri A, Karimian F, Abrishami A. Binocul Vis Strabolog Q Simms Romano 2011; 26:105-109.

Presuming this 17 year old had onset of his corneal problem not too early in childhood, he probably had normal binocular single vision for a few years, maybe even as far as maturity of binocular vision and fusion.

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Hence he did get diplopia due to impairment of his binocularity by reduced vision. Hence also his recovery.

But this why we try to caution cataract surgeons to establish the history and state of binocular vision before undertaking correction thereof in their adult patients.

Transient Reversal of a Face Turn (an Abnormal Head Posture, AHP) due to Manifest Latent Nystagmus, after Eye Muscle Strabismus Surgery for the Associate Infantile Esotropia. A Case Report. Muralidhar R, Vrushali D, Vijayalakshmi P, Jeyanthan S. Binocul Vis Strabolog Q Simms Romano 2011; 26:110-113

(Cover picture) When you first look at this photo, you see the marked face turn on the day after strabismus surgery, which must indeed have caused fright and concern for all involved, but it takes a second look to realize the right eye is totally abducted in the lateral corner. So the face turn is secondary to his attempt to now fix with his unoperated eye while encountering for the first time the effect of the surgery on the other eye. Nine year old "Kids" do "do the strangest things", naturally.

Strabology News:

We touched on this in the opening stanza of this editorial. The American Orthoptic Journal's (AOJ) final long overdue crowning as a once again National Library of Medicine indexed medical publication (do you remember the annual American Journal of Ophthalmology isssue?) was almost simultaneously and most paradoxically dropped as a membership subscription benefit by the American Association of Pediatric Ophthalmology and Strabismus. The AOJ now proclaims itself to be primarily a "pediatric eye care" publication. They did not tell us who and how this new designation was arrived at. Well, including other national orthooptic journals, we had too many publications and serials already "primarily" devoted to strabology anyway.

We have contended before in these pages that the reverse subspecialization in this era of an ophthalmic subspecialty is insane from the standpoint of science and knowledge and the practice of medicine. It is really only based on marketing, decreasing instead of increasing physician and surgeon competence thereby.

What will the orthoptists become? all PA's ? (PA's get six figures these days according to one source,, and that is much better than most orthoptists or certified ophthalmic technicians, isn't it?

The powers of the new PAs include even **writing narcotics prescriptions without so much as an MD co- or countersignature. These Rx's are fully accepted by local pharmacies.** When did that happen?. Never read anything about it anywhere....

Patients get as well attached to PAs as any decent MD - OR BETTER. SINCE MDs ARE ALWAYS SO DISTANT ANYWAY, BY VIRTUE OF HOW DIFFICULT IT IS TO TALK TO THEM or with them EVER.. (with rare exception, even in my experience as a known"retired" physician-surgeon patient or spouse).

We would welcome other opinions and voices on this subject.

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Followup on Editor's Recent Medical Adventures and Experiences.

We have mentioned in these columns several times in the past two years since we had our cataracts removed and those remarkable (heck, almost unbelieveable intraocular lenses installed, like 20/15 **SC** in my better eye **for virtually all distances, yes. And without other correction.** Saw last month a Wilmer Eye advertisement offering just such marvelous results from cataract surgery.

Just came across an Alcon Advertisement- info sheet on it and now understand a little better. Look at this graph...

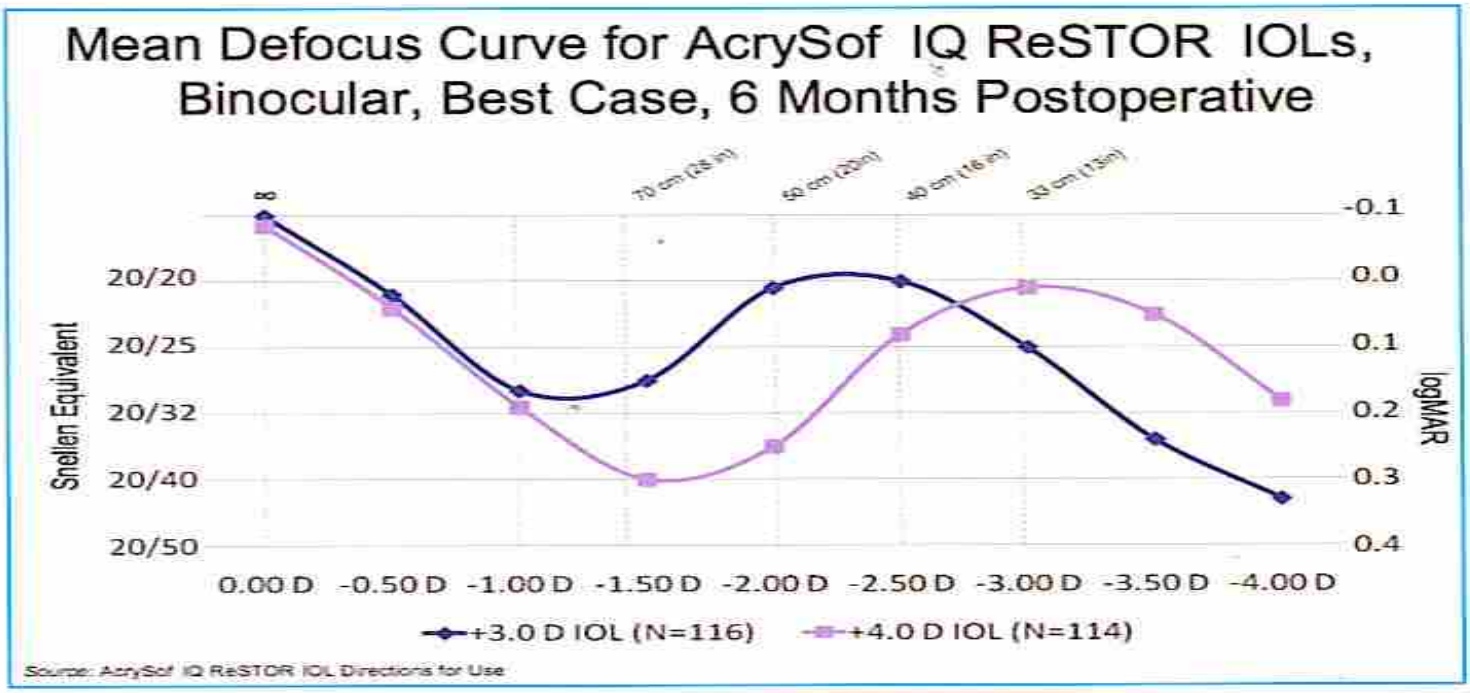


Figure 1. The AcrySof IQ ReSTOR IOL with +3.0 D add power provides an optimal near vision peak further out and enhanced intermediate visual range without any sacrifice on distance vision compared to a +4.0 D add power.

It also explained how it achieves all these revolutionary optical results as the product of "Apodized, Diffractive optics" = "A lens system in which there is a gradual modification of the optical properties of a lens as you move from the center to the edge."

[? Is that a-spheric?]"...commonly used in astronomy..."

Both from my own experience and this graph, I am very happy with my +4 OS and +3 OD as I seem to be benefitting from the best of both worlds, and I am in no way visually conscious of which eye I am using at any reading distance. It is as if my binocular vision includes all the good and sharp info from both eyes, ignoring what isn't. But that is just what binocular vision is all about and is intended and functions to do.

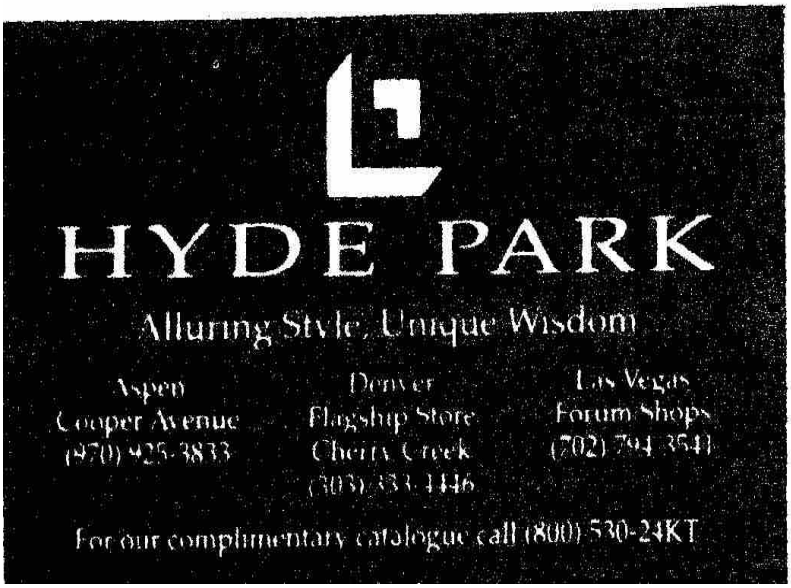
Most Exciting Recent Medical Experience
Passed Out. Last month. While standing atop a three step concrete entry to the Hotel Nevada in Ely, Nevada. Cause: Arrhythmia: Rx a week later, after work ups including two manual heart compressions to restart (my huge lower sternal bruises are resolving). Install pacemaker-defrillator. Now O.K!. thanks! *-per*

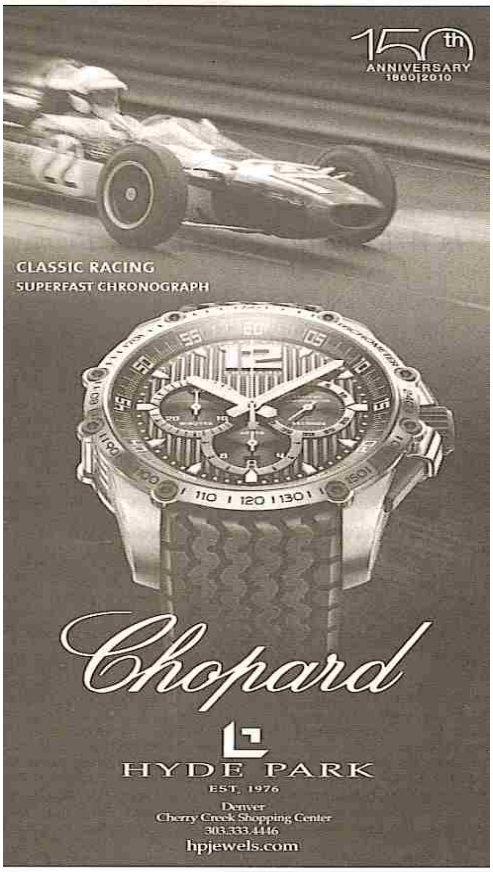
HYDE PARK EDITORIAL B: The Editor's Soapbox, Sandbox & B'LOG

(Prehistoric) Since 1985

OWL 3D; MORE no SPECS 3D! (JUST LIKE Joseph Lang's historic AUTOSTEREOTESTs); Sweet; No Fear.

Stereoscopic 3 Dimensional depth perception remains the Acme, Epitome and GOAL of all of both (monocular) vision and Binocular Vision (see OWL below).





Owls see in stereo much like humans do

at http://www.journalofvision.org
10 June 2011; Vol. 11, No. 7

Robert F. van der Willigen [1]

behavioral experiments, equivalent to hallmark human psychophysical studies, I compiled an extensive body of stereo performance data from two trained owls. Computer-generated, binocular random-dot patterns were used to ensure pure stereo performance measurements. In all cases, I found that owls perform much like humans do, *viz.*: (1) disparity alone can evoke figure-ground segmentation; (2) selective use of "relative" rather than "absolute" disparity; (3) hyperacute sensitivity; (4) disparity processing allows for the avoidance of monocular feature detection prior to object recognition; (5) large binocular disparities are not tolerated; (6) disparity guides the perceptual organization of 2D shape. The robustness and very nature of these binocular disparity-based perceptual phenomena bear out that owls, like humans, exploit the third dimension to facilitate early figure-ground segmentation of tangible objects.

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Call in 3D

Get ready for the glasses-free-3D avalanche. Fresh off the success of Nintendo's 3DS game system, countless companies are hustling to market with their own takes on the tech. One we're actually excited about: the ***HTC Evo 3D Phone (price not set)***, which features a 4.3-inch glasses-free 3D display. And while it won't have the 3DS's preloaded stash of 3D games, the Android-powered device does feature a pair of 5-megapixel cameras for shooting 3D photos and HD video.

3D Sweet Spot

I'm assuming the glasses-free 3D display on the Nintendo 3DS game system has a sweet spot. How big is it, and what happens when I move outside it?

You're right. The glasses-free (or autostereoscopic, if you want to be fancy about it) display on the new Nintendo 3DS is a minor technological miracle, but its sweet spot is more of a viewfinder than an IMAX screen. I've been testing out the portable device, and have found that tilting your head or hand even a fraction of an inch is enough to make the screen go dark or turn into a blur. This doesn't necessarily make you dizzy or nauseated (even though Nintendo does advise users to rest their eyes with a whopping 10-minute break for every 30 minutes they spend staring at the screen)—it just kind of takes you out of the game, and could prove problematic for tasks that depend on precise hand–eye coordination.

One annoying result: The device could require hyperkinetic players, who may be used to dramatically dipping and diving their hands during excited gaming, to train themselves to cool their horses. I have also found that the 3D makes it very difficult for friends to comfortably watch a game over your shoulder.

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from The Wall Street Journal December 22, 2010 by Juro Osawa and Daisuke Wakabayashi. "... The head of Toshiba's television operations, Masaaki Osumi, said the new TV, due sometime in the fiscal year starting in April, might offer the option of watching 3-D with or without glasses.

The company plans to reveal more details on the new glasses-free TV at the Consumer Electronics Show in Las Vegas... , he said. Tokyo-based Toshiba continues to push ahead with glasses-free or "autostereoscopic" TV development ..."

But for now, we still have to wear some sort of 3D glasses when we go to 3D movies, right? Or to watch 3D movies or features on your home TV Sooo.....

You do have some choices when it comes to those specs:

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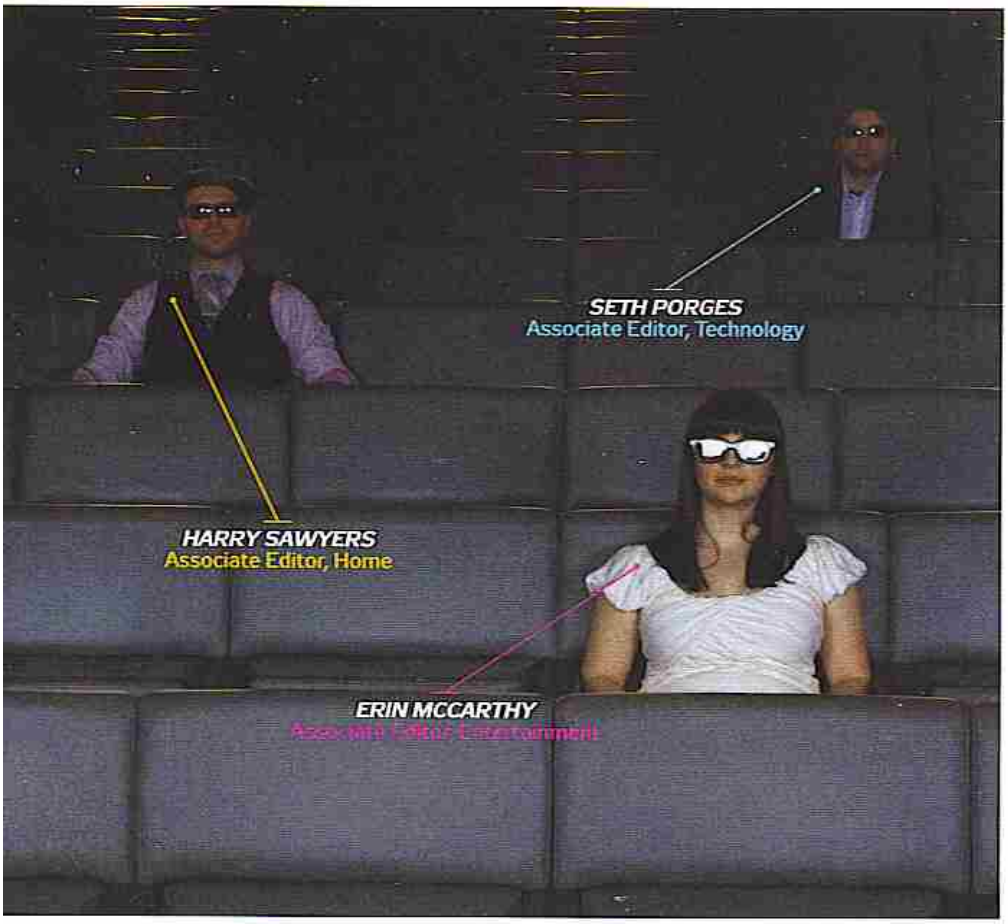
PM FIELD TEST

3D Glasses

As if the $17 admission weren't enough, manufacturers are betting that consumers will shell out big bucks for their own 3D movie glasses. The promise: optics, comfort and style that put throwaway theater freebies to shame. But are the pricey specs worth it? To find out, I teamed up with two other PM editors to conduct a test at a screening of *Drive Angry 3D*—so you don't have to. Luckily, we weren't in search of cinematic excellence; we just wanted to judge how the glasses worked. BY SETH PORGES



3D Experience

REALD: The free glasses had a very impressive 3D effect. "The depth was as good as any of the expensive pairs," says PM associate editor Erin McCarthy. But the flat lenses provided poor peripheral visibility, and one editor found the lenses to be a shade darker than the other pairs.

GUNNAR: Though the lenses produced an adequate 3D effect, we all found them to be a tad small. The frames encroached on our field of vision, and at the peripheries, all we could see was a 3D blur.

MARCHON3D: We all gave a thumbs-up to the large lenses, which completely encompassed our field of vision, giving us the most immersive experience. We were also unanimous in finding the glasses' 3D effect on par with that of the RealD control specs. The lone objection came from McCarthy, who says the "left lens seemed slightly darker than it should have been."

OAKLEY: We loved the Oakley's 3D performance. Still, no one was happy with the glare that the glossy white frames cast on the lenses. "It was hard to see popcorn through them," associate editor Harry Sawyers says. Fortunately, the Oakleys are also available with reflection-free black frames.

Fit and Comfort

REALD: While my colleagues found the free glasses surprisingly comfortable, I noticed that they had a tendency to slide down my nose. And then there's the general ickiness factor with theater-distributed glasses. I mean, who knows who else has worn them?

GUNNAR: The lightweight magnesium-aluminum-alloy frames felt the most luxurious, sitting almost imperceptibly on the nose. (The other frames in the test were plastic.) We all loved the flexible hinges, which provided a nice fit despite our differing head shapes and sizes.

MARCHON3D: Comfortable frames, a snug fit and large lenses made the Marchon3D the category winner. "I almost forgot I was wearing 3D glasses," Sawyers says.

OAKLEY: We all liked the fit, with one exception: McCarthy noted minor discomfort around her ears. "3D glasses are supposed to disappear, but I could really feel these," she says.

BOTTOM LINE Though the Marchon3Ds provided the best overall experience, it's hard to view any of these specs as a must-buy yet. Still, it's nice to see manufacturers getting ahead of the curve, and besides, these shades aren't just for theaters—they make a nice coffee-table complement to the new wave of 3D TVs, which use the same type of glasses as cinemas.

PHOTOGRAPH BY DEVON JARVIS

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BUT THOSE HOME TVs ARE COMING DOWN IN PRICE, PERHAPS IN ANTICIPATION OF TOSHIBA'S COMING AUTOSTEROSCOPIC TVs. (See also now stale prices on next page...)

Think you could make you own "AVATAR" movie? This is a "home" stereo movie camera, primarily intendedfor mounting in a race car to record your fastest laps or racing passes for the win! But if it will do that, it will do almost anything, right? And it isalmost reasonable, if not downright cheap. Net: gopro.com

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3D TVs Overview

This is the first time we're presenting 3D TVs in a separate table rather than in the LCD and plasma Ratings. They're ordered by overall score, which is based mostly on 3D and HD picture quality. Though they're in a separate chart, 3D TVs are in fact HDTVs: They simply have an extra feature: the ability to display 3D. Most 3D sets were excellent or very good for HD. In fact, the Panasonic VT20 and VT25 models are among the best HD performers we've seen. You might want to consider a 3D TV even if you don't plan to watch 3D, especially if it's well-priced.

In our 3D tests, the plasma TVs did better than the LCDs (largely because they have less ghosting, or double images visible through the special glasses needed to see 3D images), and we recommend all for a high-quality 3D experience. The Panasonics displayed the least ghosting, followed by the LG and Samsung plasmas, which exhibited a bit more. The LCD TVs displayed realistic depth, but visible ghosting detracted from the 3D effect. The Sony TVs were best among the LCD models, but only if the viewer's head was perfectly level. Their 3D scores reflect the optimal viewing position. Otherwise there was extreme ghosting.

Ratings 3D TVs

In performance order, within types. (Types designated A and B.)

Excellent · Very good · Good · Fair · Poor

☑ Recommended

	Rank	Brand & model	Screen size (in.)	Price	Overall score	Test results: Picture quality: 3D effect	High def.	Standard def.	Viewing angle	Sound quality	Ease of use: Remote	Menu	Features: Highest frame rate (Hz)	Streaming services ①	Wi-Fi	Glasses included (pairs)	Other sizes (in.)
		A PLASMA															
☑	1	**Panasonic** Viera TC-P65VT25	65	$4,300	80	◓	●	◓	●	○	●	◓	NA	A, N	*	1	50, 54, 58
☑	2	**Panasonic** Viera TC-P50VT20	50	1,800	79	◓	●	◓	●	○	●	◓	NA	A, N	*	1	
☑	3	**Panasonic** Viera TC-P54VT25	54	2,500	79	◓	●	◓	●	○	●	◓	NA	A, N	*	1	50, 58, 65
☑	4	**LG** Infinia 50PX950	50	1,600	78	◓	●	●	●	○	●	◓	NA	N, V	•		60
☑	5	**Panasonic** Viera TC-P50VT25	50	1,800	78	◓	●	◓	●	○	●	◓	NA	A, N	*	1	54, 58, 65
☑	6	**Samsung** PN58C7000	58	2,200	78	◓	●	●	●	○	●	●	NA	A, B, C, N, V	*		50, 63
☑	7	**Samsung** PN63C8000	63	3,200	76	◓	●	●	●	○	●	●	NA	A, B, C, N, V	*		50, 58
☑	8	**Panasonic** Viera TC-P50GT25	50	1,800	76	◓	●	◓	●	○	●	◓	NA	A, N	*		42
☑	9	**Samsung** PN50C8000	50	1,900	75	◓	●	●	●	○	●	●	NA	A, B, C, N, V	*		58, 63
		B LCD															
	1	**Sony** Bravia XBR-52HX909 ②	52	3,600	67	○	●	●	○	○	●	◓	240	A, N	*		46
	2	**Sony** Bravia XBR-60LX900	60	4,500	66	○	●	●	○	○	●	◓	240	A, N	•	2	52
	3	**Sony** Bravia KDL-46HX800 ②	46	1,700	63	○	●	●	○	○	○	◓	240	A, N	*		40
	4	**Sony** Bravia XBR-46HX909 ②	46	3,150	62	○	●	●	○	◒	●	◓	240	A, N	*		52
	5	**Sony** Bravia XBR-52LX900	52	3,600	60	◒	●	●	○	○	●	◓	240	A, N	•	2	60
	6	**Toshiba** 55WX800U	55	2,600	60	◒	◓	◓	○	○	●	◓	240	B, N, V	•		46
	7	**Samsung** UN55C8000	55	2,800	59	◒	◓	◓	○	○	●	●	240	A, B, C, N, V	*		46, 65
	8	**Samsung** UN46C8000	46	2,200	59	◒	●	●	○	○	●	●	240	A, B, C, N, V	*		55, 65
	9	**Samsung** LN46C750	46	1,400	59	○	○	○	○	○	●	●	240	A, B, C, N, V	*		
	10	**LG** 55LX6500	55	2,300	58	◒	◓	◓	◓	○	●	◓	240	N, V	*		47
	11	**Sharp** Aquos Quattron LC-52LE925UN	52	3,500	54	○	◓	◓	◒	○	○	◓	"240"	N, V	•	2	60

*Requires optional wireless adapter. ① Streaming services: A, Amazon; B, Blockbuster; C, CinemaNow; N, Netflix; V, Vudu. ② Requires purchase of transmitter to display 3D.

For Guide to the Ratings, see page 35

3D glasses are a necessary evil ... for now

With current 3D TVs, you need special glasses to see images in all their three-dimensional glory. The TVs in the Ratings require active-shutter glasses powered by rechargeable or disposable batteries. Some glasses are fairly heavy and cumbersome, especially when worn over prescription specs. The 3D glasses tend to dim images a bit, so some TVs crank up brightness (and power usage) to compensate. A TV might come with one or two pairs of glasses, but others don't include any. Active-shutter glasses cost about $130 to $150 a pair.

Why you need glasses to see 3D

In the real world, each eye sees a slightly different perspective of a scene, and the brain combines them into one image with depth and dimension. To simulate that, a 3D TV presents separate views, one for the right eye, one for the left. The shutters in the glasses open and close very rapidly to steer the correct image to each eye. If the two images aren't kept completely separate, you might see ghosting (double images) even with glasses.

Most 3D TVs work only with glasses from the same brand. But XpanD and Monster recently began offering so-called universal glasses that will work with several TV brands. They're lighter than most that come with the TVs, but no cheaper: about $130 for XpanD's X103 model, and $230 for Monster's Vision Max 3D starter kit plus $160 for extra glasses.

Though 3D picture quality is the most critical point, the comfort of the glasses is a consideration, so try on the specs before buying a 3D TV. The LG, Samsung, Sharp, and Toshiba glasses we've tried were fairly light and comfortable. The Sony and Panasonic glasses were heavier and less comfortable. But new glasses could come out at any time.

Other TVs coming out now use passive glasses more like those you get in theaters. They don't need batteries, so they're lighter and cheaper than active glasses. There are no shutters, so 3D images might be brighter, with less ghosting. They accept prescription lenses, and some serve as sunglasses. We'll have to see how effective TVs using passive glasses are compared with those using active glasses. 3D TVs that don't require any glasses might be here in a few years, but viewing angle and resolution will be a challenge.

SEE HERE **The special glasses needed to view 3D images, shown here with our test patterns, can be heavy and expensive.**

F MINUS/ by Tony Carillo

Elsewhere in Medicine

from *The Wall Street Journal* The Informed Patient by Laura Landro. **Taking Medical Jargon Out of Doctors' Visits.** "When it comes to understanding medical information, **even the most sophisticated patient may not be smarter than a fifth grader**... routine medical advice, [is] largely... often incomprehensible to average people. ... Confused by scientific jargon, doctors' instructions and complex medical phrases, patients are more likely to skip necessary medical tests or fail to properly take their medications. ... Medicaid agencies call for health material to be written at a reading level of between the **fourth and sixth grades** ..." *And WRITE OUT on Rx other instructions and directions !!!! -per*

Hospitals: from *The Wall Street Journal* October 30-31, 2010 by Suzanne Sataline. **Ruling Clears Path for Hospital Deal. Cerberus takeover of Boston's Caritas is latest attempt to turn nonprofits into money makers.** "... Cerberus Capital Management L.P. to assume control of Boston's Catholic hospital system and convert it to a for-profit company... investors scooping up debt-laden nonprofit hospitals, ... to outperform competitors... nationwide, driven by for-profit companies and private equity firms... flush with cash in a market with few investment opportunities. Deals are unfolding in Detroit and smaller cities, where many of the nation's 3000 nonprofit hospitals (of the 5000 hospitals total) are in debt. ... they want to do is return to the bread and butter business they're losing, to ... academic medical centers. ..."

Career Advice for medical personnel from the AMA

From: "AMA Member Communications" <MorningRounds@ama.custombriefings.com>
To: <perxbvq@colorado.net>
Sent: Friday, June 10, 2011 8:10 AM

Signing bonuses for new physicians now a common hiring incentive.

American Medical News (6/9, Berry) reported, "Signing bonuses for new physicians have become a common hiring incentive, part of what can be lucrative packages for doctors who have just completed their residencies or fellowship training." While other types of "one-time incentives beyond cash bonuses are emerging, allowing hospitals and physician groups to stand out in a crowded field of potential employers," signing bonuses "remain a core part of employment offers."

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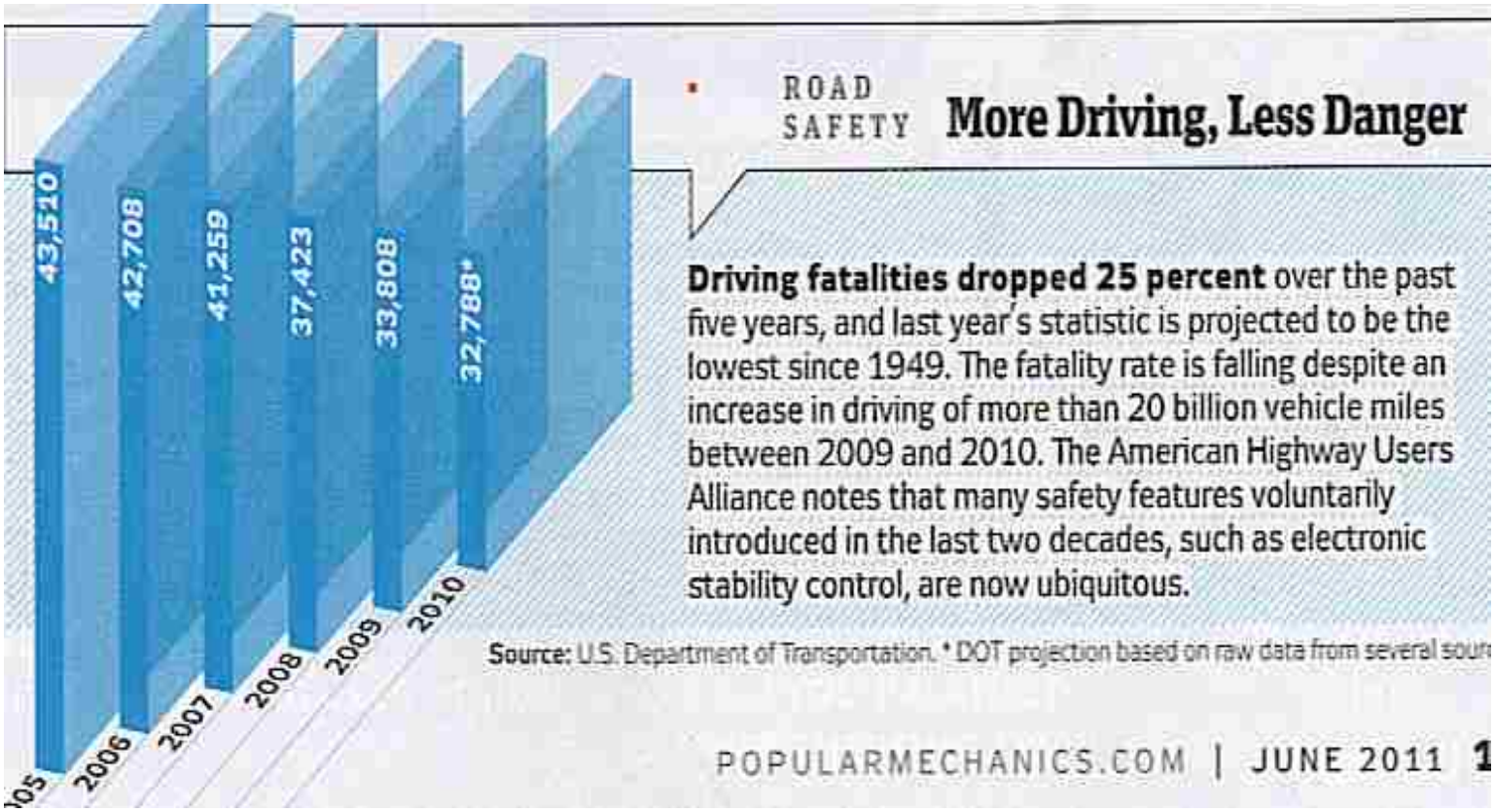
9. Public Health and Safety



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WARNING FOR ALL CYCLISTS !!!!

Seems almost daily another cyclist (or pedestrian) is run down by a car, usually killed or at least maimed badly and it is most always the motorists driving error. WHY?

WHY MOTORISTS
DON'T AND CANNOT SEE CYCLISTS ?:

Because, in a few words :**THEY DON'T FEAR THEM (the cyclists, that is).**

You can't hurt them. You are Too insignificant.

Rule 1 of life is: Reproduce !
Rule 2 of life Is: SURVIVE !

Motorists in cars fear other motorists and anything bigger. In the last decade, Americans discovered why truck owners love their trucks: they look, feel and are, bigger, heavier, stronger than all the ordinary cars out on the road. Only serious trucks and 18 wheelers are any threat to their survival. Suddenly Americans could share that SUPERIORITY BY BUYING A HUGE HEAVY STRONG SUV. Which made them feel invulnerable. Res ipsa loquitor...

the key rule, Courtesy of the Marquis of Queensbury over a century ago is the one last thing the boxing referee says before the bell rings to start the fight:
"protect yourself at all times"

If you are going to be defenseless, then portray yourself as a potential THREAT to the motorist, like wearing some of the garb of and looking like a construction worker, an official, a courier, or even a gendarme, a member of officialdom.
I do. It works.. ***-per***

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OFFSIDE UNDO › By Dutch Mandel

Culture Clash: Why We Don't Drive Well

IT WAS A MIDDLE-FINGER salute that hinted that I was no longer in Italy.

My first clue could have been the oversized woman shoveling a breakfast sandwich into her maw while leaning on her minivan's horn. But really, it was her Monday-morning digital exclamation that snapped the 2011 Mille Miglia into my rearview.

No, this isn't Tuscany.

With her bad behavior, she affirmed that the best drivers might well come from Italy. I experienced it firsthand, and not because I was in a luscious Siata or a voluptuous Gullwing, but because I *wasn't*.

The natives along this year's Mille Miglia route were accommodating and pleasant, with nary a hint of road rage. Our chase car, a pedestrian, late-model Mercedes-Benz SLK festooned with identifying decals, signaled that we belonged behind the ropes of this nationalistic event, and yet we were embraced as if we were driving a Ferrari 212 MM.

Why are the Italians so accommodating to other drivers that they move out of the way when you race up behind them? Conversely, why are American drivers so ill-mannered that they flash disdain and the occasional firearm when faced with the same situation?

Italians aren't threatened. We are.

For three days, the Mille begs you to drive at breakneck speeds. The cops and the locals know this. Along the route, we were escorted by blue-and-white superbike-riding *polizia* who used blue strobes and sirens to plow the way. Simultaneously, they stood on their pegs at triple-digit speeds and, with the flick of a hand low against their legs, prompted us drive faster still. *Andiamo!*

It became a rite and a right: Along the narrow country roads, three-lanes sprouted. The middle, the Mille Lane, was the de facto, carte blanche superhighway. One driver said of his inaugural Mille that it was "the most lawless" event he'd ever been party to.

Well, yes and no. See, if you behave badly on the Mille, the law does not respond kindly. But to drive with gusto, with brio, with purpose, while shooting gaps at triple-digit speeds—this is not lawless. This is the law of driving well, and the Italians appreciate it.

We do not understand that here. We do not applaud the elegant fluidity of the double-clutch or that two-lane country-road pass into oncoming traffic. No. We tuck behind the bumper of a honkin' sport-ute, with room enough to slide an Arby's roast beef melt between the two cars, and say we're "riding a cushion of air" in the draft.

The majority of Americans believe that NASCAR's side-by-side and front-to-back driving in a Talladega train is how we should behave at freeway speeds. Help the fool who pulls out of line to make a pass, for he is well and truly hosed.

What riled that breakfast-gobbling woman? While making my commute, I saw ahead of me a garbage truck stopped with its flashers on, so I dove to my left in behind another car. As I made this move, I checked my mirrors to see her race to close a three-car gap. I eased into "her" space. She did not like this. She convulsed. She quaked. And she shot me the bird.

What a great way for both of us to start off our week.

—dmandel@autoweek.com

from *the Wall Street Journal* January 21, 2011 by Stephen Power. **Higher Ethanol Levels Approved for Some Cars.** " ... The agency last fall approved the use of E15 for vehicles made starting in 2007 and has been awaiting the results of tests to determine whether older models can use higher ethanol blends. ... The Environmental Protection Agency is expected to say Friday that it will allow ethanol levels in gasoline blends to be as high as 15% for vehicles made between 2001 and 2006, up from the current 10% limit,..."

- booo !

Enjoy your summer (or winter) .

I need to move to Italy! See prior columns left - per