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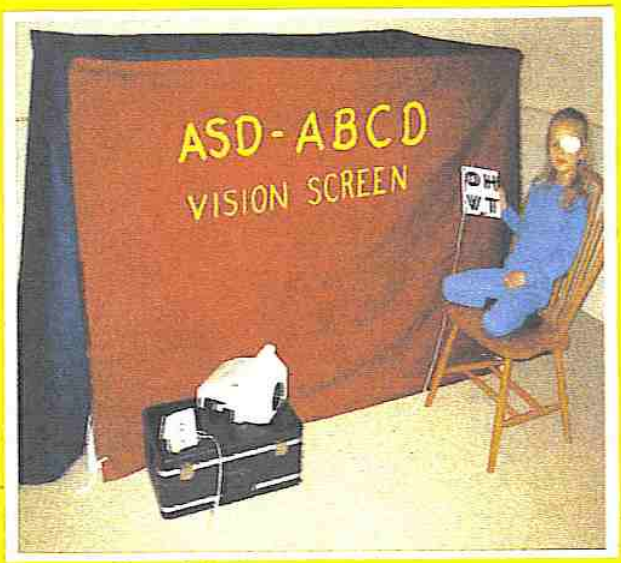


Arnold's Tent

Second Quarter, 2008
VOLUME 23, NUMBER 2
Summer
~~Winter~~

de WIT: The Evaluation of Two New Computer-Based Tests for Measurement of Aniseikonia: Discussion

- ORIGINAL SCIENTIFIC ARTICLES-

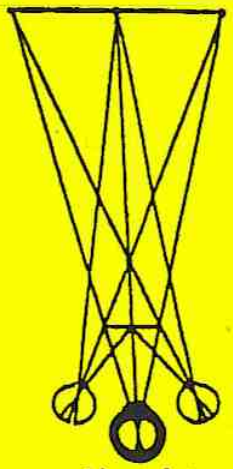
ARNOLD RW, STARK, LEMAN, ARNOLD KK, and ARMITAGE: Tent Photoscreening and Patched HOTV Visual Acuity by School Nurses: Validation of the ASD-ABCD Protocal

LAM, CHENG, KIRSCHEN and LABY: Effects of Head Tilt on Stereopsis

- MEETING REPORT-

MIMS III: Strabology Report of the 34th Annual Meeting of the American Association for Pediatric Ophthalmology and Strabismus, Washington, D.C.

PLUS: News, Editorials, Abstracts, Hyde Park



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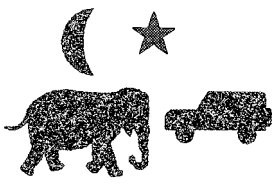

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-Watzlawick, 1976

EDITOR **ISSN 1088-6281** **Second Quarter of 2008**
Paul E. Romano, M.D., M.S.O **TABLE OF CONTENTS** **Volume 23, Number 2**
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1. Jones AB, Jones CD, Jones EF, et al: Results of Laser Surgery for Strabismus. J Outst Surg l999; 2:301-304.
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* Statistical Analysis of Results Mandatory. But give "exact" probability values (i.e., p = .06). Do not use relative p values (i.e.,p >< .05). The term "statistically significant", defined traditionally as a $p \leq .05$, is a totally arbitrary and unscientific term and should not be used (J Lab Clin Med 1988. 111:501). But DO consider whether your results may be "clinically/medically significant".

D. BRIAN STIDHAM MEMORIAL LECTURESHIP

LECTURE to be published annually in *Binocular Vision and Strabismus Quarterly*

Donations Solicited to Fund Lectureship

To the Editor:

The Pediatric Ophthalmology community lost a great doctor last October 6, 2005, with the death by murder of D. Brian Stidham.

I am attempting to create an endowed lectureship to remember Brian in our community and within pediatric ophthalmology, and wonder if I could ask you to consider helping in this regard. I know that your journal concentrates on strabismus and binocular vision, but could I interest you in publishing the "Stidham Lecture in Pediatric Ophthalmology and Strabismus" that will hopefully be given on a yearly basis? I would work with the presenter to make certain that a manuscript would be produced that would be of acceptable quality. Having a target journal for the presentation would be a great carrot to draw top speakers to Tucson on a yearly basis to give such a talk.

We have raised $14,000 towards a target of $50,000 endowment that would ensure that the lecture would be perpetuated. I am committed to continue fundraising until the goal is met. If *Binocular Vision and Strabismus Quarterly* would serve as the publisher of the named lecture, I feel certain we will be able to both attract top speakers and donors to remember Brian in the years ahead, and to provide a great lectureship in pediatric ophthalmology and strabismus to our professional community which would enjoy greater readership and distribution.

Joseph M. Miller, M.D., MPH
Head, Ophthalmology and Vision Science
University of Arizona, Tucson, Arizona

In reply:

We are honored to be asked and will most definitely be pleased to publish this lecture each year. **We would encourage our readership to donate to this fund: Checks should be made payable to The University of Arizona Foundation with memo of "Stidham Endowment" and sent to Dr. Miller at U AZ, Ophthalmology, 655 N. Alvernon Way, Ste 108, Tucson AZ 85711. - PER**

ADVICE for authors submitting papers to Binocular Vision & Strabismus Quarterly©

1. READ & FOLLOW INSTRUCTIONS FOR AUTHORS! In addition:
2. READ & FOLLOW INSTRUCTIONS FOR AUTHORS! In addition:

Reviewing the literature: A proper review of the literature starts with a review of current and appropriate textbooks, especially the latest edition (currently the Sixth of von Noorden's Binocular Vision and Ocular Motility by Mosby, and Duane's loose-leaf text Clinical Ophthalmology. Anticipating a future requirement, it will only be to your credit now to specifically state what was included in your literature search, i.e., the topics or subjects and the sites searched. For any article submitted here that should include at a minimum, Index Medicus (Medline) from 1966 to the present, Index Bnoculus Primus, 1985 to the present, and the Internet for the American Orthoptic Journal.

Acceptable TERMINOLOGY	not acceptable
AHP Abnormal Head Postures:3	
face turn	head turn
chin up/down	head up/down
Head tilt	
retroequatorial myopexy	Fadenoperation
retroequatorial myopexy	posterior fixation suture
suspension-recession	hang back, hang loose
Bielschowsky Head Tilt Test	three step test
strabolog-y, ist	Strabismolog'y, ist
exact p values	"Statistically significant"

Re: "lost to followup" - Avoid this at all costs; First it raises the possibility that the patient had a (=) bad result or was otherwise so unhappy with their care that they never came back - or went elsewhere or went nowhere out of fear or dissatisfaction. If they are "lost followup" you cannot refute the possiblity that one those very unhapy thingsppened! Second it is inexcusable - medico-legally. Third: It reflects poorly on you as both a health care professional and as a scientist and Fourth: under the worse of circumstances suggests or indicates that you may discriminate against those of lower socio-economic status (research findings).

WRITING STYLE IS IMPORTANT TOO:
(from Investor's Business Daily Nov. 26, 1997 by M. Stettner)
"Make Dry Data Come Alive in Your Reports ... tips on making your technical writing come alive:
1. Remember that less is more. ... simplify your language and prune extra words. Eliminate jargon, and keep your sentences and paragraphs short. 'If you write in little bites, you break down lots of information for the readers so that it's easier to absorb,' said Carolyn Mulford, president of The Writing Coach.
2. White in the active voice. ... For example, write 'When you review the data, you will note these trends'. Avoid saying 'These trends were noted upon a review of the data.' Another example: Write 'We will examine', not, 'This has been examined'. ...
3. Insert 'talking subheads'. ... unbroken text can intimidate any reader, ... organize your writing in sections with each carrying an easy to understand subhead ... a talking subhead ... alerts the reader of what you're about to discuss ... for instance, instead of heading a section with 'Cost of Scanners' try 'Rising Cost of the Next Generation of Scanners'. subheads should average 7 words.
4. Run a test. ... ask someone in your audience group to read your manuscript.
TABLES: Don't forget the crowding phenomenon. It works in Tables too. We prefer spaces to lines to separate the items in a Table. You can also get more material within whatever size limits you may have, using spaces instead of lines, especially vertical lines. Horizontal lines are less of a sin. -PER 22(4)

SURGICAL MANAGEMENT OF STRABISMUS

A Practical and Updated Approach, 5th edition

EUGENE M. HELVESTON, M.D.

Review by David K. Coats, M.D., Houston, Texas

Six pounds of pure muscle; no fat or byproducts here! That's what the 5th edition of Surgical Management of Strabismus packs. Quintessential strabismologist Eugene Helveston has done it again.

This classic textbook is once again jam-packed from cover-to-cover with all the information that the strabismologist needs to properly plan and execute the management of both simple and complex strabismus disorders.

The text is wonderfully illustrated with step-by-step instructions on how to perform all contemporary procedures that should be in the armamentarium of any serious strabismologist. One of my favorite "extras" in this textbook is a chapter that colorfully explores the history of strabismus surgery from its beginning. What most separates this edition of the textbook from previous editions is the inclusion of an extensive array of case examples complete with histories, clinical photographs, and details of surgical planning. While a few case examples were included in earlier versions, expansion of the case example section in this edition is so extensive that virtually any condition can now be reviewed in detail with a front row seat through the eyes of this world-renowned expert.

Space should be reserved for Surgical Management of Strabismus, 5th edition, in the bookcase of every ophthalmic surgeon. Undoubtedly this reserved space will be vacant most of the time, as this book is most likely to remain open and in constant use on the surgeon's desktop.

1 THE HISTORY OF STRABISMOLOGY
Edited by Gunter K. Von Noorden, M.D.

THE BOOK

The HISTORY OF STRABISMOLOGY is the first monograph devoted entirely to the development of strabismology in different regions of the world. Each of the co-authors has been assigned a special chapter in which his or her knowledge of the material is particularly profound. The origins of strabology go back to the beginning of medicine, thousands of years ago. The story how this specialty evolved from quackery and superstition in ancient times to its present state of sophistication is a fascinating one. It should be of more than passing interest, not only to those specialized in this field but also to others with an interest in the history of ophthalmology.

The book consists of approximately 400 pages and is abundantly illustrated with fine reproductions of old documents, engravings, drawings and historic instruments, many of which are from ancient and rare manuscripts. Printed on deluxe art paper THE HISTORY OF STRABISMOLOGY is bound by hand and gold embossed on book plate and spine.

THE EDITOR Gunter K. Von Noorden is a world-renowned author and strabologist. His expertise in the entire field of stabismus is docu-mented in his textbook (now in its 6th edition) and uniquely qualify him to organize and edit a book on the history of strabology.

THE AUTHORS The authors are prominent strabologists from different parts of the world, internationally known for their contributions. Indeed many have actually played an active part in shaping the history of strabismology during the second half of the 20th century. They are joined by a comprehensive ophthalmolgist who is also an ophthalmic historian of international reputation and by one of the leaders of the orthoptic profession. The following contributed to this book: Henderson C. Almeida, MC, Shinobu Awaya, MD, Alberto Brown-Limon, MD, William E. Gillies, MD, Eugene M. Hel;veston, MD, Joseph Lang, MD, Emma Limon de Brown, MD, Gunter K von Noorden, MD., Hans Rmeky, MD, Geraldo Ribeiro de Barros, MD, and Gill Roper-Hall, DBOT, CO, COMT

SURVEY OF OPHTHALMOLOGY VOLUME 51 • NUMBER 1 • JANUARY–FEBRUARY 2006

MULTIMEDIA REVIEWS

LEE M. JAMPOL AND ANGELO P. TANNA, EDITORS

Burton J. Kushner's Binocular Vision and Strabismus Grand Rounds: A Collection, 1985 to 2002, edited by Burton J. Kushner, and Paul E. Romano, *Dillon, Colorado, Binoculus Publishing*, 2003, 450 pp., illus., hardcover. Price: US$ 89.00 (subscriber rate), $169.00 (nonsubscriber rate), $249.00 (institutional rate).

To quote Dr. Kusher, "Many roads lead to orthophoria." The treatment of strabismus, that "art form" with scientific underpinnings, can be the bane or the joy, or more likely both, of the ophthalmologist's existence. For those of us in pediatric ophthalmology, it is our "bread and butter" and the source of endless discussions and debates. There is enough science to provide a logical approach, and enough art to make things *really* interesting.

This book is a compilation of 68 cases published over 17 years in the journal *Binocular Vision and Strabismus* in its "Grand Rounds" section, edited by Dr. Kushner. The cases are presented in a standardized format, including summary of the therapeutic problem, history, eye exam, and final diagnosis. Dr. Kushner states that he was not attempting to solve a clinical problem for a specific patient but rather presenting an intellectual exercise with input from respected colleagues. Indeed, he does not present his own opinion, nor the actual results following treatment on most of the cases. Several experts in the field present opinions on the diagnosis and treatment. Each case is followed by the editor's perspective which highlights the issues raised. The cases cover clinical topics from nonparalytic vertical strabismus to cataract. There were 249 different individuals who served as discussants for one or more cases. This provides a broad perspective covering many schools of thought.

The cases are numbered and have descriptive titles such as "A Case of 'V-pattern' Esotropia with Excyclotropia after Bilateral Superior Oblique Tucks." These allow for easy selection of cases for clinical purposes or teaching. The cases are interesting and informative analyses of complicated problems, primarily involving strabismus. However, although it is useful to have these case reports, previously published in a journal, collected together in one volume, it would have been more useful to have included outcomes and follow-up. Nonetheless, the compilation provides a thought-provoking read, an aid to clinical problem-solving, and a stimulating jumping-off point for teaching sessions.

Marilyn B. Mets, MD
Chicago, Illinois, USA

doi:10.1016/j.survophthal.2005.11.008

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Binocular Vision & Strabismus Quarterly© A Medical, Scientific e-Periodical
Comment/Critique of Current Literature The Evaluation of Two New Computer-Based Tests for Measurement of Aniseikonia G. C. De wit, PhD
Second Quarter of 2008 Volume 23 (No.2): Pages 76-78

Comment / Critique of Current Literature

RE: The Evaluation of Two New Computer-Based Tests for Measurement of Aniseikonia. Fullard RJ, Rutstein RP, Corliss DA. Optom Vis Sci 2007; 84:1093-1100

This letter was originally sent to the journal "Optometry and Vision Science" as a Letter to the Editor. However, the editor decided not to publish the letter because of space limitations in the journal. Also, he did not see the need for a similar discussion as with a previous. I disagree with that, because without a discussion on the clinical relevance of their results, the reader may have been given the wrong impression on the clinical usefulness of the aniseikonia Inspector.

The Evaluation of Two New Computer-Based Tests for Measurement of Aniseikonia: Discussion

GERARD C. de WIT, Ph.D.

ABSTRACT: **Purpose:** To discuss the clinical relevance of the article with the same name by authors: R.J. Fullard. R.P. Rutstein, and D.A. Corliss.

Method: The results of the authors are compared to clinical relevant aniseikonia values. Also, the (in)accuracy of the analysis is questioned.

Results: The authors used an aniseikonia test range (-3.5% to 3.5%) that for the most part will not give symptoms. The measurement results show deviations from the expected aniseikonia values in the order of 0.3%, which is not clinically significant. The repeatability values found (~0.5%) are small enough for clinically useful aniseikonia management. More accurate results could have been obtained if the accuracy of the size lenses would have been taken into account.

Conclusions: When considering the clinical relevance of the findings in the article, it becomes clear that the Aniseikonia Inspector is a useful (and only) tool for complete aniseikonia management.

INTRODUCTION

The group of Rutstein et al. (School of Optometry, UAB, Birmingham, Alabama, USA) has published a series of articles (1-3) in which the Aniseikonia Inspector (Optical Diagnostics, Culemborg, The Netherlands) has been evaluated. The first two articles have been criticized by letters to the editor (4,5) for their experiment design, analysis of the results, and lack of a discussion on the clinical relevance of the results found. Their third article was recently published, but still contained some of the same 'flaws' as the previous articles. Therefore, this letter discusses their latest article, so the reader can better assess the value of that article.

Desired clinical accuracy

Before saying anything about the clinical relevance of the results, it is important to define what kind of accuracy would be considered clinically accurate enough. The goal of aniseikonia management is to reduce the patient's aniseikonia as the patient becomes asymptomatic. Aniseikonia becomes symptomatic at approximately 3-5%. (6-8). Therefore, the accuracy of the aniseikonia test should preferably be (much) smaller than 3%. Note that sometimes sensitive patients are said to become symptomatic at values less than 3%, but this is more likely to be an accompanying anisophoria symptom than an aniseikonia symptom.

Absolute versus relative errors

The criterion that the test accuracy needs to be less than 3% is an absolute and not a relative one. To assess the clinical implication of a possible underestimation or overestimation of an aniseikonia test, the authors could therefore better have calculated the absolute under- or overestimation. For example, in the horizontal direction for the Aniseikonia Inspector 1, the authors find a slope of 0.866 and then state in the text that the test underestimates by a relative value of 14%. Table 1 below gives the same data, but now as an absolute underestimation.

Table 1: Transforming relative errors to absolute errors

Induced aniseikonia	Underestimation of 14% means:
1.0%	0.1%
2.0%	0.3%
3.5%	0.5%

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Comment/Critique of Current Literature The Evaluation of Two New Computer-Based Tests for Measurement of Aniseikonia G. C. De wit, PhD
Second Quarter of 2008 Volume 23 (No.2): Pages 76-78

The main thing to notice from Table 1 is that all absolute underestimation errors are much smaller than 3%, and therefore this underestimation would not have a major impact on the clinical usefulness of the test. In the discussion, the authors themselves reject as insignificant a possible chromatic error of 0.25%. Therefore they will probably agree that the underestimation they found, which is of the same order of magnitude, cannot be considered clinically significant.

Test range validity

It is unfortunate that the authors only tested in a range of –3.5% to 3.5%, since in this range people are for the most part not symptomatic. Neither can one extrapolate their results to larger (more symptomatic) aniseikonia values, because previous research indicates that for larger aniseikonia values the relative underestimation reduces. (5,9)

Illumination

The authors' study makes a distinction between measuring with and without room illumination. The clinical relevance of the differences found is again doubtful. The reader should also know that the test setup section of the Aniseikonia Inspector manual already states that the best results are obtained with dimmed lights. Normal illumination is therefore not with the room lights on.

Induced aniseikonia accuracy

Even though the slope differences found do not have a large clinical impact, for a more accurate analysis the inaccuracies of the size lens induced aniseikonia values should also have been included. The authors use a size lens of said 1%, 2%, and 3.5% magnification in front of the left and right eye. However, since the calculated slopes are with an accuracy of 2 or 3 decimal places, this means that the size lenses are assumed to be 1.00%, 2.00%, and 3.50%. To manufacture (or evaluate) lenses with such a precise magnification would require near perfect control on the base curve, center thickness, residual power, and refractive index as a function of the wavelengths used in the test. Also, when the 3.50% size lens is held in front of the right eye, then the induced aniseikonia is (1/1.035-1)*100% = -3.38%, so clearly different from the value -3.50% used in the analysis. Note again that all these differences are clinically not very important, but can cause significant differences when statistically evaluating if a test underestimates or overestimates.

Repeatability

The standard deviation of repeated measurements that the authors find is in the order of 0.5%. When compared to the approximately 3% at which aniseikonia becomes symptomatic, this could be considered clinically useful. Note also that the silent assumption that aniseikonia is stable over time does not seem to be true (10,11). Reasons could be, for example, fluctuations in adaptation (cortical processing), refraction, or accommodation. So part of the repeatability inaccuracy may also be actual aniseikonia fluctuations.

Inter-subject differences / outliers

As with other psychophysical tests, an aniseikonia test will also experience inter-subject differences due to the statistical measurement uncertainty and natural fluctuations. These normal differences seem to be clinically acceptable. However, looking at the raw data, I agree with the authors that there are some subjects who show one or more weird data points, causing relatively large slope differences. It would indeed be interesting to know why these outliers arose. Didn't the subjects understand the test well enough, did they make accidental errors, were they perhaps unmotivated or tired after many measurements?

CONCLUSION

The authors end their article by recommending the use of the Aniseikonia Inspector 1 for clinical use above the customized aniseikonia test (erroneously called version 2 in the article). I disagree with this conclusion. First of all, the above shows that the customized test also seems to provide useful results for clinical practice. Secondly, the customized test used by the authors was a preliminary, not commercially available, research version, which has been further improved since then. By the time it became part of successive commercially available Aniseikonia Inspector versions, it contained 1) afull fixation disparity correction, 2) a strong fixation target, 3) an optimized size target shape, 4) field of attention widening stimuli, and 5) a three alternative forced choice procedure instead of a two-alternative forced choice procedure. Thirdly, there are several reasons why the new aniseikonia test was developed in the first place: 1) the new test measures static aniseikonia without interference of anisophoria, 2) the new test measures field-dependent aniseikonia important for retinally-induced aniseikonia, (12) , 3) in the new test accidental patient handling errors are less likely, 4) the forced choice method provides a measurement consistency parameter, so the eye care provider can evaluate the patient's testing capability, and 5) the test is less affected by fluctuating fixation disparities due to the short presentation times.

In conclusion, the Aniseikonia Inspector measures aniseikonia with a clinically relevant accuracy and

successive Aniseikonia Inspector versions are preferred above version 1 (both for the aniseikonia testing capabilities as discussed above, as well as the iseikonic lens design capabilities).

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"New" Version 3 Aniseikonia Inspector

Optical Diagnostics has launched the Aniseikonia Inspector, version 3. This software product allows each eye care provider to manage the binocular vision discomfort resulting from aniseikonia. **New in this version is that the aniseikonia test is based on a forced choice procedure with three different test strategies (screen, diagnose, and field dependent)**. The diagnostic test strategy is aimed at optically-induced aniseikonia (e.g., as in anisometropia, pseudophakes, or refractive surgery patients), while the field dependent test strategy has been developed especially for retinally-induced aniseikonia (e.g., due to an epiretinal membrane or a retinal detachment). The difficult designing of an iseikonic prescription has never been easier for the practitioner with many new features in this version, including the use of lenticular lenses and automatic splitting of the refractive power between a spectacle lens and a contact lens. Furthermore, integrated is an internet-based support feature to get help with a difficult (or occasional) aniseikonia case. For more information or to request a free trial of the software, please visit

http://www.opticaldiagnostics.com.

Gerard de Wit, Ph.D.,Optical Diagnostics

Tribute to Caleb González, M.D.

A lovely tribute for Caleb González, MD on the occasion of his retirement in May 2007. DVDs were made of the presentations and photographs. Lectures were given by Eduardo Alfonso, MD, L. Jay Katz, MD, Joseph M. Miller, MD, MPH, Ivan J. Suñer, MD, Marvin L. Sears, MD and William M. Townsend, MD. Dr. González is a Charter Member of our Editorial Board and has (and continues to)contributed greatly to the success of BV&SQ. We wish him, and his wife, Flora, much enjoyment in their retirement. For information regarding the DVDs, please contact Sandy Hanrahan at 203-785-7647 or email: sandra.hanrahan@yale.edu.

University of Tennessee Faculty Appointments

Robert W. Enzenauer, MD, MPH was recently appointed Professor of Ophthalmology. He has been recognized at several institutions as an exception teacher and has mentored many young ophthalmologists-in-training. He has also served in both Afghanistan and Iraq,(see *BV&SQ 2007)* **Mary Ellen Hoehn, MD** was appointed Assistant Professor of Ophthalmology. She joins Dr. Enzenauer at the Hamilton Eye Institute and serves as an atten-ding ophthalmologist at St. Jude Children's Hospital.

Meeting Announcements

Montreal, Quebec, Canada. October 17, 2008, 33rd Annual Pediatric Ophthalmology Day. A day of lectures on strabismus and pediatric ophthalmology. (Seating is limited: Contact: Luis Ospina, MD, Dept Ophthalmology, CHU Sainte-Justine, 3175, chemin Cote-Sainte-Catherine, Montreal , Quebec, Canada, H3T 1C5. Tel: 514-345-4715. Fax:514-345-7706.

Munich, Germany. September 7-10, 2008. European Strabismological Association. Organizer: Dr. Oliver Ehrt <oliver.ehrt@med.uni-muenchen.de). For information see: www.esa2008.org

Practice Opportunities

Maryland/Washington DC: Well established, exclusively pediatric ophthalmology and strabismus practice. Clinical and surgical care. Research with NIH funded PEDIG. Main office in Rockville, Maryland, with a satellite office 30 minutes away. Partnership prn. Send resume (in strict confidence) to goblue87@comcast.net or call Dr. Stephen Glaser at 301-580-8018. See also: www.kidseyecare.com.

Fayetteville, North Carolina: Leading ophthalmology practice with 5 MDs and 2 ODs. City of about 170,000. Approximately 60 employees with three sites. No other pediatric ophthalmologist in the county. Partnership quality. **$150,000 +.** Contact: Laura Campbell, The Eye Group, email;: Laura@threeye group.com. www.theeyegroup,com.

Spokane, Washington: Recruiting a new pediatric ophthalmologist to replace a planned retirement. 12 Ophthalmologist (all subspecialty trained) group with 5 ODs is offering first year salary of **$250,000**, plus benefits and incentive bonus. Partnership after 1 year. Second language in Spanish and Russian are helpful.

Contact: Jeffrey Snow, MD. Jeffreysno@aol.com

Montreal, Canada: McGill University Children's Hospital. Looking to recruit **two** French & English speaking pediatric ophthalmologists. Contact: Robert Koenekoop, MD, PhD, McGill University Children's Hospital, Ophthalmology, 2300 Tupper, Montreal, Quebec H3H 1PC, Canada.

NEW BOOK

Ken Wright's 3rd edition of the ATLAS OF STRABISMUS SURGERY, published by Springer, now available. Watch for our review next issue.

Binocular Vision &
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Editorial:
P. E. Romano, MD, MSOphthalmology

Second Quarter of 2007
Volume 23 (No.2):
Page 80-82

EDITORIAL: Civility, Our Loss of; A Couple of Champions for it; Definitive Standards for Eye/Vision Screening; Binocular Vision Stereopsis Changes from Head Tilt; AAPOS Meeting Report.

In the last issue we said here: "Too bad our society has become so competitive, so vicious, so fault finding, so arm chair generaling. I blame the rise of TV media and all its talk shows, and their need for attracting eye balls [*primarily to sell advertising, not to inform and educate the public]* changing our society for the worst".

Shortly after publication, we came across someone else who was disturbed about the direction our society is taking (like but much more sincere and reasonable than all those politicians running for president right now) and he's written a book on **CIVILITY.** He got to the government in the little Maryland town near Baltimore where he lives and got them to sort of endorse and distribute his book. Wow, did that raise hackles!!!! Nobody likes to get criticized!!! -for anything!!!

And then there's this story from the FRONT PAGE of the *Wall Street Journal* just last week! Maybe she or rather the writer of the headline got the idea for "Lesson in Civility" from that book.

Detroit Politician Gets Lesson In Civility From a 13-Year-Old

* * *

Keiara Bell Becomes Local Hero After Council Member's Name-Calling

BY KATHERINE ROSMAN

DETROIT—When Monica Conyers, president pro tem of Detroit's City Council, called the council president "Shrek" during an angry exchange at a hearing in April, one city resident found the remark immature.

"That's something a second-grader would do," says 13-year-old Keiara Bell.

During a panel discussion Ms. Conyers had with local schoolchildren two weeks after making the remark, Miss Bell admonished the 43-year-old Ms. Conyers for her behavior. The eighth-grader didn't back down when the councilwoman engaged her in debate.

Ms. Conyers was peppered with questions by Miss Bell, who said, "You're an adult. We have to look up to you. We're looking on TV and we're like, 'This is an adult calling another adult a Shrek?' "

Ms. Conyers is the wife of U.S. Rep. John Conyers Jr., the chairman of the House Committee on the Judiciary. She declined to comment for this story, but her chief of staff, Linda Bernard, says Ms. Conyers believes she is "being targeted by the press" because "her husband was recently in New York City and is considering having hearings about police brutality."

Keiara Bell

In Miss Bell, Motown has found an unlikely folk hero: a child demanding that politicians exercise civility and restraint. Her parents, Marsha and Harry Bell, say they are proud of

Please turn to page A18

Binocular Vision & Strabismus Quarterly©
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Editorial:
P. E. Romano, MD, MSOphthalmology

Second Quarter of 2007
Volume 23 (No.2):
Page 80-82

In THIS ISSUE

First, if you didn't already go there, go back and read our correspondence section. There's an important letter from a recognized expert on aniseikonia regarding an article in a recent edition of an optometric journal testing his reknowned test for this condition.

Elsewhere in 23(1):

Arnold RW, Stark L, Leman R, Arnold KK, Armitage MD. Tent Photoscreening and Patched HOTV Visual Acuity by School Nurses: Validation of the ASD-ABCD Protocol. *Binocul Vis Strabismus Q* 2008; 23:83-94.

This epic and definitive work on this topic answers many of the uncertainties we have had concerning eye-vision screening (excuse us but we feel strongly that this should be the moniker for this exercise, since we are also looking for eye problems which do not per se impair vision and which would therefore not be detected by simply screening for abnormal vision, such as STRABISMUS or other abnormalities of BINOCULAR VISION..

Twenty years ago, your editor had the honor of being asked by the Council of the American Association of Certified Orthoptists (AACO) to put together one of their annual Sunday Night (then) Symposiums at the annual meeting of the American Academy of Ophthalmology on vision screening. The final title was "Pre-School Vision and Eye Screening: Current Technologies and Future Trends." (Our first effort at renaming this process/practice.)

With the generous help of many colleagues, national and international, (**see appendix, last page 82 of this editorial**) we did it. The result was much appreciated and pro forma was ultimately published in the next issue, of the *American Orthoptic Journal*, Volume 38, 1988. Editor Tom France expressed his opinion to me that this was at the time, the definitive work on the subject. He suggested/considered publishing it separately as such. In the *AOJ* publication, we did express our opinion that there was still much work to be done on the topic.

Arnold and co authors' work (the their other efforts) answer many of the questions which had not been in the intervening 20 years such as:

"true criteria [for screening] can be derived only from accurate known false positive and false negative rates for each test...We are a long way from there on any test-"

"Photoscreening...There is no 100% sure way to make sure the child is fixing directly the center of the lens of the camera".

"We must reduce if not eliminate [screening] over-referrals."

Dr. Arnold and co-worker's answers are:

"...overall sensitivity/specificity using AAPOS guidelines for the modalities to be 39%:99% for patched HOTV acuity, 77%:99% for MTI photoscreening, and 85%:98% for Gateway photoscreening." (See text for details and more info).

We commend him for the immense amount of work he has carried out on this subject.

Lam DYS, Chen TL, Kirschen DG, Laby DM. Effects of Head Tilt on Stereopsis. *Binocul Vis Strabismus Q* 2008; 23:95-104.

These researchers have worked in the sports area in the past like we have studying baseball players and ocular dominance and other factors that may effect success in such endeavors.

Mims III. Strabology Report of the 34th Annual Meeting of the American Association of Pediatric Ophthalmology and Strabismus. *Binocul Vis Strabismus Q* 2008; 23:105-119.

We missed this last AAPOS meeting in Washington, D.C. It was a great meeting as you can see from this extensive highly detailed report. **If you made a presentation there, PLEASE CONSIDER SUBMITTING IT FOR CONSIDERATION FOR PUBLICATION HERE IN *BV&SQ directly IF IT IS A POSTER THAT IS NOT MANDATORY FOR SUBMISSION TO THE JAAPOS -OR IF A FORMAL PRESENTATION, IF IT IS NOT ACCEPTED ON SUBMISSION TO THE JAAPOS.***

WE WILL CONSIDER NON-STRABOLOGY PEDIATRIC OPHTHALMOLOGY PAPERS AS WELL.

Don't miss the Abstracts or Hyde Park editorial - have a good summer - per

Binocular Vision &
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Editorial:
P. E. Romano, MD, MSOphthalmology

Second Quarter of 2007
Volume 23 (No.2):
Page 80-82

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Volume 38, 1988

TABLE OF CONTENTS

Binocular Vision & Strabismus Quarterly© A Medicial Scientific e-Periodical
Tent Photocreeening and Patched HOTV Acuity by School Nurses: Validation of the ASD-ABCD Protocol
R.W. Arnold, MD, L. Stark, RN, R. Leman R, K.K. Arnold, RN, MHA and M. Diane Armitage CO
Second Quarter of 2008 Volume 23 (No2): Pages 83-94

Original Scientific Article

Tent Photoscreening and Patched HOTV Visual Acuity by School Nurses: Validation of the ASD-ABCD Protocol

(Anchorage School District - Alaska Blind Child Discovery *program*)

Robert W. Arnold, M.D[1], Lee Stark, RN[2], Rachel Leman[3,4], Koni K. Arnold, RN, MHA[3], and M. Diane Armitage, CO[1]

from (1) Ophthalmic Associates, (2) Anchorage School District, (3) Grace Christian School, and (4) University of Alaska, School of Nursing, Anchorage, Alaska

ABSTRACT: ***Background:*** Novel objective tests of risk factors for amblyopia offer an alternative for preschool vision screening. We compared the merits of photoscreening versus portable patched acuity testing in elementary schools. Photoscreening may outperform routine acuity testing in pediatric offices; however, both have fairly good validity when performed by specialists in preschool vision screening.

Methods: School nurses performed patched HOTV surround acuity testing and two types of photoscreening (MTI and Gateway DV-S20) in a portable tent near each classroom.

Results: 1700 children (696 1st grade, 710 Kindergarteners, and 271 special-needs pre-Kindergarten). 14% had comprehensive exams and another 65% had normal photoscreens combined with patched acuities of 20/20 or better OU. We estimate the overall sensitivity/specificity using AAPOS guidelines for the modalities to be 39%:99% for patched HOTV acuity, 77%:99% for MTI photoscreening, and 85%:98% for Gateway photoscreening. The specificity of acuity testing was particularly low in pre-K due to 33% unable to complete the test, but about 80% of initial acuity failures were able to pass with pinhole.

Conclusion: Tent photoscreening in younger elementary school children was more sensitive and faster than patched acuity particularly in developmentally delayed pre-K children.

Received for consideration November 2, 2007; accepted for publication January 18, 2008.

Financial Disclosure: None of the authors receive any direct compensation from the included vision screen marketers or their competitors. Dr. Arnold coordinates the Alaska Blind Child Discovery program that has received discount vision screening technology from MTI, EyeDx, iScreen, JVC, Gateway, Welch Allyn, the Amblyopia Foundation of America and Eye Care and Cure. Dr. Arnold is an investigator and protocol developer for the Pediatric Eye Disease Investigator Group.

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Second Quarter of 2008 Volume 23 (No2): Pages 83-94

INTRODUCTION

Preschool vision screening now has favor of evidence-based medicine[1].

Vision screening, seeking to detect treatable amblyopia, satisfies most of the World Health Organization criteria for screening[2] particularly when applied to preschoolers in developed countries with strong amblyopia treatment emphasis[3-5]. The Vision In Preschoolers (VIP) Studies recently demonstrated different sensitivities for a predefined 90% specificity for various objective and subjective screening tests in neurologically normal preschoolers[6,7]. The Amblyopia Treatment Studies by the Pediatric Eye Disease Investigator Group (PEDIG) has consistently used threshold surround HOTV logMAR optotypes and adherent patching of the non-tested eye; this precludes subject "peeking" even when tested by experienced pediatric eye doctors or orthoptists[8,9]. Objective photoscreening outperforms conventional visual acuity testing in preschool vision testing by pediatric nurses[10]. It is difficult to obtain a high community penetrance with a large-scale preschool vision screening program[11, 12]. We obtained a high specificity using the MTI photoscreener and experienced photographers[13] and then adapted inexpensive digital flash cameras for photocreening[14, 15].

In recent local studies with photo-screening school-aged children, large numbers of occult amblyopes were detected[11,16]. We therefore trained school nurses to perform vision screening in school according to the ASD-ABCD protocol. In this study the results are compared against two standards, which we term "gold" and "silver" standards, to determine the validity of the screening protocol.

METHODS

The vision screening protocol of the Alaska Blind Child Discovery program had initial institutional review 1996 by Providence Hospital. It was adapted for public school use and received approval from the Institution Review authorities for the Anchorage School District

A screening protocol was devised and thoroughly reviewed with interested administrators and elementary school nurses representing the 62 public elementary schools in Anchorage and the Grace Christian School.

Visual acuity was tested using a slightly modified surround logMAR HOTV 10-foot flip-card book designed by Wendy Marsh-Tootle (Cat # 2021; Precision Vision, LaSalle, Ill). Students were seated next to the tent described below, and held the HOTV matching card separated by a ten-foot nylon cord from the HOTV flip book held by the nurse. To enhance acceptance by young children, we pre-printed child-friendly occlusion patches. Preschoolers had to achieve at least 20/40 acuity and an inter-eye difference of two or less lines. Kindergarten and first graders had to achieve 20/32 and an inter-eye difference of two or less lines. If children were unable to pass, they were offered the option to view the chart through an array of pinholes on their matching card, or to try to read a custom near-card of surround HOTV letters scaled to ten inches (**Figure 1, right, next page**). We categorized these as "fail acuity" but "pinhole or near pass." Visual acuity testing preceded photoscreening and was performed just outside the tent.

One of the greatest challenges to achieving low false positives from photoscreening is to have pupils dilated and the child fixing directly on the camera without the distraction of looking at classmates or the face of the nurse. Therefore, photoscreening was done with two different cameras in a specially designed, portable tent erected a short distance from the classroom being tested. The tents were of opaque, heavy cotton cloth covering PVC pipe frames with dimensions 183 cm long, by 76 cm wide by 130 cm high. (**Figure 2, right, next page**).

The first photoscreen was taken with a previously calibrated[14], miniature digital flash video/still camera called the Gateway DV-S20 (Gateway computer company). Students were

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Tent Photocreeening and Patched HOTV Acuity by School Nurses: Validation of the ASD-ABCD Protocol
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Second Quarter of 2008 Volume 23 (No2): Pages 83-94

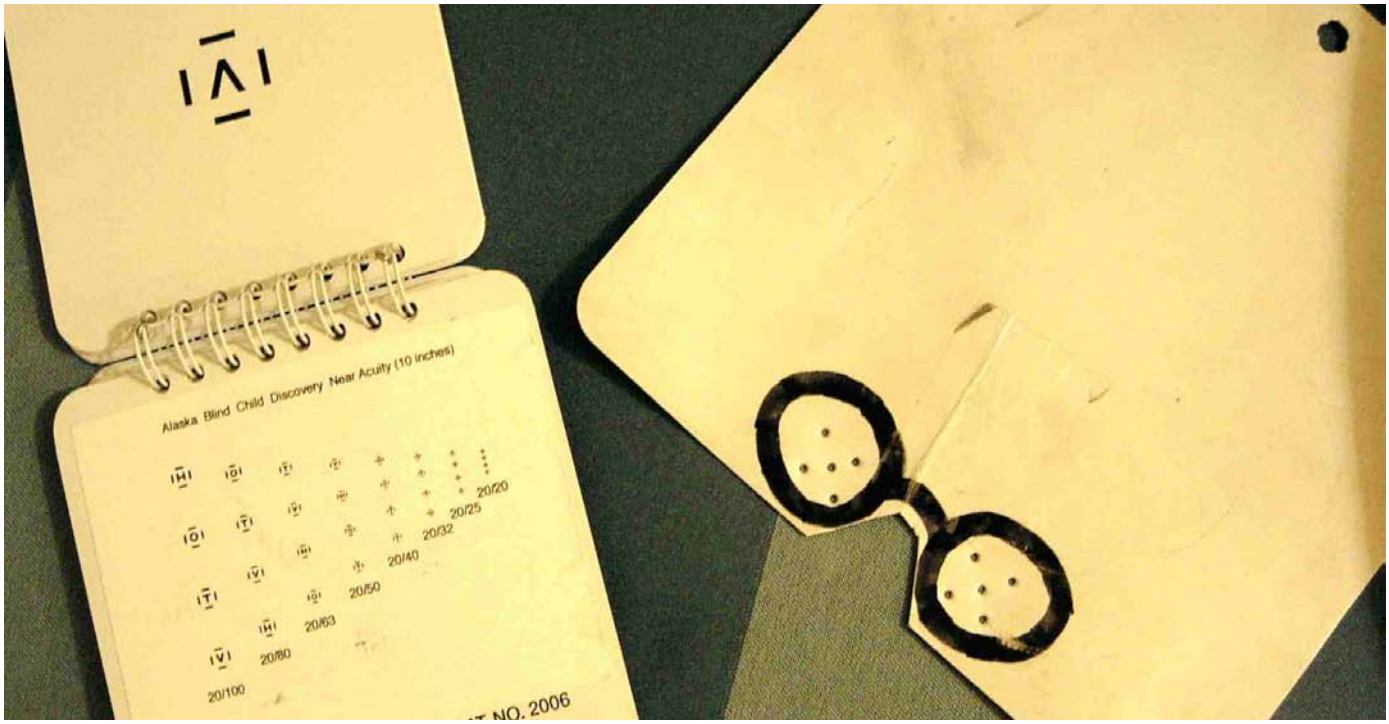

Figure 1 *(Arnold et al): Modified Surround (four bars) HOTV near vusual acuity card (Cat # 2021; Precision Vision, LaSalle, Ill.): "V" when folded down; with Matching card spectacles with multiple pinholes. HOTV near card scaled to ten inches.*

Figure 2 *(Arnold et al): Special screening tent made of opaque cloth over a PVC pipe frame (6 ft L x 2.5 ft W x 4.5 ft H) for photoscreening in school. Patched student holds HOTV matching card separated from the surround HOTV flip cards with a ten-foot nylon cord. MTI photoscreener rests on traveling case.*

uniquely identified with a large adhesive patch on their upper torso to be included in the photoscreen images. This camera had a fixed flash intensity and "focus" and was taken from a distance 1.6 m from the students face. At least one image was taken with the camera oriented vertically and then the camera was rotated LCD screen down, for a subsequent image similar to the automated sequential orthogonal images of MTI intended to detect astigmatism. Then a retrofit MTI camera was used to take one or more sequential, orthogonal flash photoscreen images. The intensity of the MTI camera flash exceeded that of the Gateway DV-S20. The luminance of the tent was controlled with the back flap to allow minimum localization of the student. Both the Gateway and MTI cameras operate on batteries, however an A/C adapter was used to decrease flash cycle time. Two centralized 2 hour teaching sessions trained the nurses in advance of screening their schools, and two mentor nurses (KKA and LS) traveled to each school to apprentice and assist in the screening process.

Parents or guardians consented to this additional screening effort. On each ABCD consent form, additional information was gleaned including whether previous eye exam had been done and by whom,[11]. The questionnaire health data was not included in determining "pass" or "refer," however notes were included if a parent noted a warning sign (i.e misalignment or white pupil) or other symptom of serious eye disease.

The digital and Polaroid photoscreen images were physician-interpreted at the ABCD Coordinating Center with results conveyed to the school nurses and mailed directly to parents. Referral was identified for photoscreens whose light crescent was within 1 mm of the center of the pupil ("Delta-center crescent;" a simplified interpretation criteria that resembles the pupil-size protocol at Vanderbilt University[15]) or students with photographic evidence of manifest strabismus, blepharoptosis or anisocoria.

For those students' consent/data forms with written evidence of prior eye exam or spectacle use, school nurses contacted eye doctors for information on comprehensive (with or without cycloplegia) eye examinations for pass or refer interpretations. ABCD differentiates between "comprehensive" and "confirmatory" exams; both include assessment of monocular visual acuity, binocular alignment, media clarity, cycloplegic refractive error and retina. However the "confirmatory exam" indication was a high risk sign or symptom referral and the doctor allocates more time and effort. Students for whom either the patched acuity, or the Gateway photoscreen, or the MTI photoscreen were interpreted as "not normal" were urged to have a confirmatory eye examination with cycloplegic refraction from their nearest convenient eye doctor and to send results from that examination back to the ABCD coordinating center, or to the school nurse.

For validation, two different outcome standards were utilized since this screening did not require all non-refer students to also obtain a confirmatory exam. Our "gold standard" exam positive and negative was for those children who had confirmatory exams. We devised a second standard ("silver standard") by adding all those children with patched acuities of 20/25 or better in each eye and normal photoscreens, both cameras, added to the negative confirmatory exam column. We also evaluated those children treated with spectacles who, presumably as a result of their treatment, were able to pass the acuity testing, but demonstrated referral red-reflex images without their spectacles during photoscreening. The gold-standard exam criteria for positive or negative were determined from the published recommendations of the AAPOS Vision Screening Committee[17]. An additional validation criteria, the ABCD statistic (i.e. ABCD specificity) includes un-screenable, or un-interpretable screenings in the denominator[13].

RESULTS

During 4 months of the spring semester of 2004, 1700 Anchorage elementary school children from 20 schools were vision screened by

Binocular Vision & Strabismus Quarterly© A Medicial Scientific e-Periodical
Tent Photocreeening and Patched HOTV Acuity by School Nurses: Validation of the ASD-ABCD Protocol
R.W. Arnold, MD, L. Stark, RN, R. Leman R, K.K. Arnold, RN, MHA and M. Diane Armitage CO
Second Quarter of 2008 Volume 23 (No2): Pages 83-94

22 nurses after their parents consented. This included 696 first graders, 710 Kindergarteners, and 271 pre-Kindergarten (some of which were enrolled for physical or developmental challenges). Summary data are given in **TABLE I**, right.

By the end of summer 2004, we had confirmatory "gold standard" exam results on 234 (14%) of these 1700 children. Of these 234, only 119 passed each screening test. Validation data for all three by grade level is displayed in **TABLE II:**

TABLE I : RESULTS: Tent Photoscreening & HOTV VA by ASD-ABCD protocol, of 696 Children, Raw Data

	Incomplete	Positive	Normal	Total
Acuity	117	139	1444	1700
pre-K HOTV	90	31	149	270
K HOTV	18	43	649	710
F HOTV	8	45	643	696
Gateway	20	236	1444	1700
preK Gateway	6	57	207	270
K Gateway	10	101	618	729
F Gateway	4	76	616	696
MTI	39	185	1476	1700
preK MTI	11	44	216	271
K MTI	11	73	645	729
F MTI	16	66	614	696

Raw data breakdown by class (F = first grade, K = Kindergarten and pre-K = preschool) and referral classification Anchorage School children screened with 10-foot, patched surround HOTV acuity card (HOTV), Gateway DV-S20 digital flash camera and MTI photoscreener. Almost all of the **"incomplete" are due to untestable acuities, while ~30% of incomplete photoscreens were not testable and the remainder "inconclusive" due to small pupils or film problems**.

TABLE II : RESULTS: GOLD STANDARD: Tent Photoscreening & HOTV VA by ASD-ABCD protocol, of 234 Children, validated by Gold exam

HOTV	sensitivity	specificity	ABCD sensit	ABCD spec	PPV	NPV	prescreen Prob	ABCD prescreen
P	59%	78%	23%	31%	71%	67%	49%	56%
K	41%	93%	35%	84%	80%	71%	39%	42%
F	36%	96%	32%	92%	73%	82%	24%	26%
total	44%	92%	29%	73%	75%	76%	34%	39%

MTI	sensitivity	specificity	ABCD sensit	ABCD spec	PPV	NPV	prescreen Prob	ABCD prescreen
P	75%	100%	69%	90%	100%	77%	54%	56%
K	76%	93%	76%	93%	89%	84%	42%	42%
F	91%	94%	84%	91%	84%	97%	25%	26%
total	80%	95%	75%	92%	91%	88%	38%	39%

Gateway	sensitivity	specificity	ABCD sensit	ABCD spec	PPV	NPV	prescreen Prob	ABCD prescreen
P	69%	96%	69%	96%	96%	70%	56%	56%
K	81%	80%	79%	79%	74%	86%	41%	42%
F	96%	96%	92%	94%	88%	98%	26%	26%
total	80%	91%	78%	90%	85%	88%	39%	39%

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Second Quarter of 2008 Volume 23 (No2): Pages 83-94

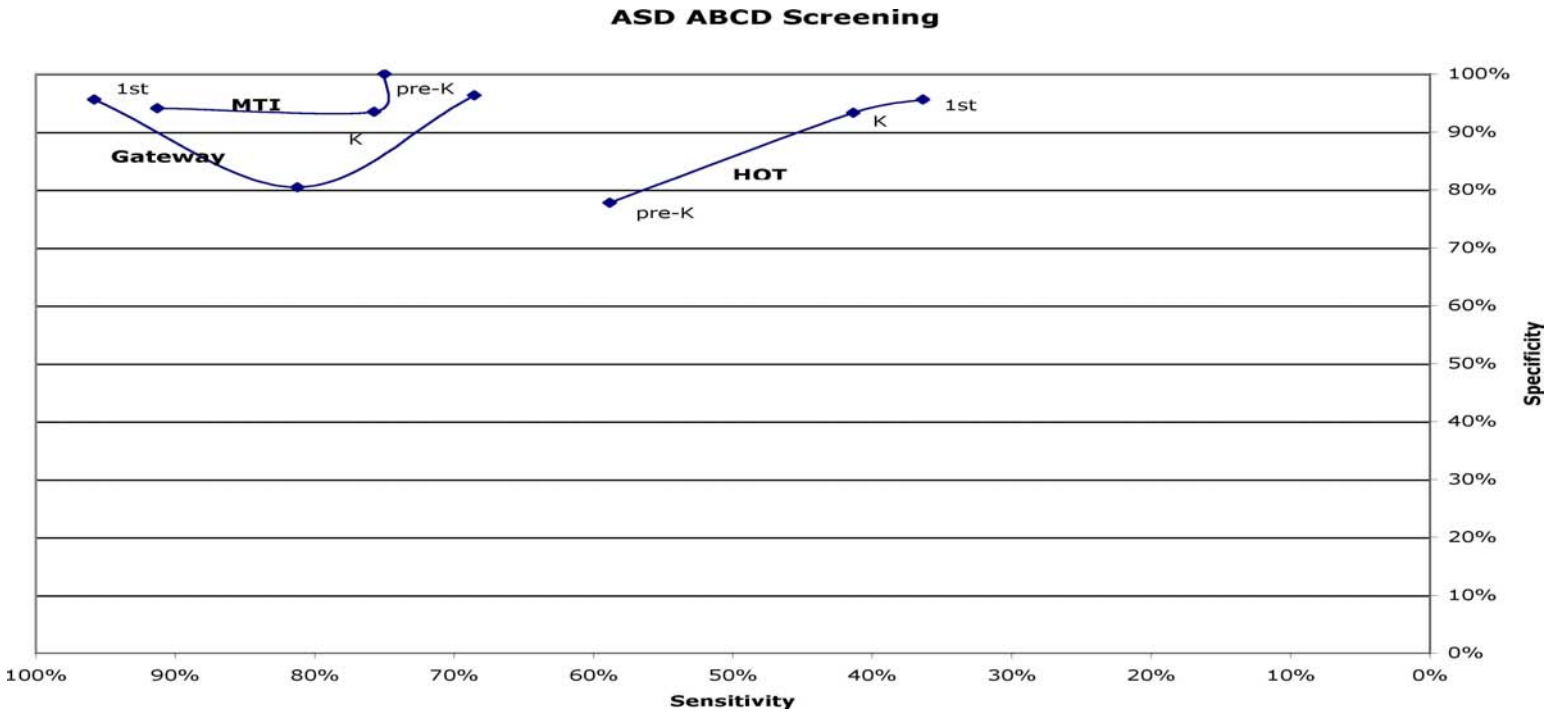
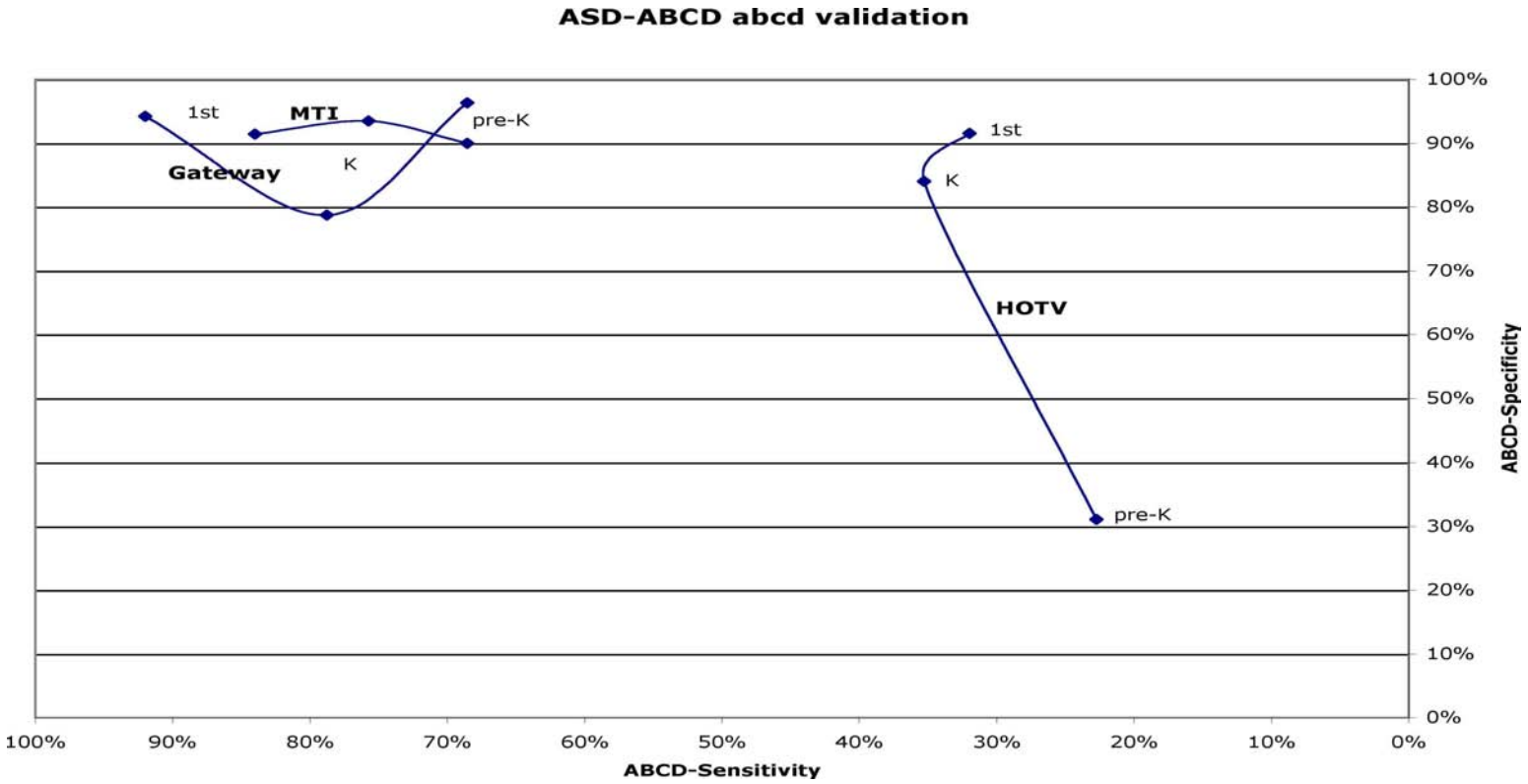


Figure 3:ABOVE (Arnold et al) Validation (TEST SENSITIVITY VS SPECIFICITY) separated by grade level for surround HOTV visual acuity testing, MTI and Gateway DV-S20 photoscreening. ***GOLD STANDARD EXAMS, n=234.*** *See also bold text next page ->*

Figure 4:BELOW (Arnold et al) IDEM Figure 3 above,MODIFIED to favor tests with low rates of "incomplete" or "inconclusive" results. See also emboldened text NEXT page.



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Second Quarter of 2008 Volume 23 (No2): Pages 83-94

Using this portion all the children screened, the ABCD prescreen **probability of eye disease was 39% (56% of pre-K). The positive predictive value was 79% for patched HOTV, 83% for Gateway and 91% for MTI photoscreening. The overall sensitivity and specificity were 44% and 92% for patched HOTV acuity, 80% and 95% for MTI photoscreening, and 80% and 91% for Gateway photoscreening** (see Figure 3 on prior <--facing page) Figure 4, bottom of prior facing page is the same as Figure 3 however the ABCD sensitivity and specificity are plotted giving advantage to any screening test with a low "incomplete" ior "inconclusive" interpretation rate.

We then combined the 234 known comprehensive exams with all children capable of resolving 10-foot, patched surround HOTV acuity 20/25 or better with normal Gateway and MTI photoscreens to arrive at a "silver standard" exam total of 1340 students (79%), see **Table 3, below**. Using this enhanced portion of all the children screened, the ABCD prescreen probability of eye disease was reduced to 9% (30% of pre-K). The overall sensitivity and specificity were 39% and 99% for patched HOTV acuity, 77% and 99% for MTI photoscreening, and 85% and 98% for Gateway photoscreening without and with the ABCD statistics (see **Figure 5 and 6, next two pages** –>)

TABLE III : RESULTS: SILVER STANDARD: Tent Photoscreening & HOTV VA by ASD-ABCD protocol, of 234 Children, validated by Gold exam PLUS 1106 Children with ≥20/25 patched HOTV VA and both photoscreening tests Normal, n=1340.

HOTV	sensitivity	specificity	ABCD sensi	ABCD spec	PPV	NPV	prescreen Prob	ABCD prescreen
P	53%	95%	19%	68%	69%	90%	18%	30%
K	41%	100%	35%	98%	89%	96%	7%	7%
F	29%	99%	26%	99%	75%	96%	5%	6%
total	39%	99%	27%	96%	79%	96%	7%	9%

MTI	sensitivity	specificity	ABCD sensi	ABCD spec	PPV	NPV	prescreen Prob	ABCD prescreen
P	82%	100%	74%	96%	100%	93%	28%	30%
K	73%	99%	73%	99%	89%	98%	7%	7%
F	76%	99%	66%	98%	83%	99%	5%	6%
total	77%	99%	71%	99%	91%	98%	8%	9%

Gateway	sensitivity	specificity	ABCD sensi	ABCD spec	PPV	NPV	prescreen Prob	ABCD prescreen
P	78%	97%	76%	95%	90%	91%	29%	30%
K	84%	98%	77%	97%	75%	99%	7%	7%
F	94%	99%	89%	99%	86%	100%	6%	6%
total	85%	98%	80%	98%	83%	99%	8%	9%

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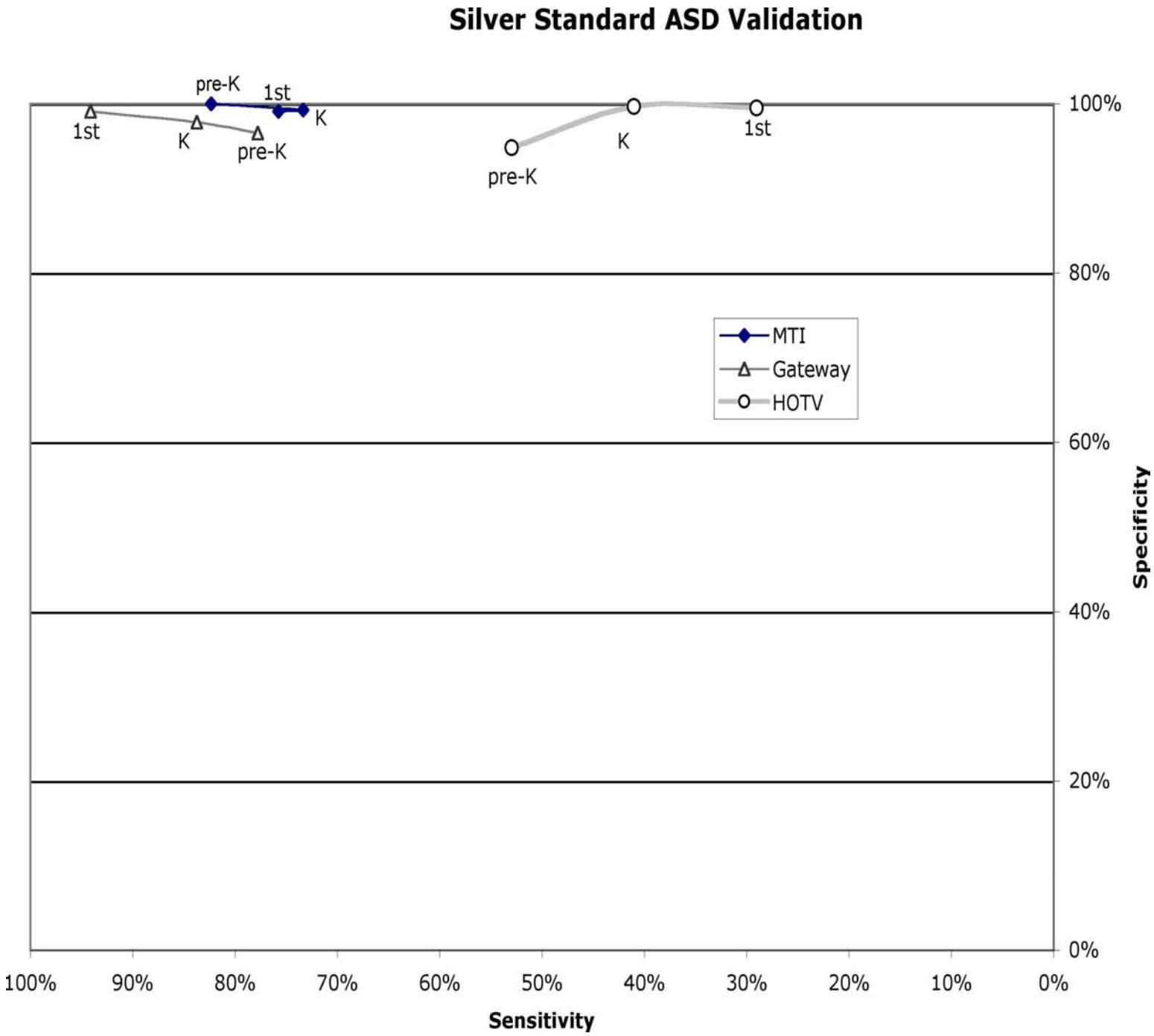

Figure 5: (Arnold et al) Silver Standard Validation of 1340 of the 1700 students by adding to the 234 Gold standard confirmatory exams all those students who had 20/25 patched acuity or better in each eye plus both photoscreening tests also normal.

. The average time to test with HOTV was 143±58 sec (SD), the time to test with MTI was 82± 27 seconds while the time to test with Gateway DV-S20 was 41 ±10 seconds. The estimated direct cost to screen with patched HOTV was 12 cents (includes patch), for MTI was $3.75 and for Gateway was 11 cents. We did not account for personnel time, additional time moving to and from the classroom (though the tent was much closer than the nurses office), nor

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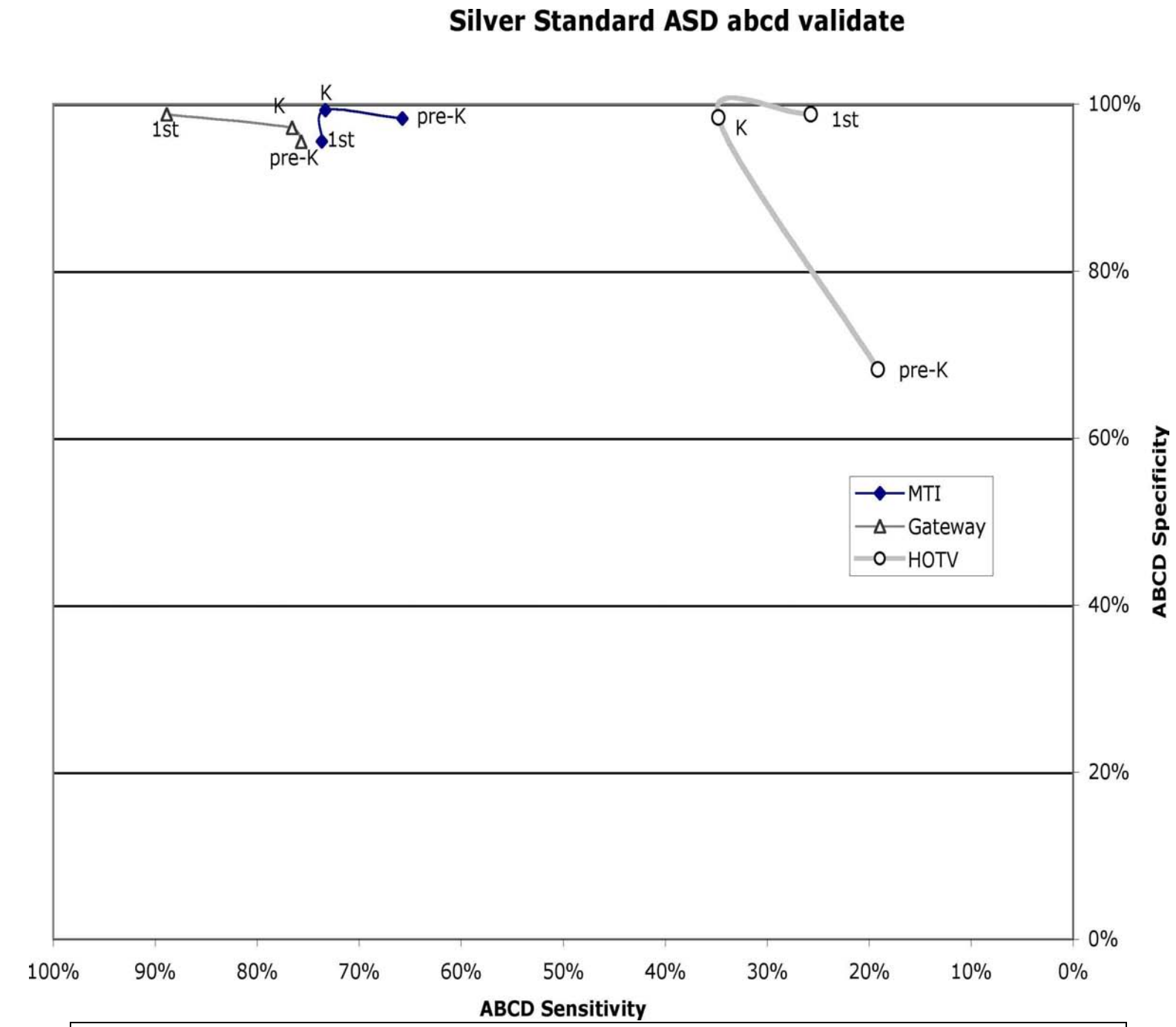

Figure 6: (Arnold et al) Silver Standard Validation using modified ABCD criteria favoring screening modalities with low rates of inconclusive interpretations. N=1340.

did we account for record keeping and parental notification time because these remain a part of prior conventional screening and the ASD-ABCD protocol.

The breakdown of refer photoscreen impressions was 29% hyperopia, 28% astigmatism, 16% myopia, 15% anisometropia, 4% strabismus and the remaining 8% blepharoptosis, cataract and "Brückner" anomaly. Ten developmentally delayed pre-K sttudents were untestable and objected to the patch. The pinhole modification of the HOTV matching card was not universally employed by nurses for acuity refers, however 41 passed with pinhole (GSE 5

true threshold astigmatism and 3 false) and 10 did not improve with pinhole (GSE true); this improved positive predictive value 6%. In no case did near acuity add to pinhole interpretation.

CONCLUSION

One clear advantage of school screening is the chance to increase community penetrance of screening during the amblyopia-sensitive period, potentially with a legal mandate. Despite published guidelines that all children receive the AAP serial battery of objective and eventually subjective screening during pediatric exams[18] or the American Optometric Association recommended battery of 5 comprehensive eye exams, many American children are not thus screened[19,20]. Even statewide charitable preschool efforts fail to achieve levels of community penetrance[21]. In addition, the pediatric nurse routine 4-year-old visual acuity testing without occlusion of the non-tested eye may miss some cases of treatable eye disease[22]. Compared to other lay persons, school nurses are specifically trained to screen children. About 5% of school nurses time is devoted to health screening[23].

The ideal validation test of a screening test for a relatively uncommon disease like amblyopia is very time and labor intensive and costly because it required confirmatory exams an a large number of screened individuals from a non-disease-enhanced cohort[24]. A less complete validation for actual community screening can report positive predictive value (PPV) which is the portion of referred individuals who meet the pre-defined confirmatory exam criteria[17]. Photoscreening with centralized interpretation has higher positive predictive value (PPV) than pediatrician-office acuity testing[10] and has somewhat better PPV than the manufacturer's referral criteria on the Welch-Allyn Suresight. Compared to the first phase of VIPS[6], with a disease-augmented cohort of 2588 preschool children "screened" by licensed eye professionals (experienced pediatric optometrists), our school-aged study may demonstrates better validation of photoscreening but fairly similar validation on the acuity testing. Our self-funded effort lacked the NIH-funded universal comprehensive exam criteria of VIPS. Unfortunately the criteria by which VIPS identified "true" positives differs from the previously published AAPOS standards[17] making direct comparisons between our conclusions less reliable. There are certain ocular conditions that qualify as "True" by AAPOS standards[17] that would be easily missed by an acuity test, or a photoscreen such as a compensated intermittent exotropia or a high hyperopia with sufficient accommodation[25]. On the other hand, young patients with insufficient accommodation and moderate hyperopia may yield photoscreens with interpretation of "refer"[26]. We were impressed with the VIPS reported performance of the remote autorefractor Welch-Allyn SureSight and will continue to compare it with simple photoscreeners[15]. The ability to interpret onsite of the Suresight (with VIPS retrospectively altered referral criteria) and acuity testing offer school nursing advantages over methods of photoscreening that require centralized interpretation[11,12,27,28]

We had limited number of children with comprehensive exams prior to the school screening, and these overemphasized children with otherwise recognizable pathology (overt strabismus) or who had been detected by prior screening efforts. Some of the children had received normal exams during a routine trip to the family eye doctor. Of the children detected by our screening effort, some had occult refractive amblyopia, entered the Amblyopia Treatment Study[29], and have already been effectively treated. In addition to the gold standard confirmatory exams, we analyzed validation with our "silver standard" exam that also included all those children whose school acuity was 20/25 or better, and for whom both photoscreens were interpreted as normal. We are confident our "silver standard" did not include patients with significant amblyopia, but this group could have included students with above AAPOS threshold levels of hyperopia, astigmatism and/or intermittent strabismus.

Again, this study was limited since it lacked confirmatory exam on all screened children, the "silver standard" only approximates true complete validation, and only one physician performed the photoscreen interpretations not completely blinded to other history information about the student. However, we feel that acuity testing with AAP referrals levels with Surround HOTV flip cards appears moderately valid for testing children Kindergarten level and older, but may be supplanted by an objective test like photoscreening particularly in younger children in a school environment. The addition of pinhole retesting for those children[30] who failed the patched HOTV acuity reduced false positives and would have only missed some cases of myopia and astigmatism. We are in accord with AAP guidelines to assure monocular testing[18], the adhesive patches were well tolerated by almost all of the students. Fixation and pupil dilation with the photoscreeners was probably enhanced by the tent.

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Second Quarter of 2008 Volume 23 (No.2): Pages 95-104

Original Scientific Article

Effects of Head Tilt on Stereopsis

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ABSTRACT: ***Purpose:*** Depth perception is an important part of many everyday tasks such as driving, catching a ball, and threading a needle. Binocular cues such as horizontal retinal image disparity (HRID) are significant cues to depth and play an important role in overall depth perception. Stereoscopic threshold (stereoacuity) is directly proportional to the interpupillary distance (IPD). Therefore, decreasing the IPD would predictably decrease stereoacuity. Tilting the head toward one shoulder or the other will decrease the horizontal separation between the eyes thereby decreasing the IPD. This results in a decrease in stereoacuity. Although this has been demonstrated mathematically it has yet to be shown to have clinical significance.

Methods: All subjects had normal vision, eye alignment, and ocular health. Stereoacuity was evaluated using the BVAT distance stereoacuity test with subject's head upright as well as when tilted to the right and left at 10, 20 and 30 degrees. A digital photograph verified the head tilt and IPD. The median stereoacuity for each head position was analyzed using the Friedman Test and pair-wise comparisons were made between different head positions using the Paired T-Test.

Results: 77.2% (44/57) of subjects exhibited a decrease in stereoacuity of at least 15 arc-sec with head tilt. The median change in stereoacuity from the upright was 22.5 to 45 arc-sec for the 6 head tilt positions ($P < 0.001$). Although statistically the decrease in stereoacuity was not linear with regard to head tilt, there was an *almost* linear correlation ($R^2 = 0.76$ for right head tilt and $R^2 = 0.74$ for left head tilt) between increasing head tilt and decreasing stereoacuity.

Conclusions: Head tilt to either the left or right creates a relative decrease in interpupillary distance with regards to the horizontal plane. This effective decrease in IPD results in a decrease in a subject's stereoacuity. Additionally, the greater the head tilt, the greater the loss of stereoacuity. This information is useful in counseling individuals, especially those engaged in activities where stereoacuity is critical to performance, to make a special effort to maintain a straight head position.

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INTRODUCTION

Depth perception is an important part of many everyday tasks. Activities such as driving, throwing a ball, and threading a needle utilize both monocular and binocular cues to perceive depth. Cues such as overlap, shading, and shadowing are monocular whereas cues utilizing horizontal retinal image disparity (HRID) are binocular. Binocular cues are possible because the eyes are laterally separated in the head. Each eye sees a slightly different view of the target of interest and this difference creates HRID. The brain then converts the HRID into a depth percept.

There are several factors that determine our sensitivity to HRID as a cue to depth. Schor and Flom (1) summarized these factors with the following formula:

$$\eta \text{ min} = \frac{-2a \quad b}{2.9\text{x}10^{-4} \text{ x } b^2}$$

In this equation, η represents HRID, 2a represents interpupillary distance or the horizontal distance between the eyes, Δb represents the linear depth interval and b represents viewing distance. Given a fixed viewing distance (b) and η being constant for a given individual, there is an inverse relationship between the horizontal distance between the eyes (2a) and the linear depth interval (Δb). Therefore, as 2a increases, Δb decreases and vice versa. Studies have shown that for a fixed viewing distance, an increase in 2a resulted in a linear decrease in Δb (2,3). Timbre and Lieu (3) demonstrated that by using a mirrored optical system, they were able to increase 2a by a factor of 3 and found b to decrease in the same proportion. It then could be hypothesized that decreasing the horizontal distance between the two eyes would result in a corresponding larger b or a decrease in stereo-sensitivity.

A decrease in the horizontal distance between the eyes could be achieved by using a mirrored optical system, but it could also be achieved physiologically by tilting the head around the anterior-posterior axis (**Figure 1**). Tilting the head around the anterior-posterior axis leads to a decrease in lateral distance between the left and right eye (**Figure 1B**). Along with the head tilt, the eyes counter roll (torsion), and vertical vergence maintains fusion of the target. Does tilting the head have any effect on our ability to use HRID as cue to depth? This is an important question in many sports, such as football, baseball (4), and hockey because depth judgments are made when the head is tilted. With regards to baseball, when a batter takes their stance at the plate, some players have a tendency to tilt their heads down to the side, while others keep their heads upright. Similarly, in football, wide receivers have their head turned at an angle while they are running to catch the ball. It would be important to know how these specific head postures, which decrease the horizontal distance between the eyes, affect stereo-sensitivity.

We hypothesize that head tilt around the anterior-posterior axis, thus reducing the horizontal distance between the eyes, will increase the linear depth interval and cause the individual to be less sensitive to HRID as a cue to depth.

MATERIALS & METHODS

Sixty-three subjects participated in this experiment. Six subjects were eliminated due to poor stereo-sensitivity, strabismus, or poor visual acuities. Subjects were between the ages of 22 and 34 years old, with best corrected visual acuity of 20/20 or better in each eye. 38 subjects wore spherical contact lenses with powers no more than +/- 9.00 DS, 7 wore glasses with a refractive error of no more than +/- 5.00-0.25x180 and 12 were emmetropic. All subjects had good binocularity, i.e. no strabismus, good ocular health and distance contour stereo-sensitivity better than or equal to 30 seconds of arc on the Binocular Video Acuity Tester (BVAT) (Mentor O & O, Inc., Norwell, Massachusetts). There was no exclusion based on gender. This research followed the tenets of

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Second Quarter of 2008
Volume 23 (No.2):
Pages 95-104

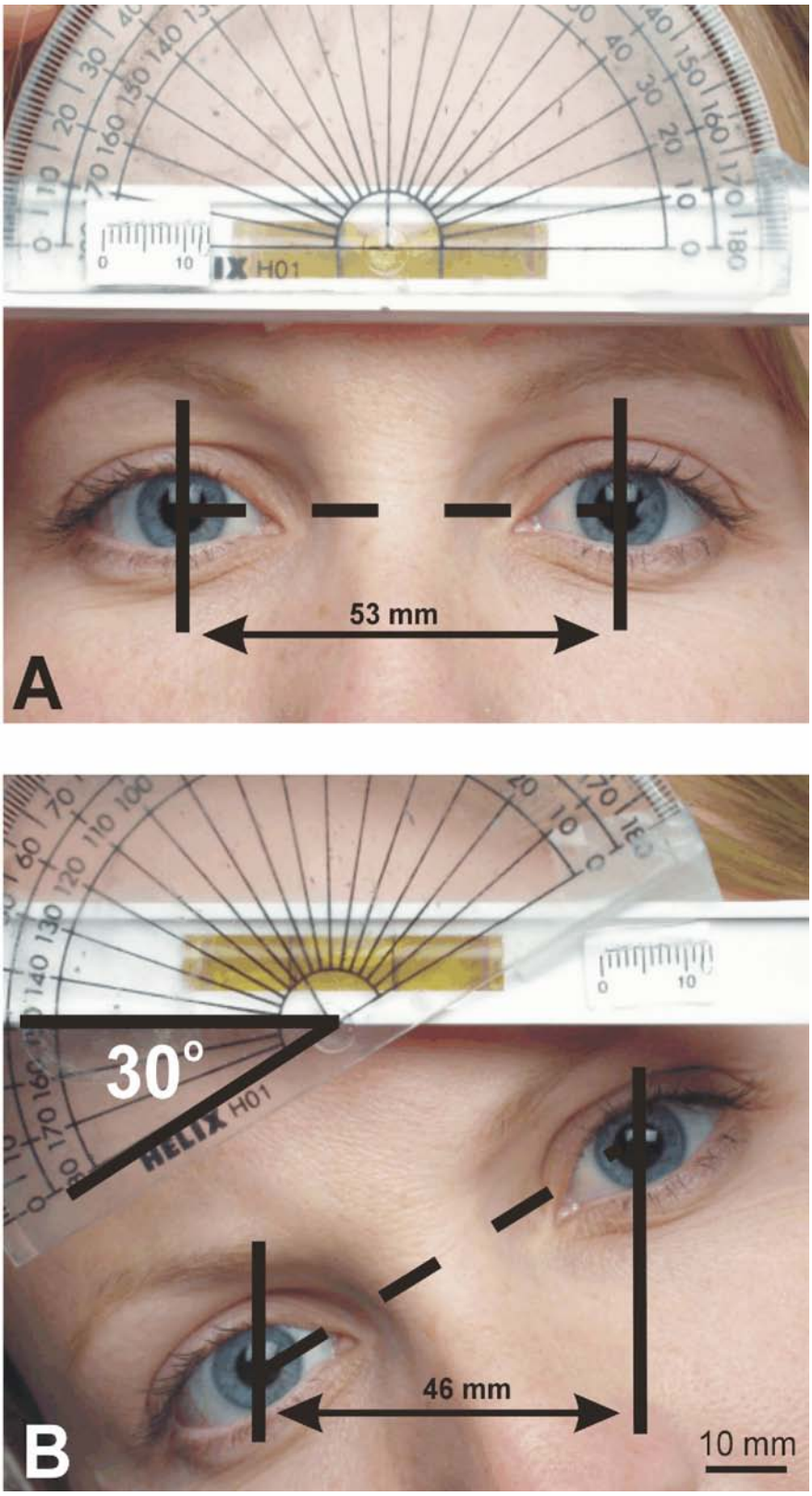

Figure 1 (Lam et al): *This figure demonstrates the horizontal distance between the eyes of subjects with their head upright and head tilted at 30 degrees to the right. The level is used as a reference line to mark the horizontal. Dashed lines demonstrate that the distance between the two eyes in both photographs (A, B) is identical. The distance between the solid vertical lines indicates the horizontal distance between the eyes.* ***A, TOP.*** *An upright head position demonstrating the horizontal distance between the two eyes to be 53mm. A protractor is centered on the level, showing zero degrees of head tilt.* ***B. BOTTOM*** *A 30 degree head tilt position demonstrating a horizontal distance between the two eyes to be 46mm. Note that the protractor is set at 30 degrees and the bottom of the protractor is parallel to the dashed lines between the subject's eyes. A vertical displacement of the eyes can also be observed.*

the Declaration of Helsinki. Informed consents were obtained from the subjects after an explanation of the nature and possible consequences of the study. This research was also approved by the Institutional Review Board at the Southern California College of Optometry.

Baseline Measurements

The subject's head was placed in a chin rest, with their forehead against a forehead rest. A level was mounted in front of the forehead rest to ensure that the eyes and head were parallel to the horizontal (**Figure 1**). Baseline measurements of the horizontal distance between the eyes and head

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Effects of Head Tilt on Stereopsis D.Y.S. Lam, OD, T.L. Cheng, OD, D.G. Kirschen, OD, PhD, D.M. Laby, MD
Second Quarter of 2008 Volume 23 (No.2): Pages 95-104

position were taken with their head upright using a photographic technique. A digital camera was securely mounted on a tripod and the picture display was adjusted so that the subject's eyes, forehead, and level were visible. The digital photographs taken were analyzed using Adobe Photoshop to precisely measure the horizontal distance between the eyes.

Once the head position was established, the subject's distance stereo-sensitivity was measured with their head upright using the BVAT. The computer screen was set 6 meters from the subject, who wore liquid crystal shutter goggles (LCSG) to view the target. The LCSG allowed targets to be presented to each eye independently. The LCSG shuttering mechanism allowed a rapid alternating of the right and left eye images at 60 Hz so that the subject perceived the images as continuous because the alternating frequency was above the critical flicker frequency. The BVAT targets were four circles arranged in a diamond pattern. Subjects were asked to determine which circle (the disparate image) appeared to float off the monitor. For each stereopsis level, one target was always disparate. The position of the disparate image was randomly determined by the BVAT computer system. A descending method of limits (staircase method, using two reversals as a criterion) was used to determine the stereothreshold level.

Experimental Measurements

BVAT Apparatus

With the subject's head fixed in place by the head and chin rest, their head was tilted around the AP axis at angles of 10, 20, 30 degrees to the right and then 10, 20, 30 degrees to the left (**Figure 2**). At each head tilt, the subject's stereo-sensitivity was tested with the BVAT using the same protocol as baseline measurements. Verification of degrees of head tilt was done using two methods. First, a protractor mounted onto a level was set at angles of 10˚, 20˚, and 30˚ to the right and then 10˚, 20˚, and 30˚ to the left (**Figure 2**). The bottom of the level was parallel to the horizontal and the bottom of the protractor was parallel to a line which bisects the center of the subject's pupils. The configuration of the head rest ensured that the subject's head was not shifted laterally from the computer monitor and maintained stability during the experiment. Head position was also analyzed using Adobe Photoshop to precisely measure the horizontal distance between the eyes and head tilt. Investigator's reliability in extrapolating the horizontal distance between the eyes was found to be within +/- 0.15mm.

Howard Dolman Apparatus

Although the BVAT apparatus can be used to investigate horizontal disparity with head tilt, the stimulus is an artificial method of representing disparity. The Howard Dolman, which utilizes laterally displaced rods, was used to determine if this has any applicability to real life stereo perceptions with head tilt. We modified the apparatus by adding an extra stimulus of varying orientations (a 1 inch photo) to each of the vertical rods (**Figure 3**). We then compared the stereo-sensitivity of three subjects with their heads upright and then with their heads tilted at 30^{o}.

Data Analysis

Median stereothresholds for each head position was recorded. Because the stereothreshold scale used in this study was non-linear (much like Snellen visual acuity), values were not averaged; however, the median stereothreshold for each head position was analyzed using the Friedman test. This was a non-parametric test, which tested the null hypothesis that for all degrees of head tilt, the median stereothreshold would be the same. As well, pair-wise comparison was made between the different head positions with the Paired T-Test

The interpupillary distance (IPD) varies amongst subjects. Similarly, the absolute amount of change in IPD as subjects tilt their heads also varies. Subjects with a larger upright IPD may

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Second Quarter of 2008
Volume 23 (No.2):
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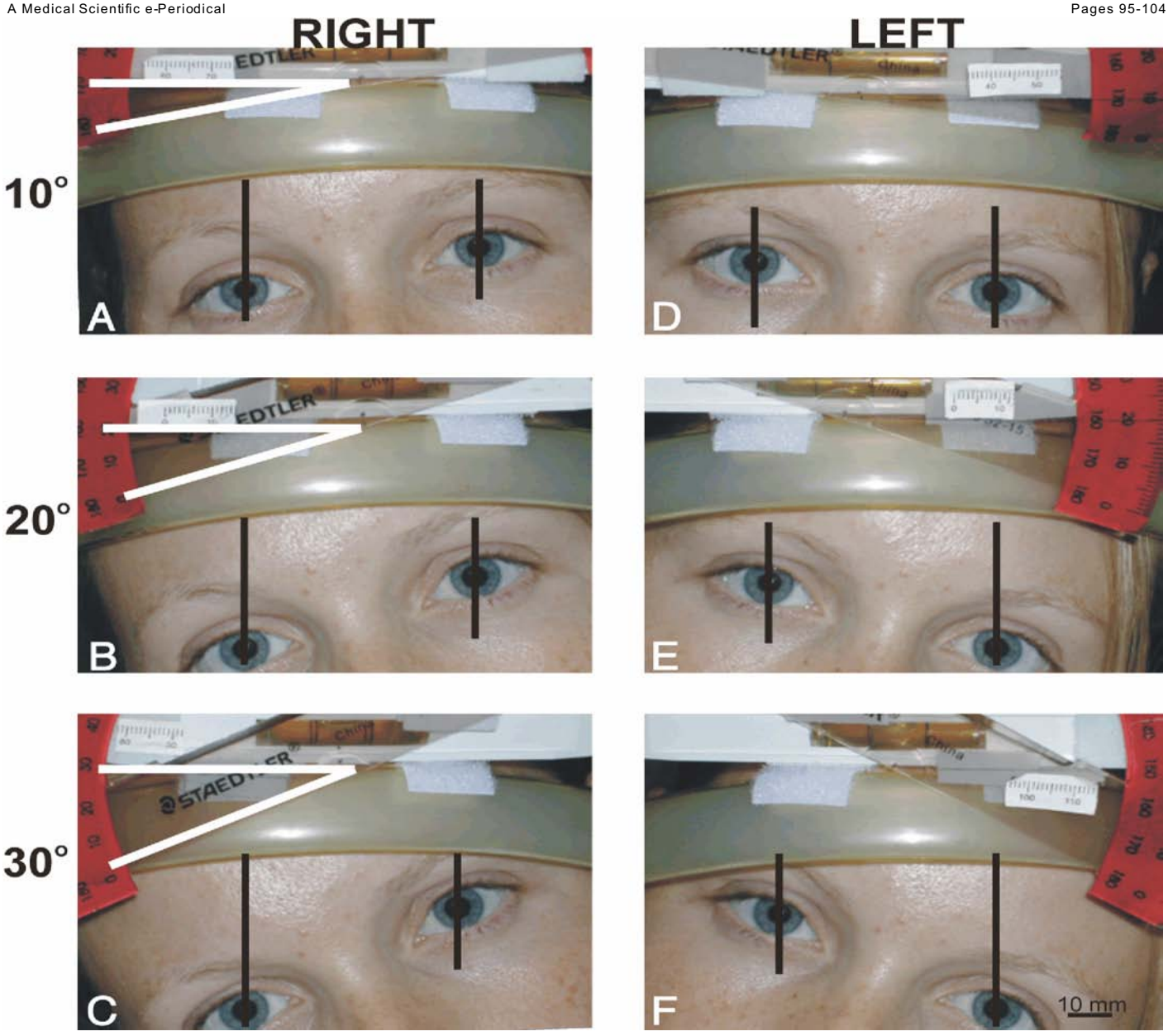

Figure 2 (Lam et al): *Head tilts to the right (A, B, C) and left (D, E, F) at 10, 20, and 30 degrees without the liquid crystal shutter goggles so that the eyes can be observed in the photo. Note that as the head tilt increases there is a decrease in the horizontal distance between the eyes.*

<---- LEFT Figure 3 (Lam et al): *Modification of Howard Dolman apparatus by adding an extra stimulus of varying orientations (a 1 inch photo of our institutional logo) to each of the movable vertical rods of the apparatus.*

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exhibit different amounts of change in IPD with head tilt as compared to subjects with a smaller upright IPD. Therefore, the percentage change in IPD as compared to upright would be a more useful tool in comparing the change in IPD from upright. The percentage change in IPD compared to upright is calculated as follows:

Percentage Change in IPD Compared to Upright =

$$\frac{(\text{IPD at upright} - \text{IPD at different head tilts})}{(\text{IPD upright})} \times 100$$

RESULTS

Change in IPD compared to upright

The physical distance between the two eyes does not change as the head is tilted about the anterior-posterior axis; however, the horizontal distance (IPD) between the two eyes is reduced (**Figure 1A, 1B** see prior pages). This horizontal change and the vertical displacement of the eyes and the IPD can be triangulated and the predicted percentage change in IPD can be calculated from a cosine function (**Figure 4**):

Predicted percentage change in IPD from upright = $(1-\cos\theta)100$

Figure 4 shows a graph of the predicted percentage change in IPD from upright (0 degrees) to 30 degrees of head tilt. Measured percentage change in IPD from upright for both the right and left head positions (10, 20, 30 degrees) in our experiment are also plotted on the same graph (**Figure 4**). The largest mean difference in measured percentage change versus predicted change was 1.5 ± 2.7 %.

Stereothreshold vs. head tilt

The results of the experiment revealed that of the 57 subjects who participated in this study, nine had no change in stereothreshold with any head tilt (15 sec of arc (maximum measurable) at all head positions), four showed some improvement in stereothreshold, and 44 subjects demonstrated a statistically significant decrease in median stereothreshold from upright to any of the six head tilt positions. No statistical difference was found in median stereothreshold between head tilts of 10°, 20° or 30°; however, both right and left eye revealed that as the percentage change in IPD from upright increased, the stereothreshold increased (**Figure 5A, 5B**).

% change in IPD compared to upright

There was a statistical difference in the percentage change in IPD between right and left head tilts at 10, 20 and 30 degrees; however, the differences of 0.64 ±1.60 % (p=0.004) at 10 degrees, 0.72 ±2.29 % (p=0.022) at 20 degrees and 1.54 ±3.26 % (p=0.001) at 30 degrees may not be *clinically* significant. Interestingly, a paired T-test of the difference in stereothreshold data between right and left head tilts at 10, at 20 and at 30 degrees are not statistically different from each other. Therefore, the left and right tilt data were combined to analyze the relationship between percentage change in IPD and stereothreshold. A regression line drawn through the mean percentage change in IPD and median stereothreshold at each head position reveals a correlation coefficient $R^2 = 0.77$ (**Figure 5C**)

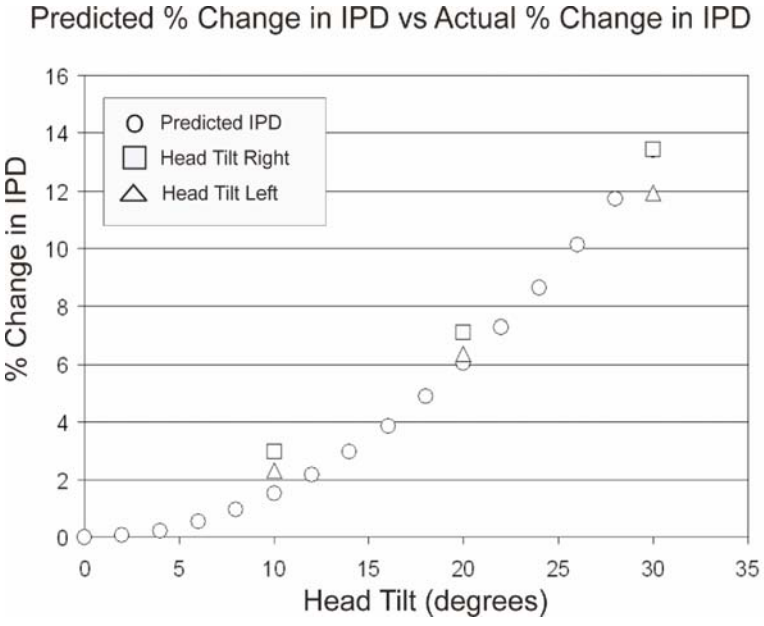

Figure 4 (Lam et al): *This graph shows the relationship between predicted percentage change in IPD, y = 1-cos ( ) versus experimental/actual values (□ right head tilt, left head tilt).*

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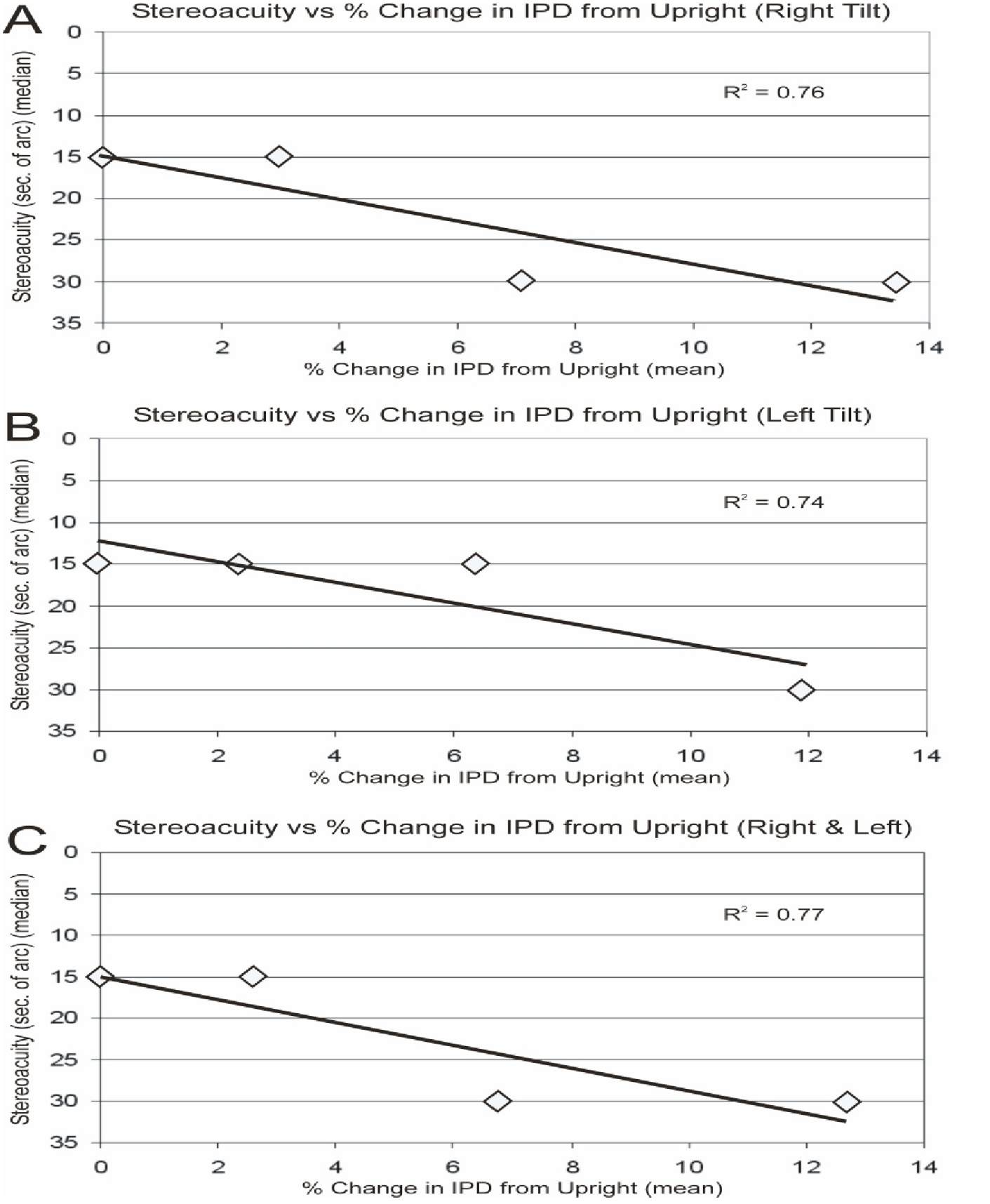

Figure 5 (Lam et al): *The graph demonstrates the relationship between head tilt and stereopsis. Note the linear correlation of the right and left eyes.*

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Table: Results: Raw Data Howard Dolman Apparatus- Stereothreshold vs Head Tilt

	Subject 1		Subject 2		Subject 3		Average
	0 tilt	30° tilt	0 tilt	30° tilt	0 tilt	30° tilt	
	14.5	2.5	9.5	23.0	-5.5	-12.0	
	12.0	9.5	11.0	27.0	-10.5	-0.5	
	14.5	10.0	10.0	28.0	-19.5	-10.5	
	11.5	13.5	8.0	19.0	-20.5	-2.0	
	9.0	5.5	18.0	17.0	-7.5	3.5	
	10.5	11.0	14.5	34.5	-16.5	-4.0	
	13.5	7.5	24.0	23.0	-11.5	2.5	
	13.5	10.0	24.5	8.5	-13.5	1.0	
	15.5	9.5	18.5	18.0	-8.0	-0.5	
	9.0	6.0	13.0	21.0	-12.0	9.0	
	12.4	8.5	15.1	21.9	-12.5	-1.4	
StDev	2.203	3.000	5.629	6.726	4.791	5.975	
Ratio		1.362		1.195		1.247	Average ratio 1.268

	Linear Depth Interval
cos (0)	37.4
cos (30°)	43.2
Expected ratio	1.1547

Howard Dolman – stereothreshold vs head tilt

Stereothreshold standard deviations of upright and 30 degree head tilt was compared. The ratios are indicated in the **Table**. The average ratio was 1.268. The predicted ratio can be calculated from the degree of head tilt and a calculated reduction in horizontal interpupillary distance (cosine function). Our predicted ratio was 1.1547. The subjects' stereothreshold increased when performing the Howard Dolman with a head tilt of 30° (**see Table**). The average ratio was not found to be statistically significant from 1.1547 (p=0149)

DISCUSSION

Based on the work by Schor and Flom (1), their equation predicted that as the interpupillary distance decrease (2a), stereothreshold should increase as measured by a larger Δb. This experiment involved components more complex than a mere reduction in IPD. Tilting the head about the anterior posterior axis led to a decrease in the lateral distance between the two eyes (**Fig 1**); however, in addition this decrease also resulted in cycloversion and vertical displacement of the two eyes. The amount of compensation for these two factors may vary amongst individuals and may explain why some individuals had no change in stereothreshold (15.8%) and some showed an improvement (7%).

Figure 4 validated our experimental design in that the percentage difference change in IPD from upright, as measured in our experiment followed the general trend of predicted values. This is what one would predict, since the percentage change in IPD from upright should not change between the right and left head tilt positions. When analyzing the relationship between the percentage change in IPD from upright and stereothreshold, the percentage change in IPD from upright increased (i.e. distance between the eyes decrease) as stereothreshold worsened. Although the relationship between the percentage change in IPD from upright and head tilt was a cosine function, (i.e. the percentage change in IPD from upright was greater with larger head tilts), when comparing the percentage change in IPD for each

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head position (10,20, 30 degrees) to stereothreshold, we found a linear trend (**Figure 5C**).

Schor and Flom (1) stated that for a fixed stereoscopic threshold angle (η) and a fixed viewing distance (b), a decrease in IPD (2a) resulted in an increase in the linear depth interval. i.e. as the IPD became smaller, stereopsis (Δb) worsened. Because vertical cues were only used in the BVAT instrument, the Howard Dolman was also incorporated to demonstrate that a stimulus of varying orientations (not just vertical) can also be used to judge stereopsis. Our modification of the Howard Dolman with additional spatial orientation cues ensured that the data were not only applicable to vertical contours (**Figure 3**). In addition, the Howard Dolman gives us a disparity stimulus in the anterior posterior plane. An increase in standard deviation was found each time a subject tilted their head (**Table**). The average ratio of change between upright (0 deg) and head tilt (30 deg) was larger than the predicted ratio (**Table**). In each case, stereopsis was reduced with an increase in head tilt compared to upright, but statistical significance could not be demonstrated because of the small sample size (n=3). The trend however does remain in both the BVAT and Howard Dolman in that stereopsis is reduced with head tilt.

Because our experimental design involved rotating the head about the anterior-posterior axis to achieve a reduction in IPD, one might argue that ocular counter roll could be a factor in increasing stereothreshold. When the head was tilted about the anterior-posterior (AP) axis a compensatory counter roll of the eyes occurred. As the head was tilted to the right (right ear towards the right shoulder), the right eye incyclorotated and the left eye excyclorotated (i.e. both will roll in a clockwise direction around the AP axis when viewing the front of the subject). Some reports have shown less than 9° compensatory counter roll for a 30° head tilt (5) and others have reported a 9.3° counter roll for a 45° head tilt (6). Schworm et al (6) evaluated the relationship between compensatory eye movements and head tilts about the AP axis and found that a head tilt of 15°, 30°, and 45° resulted in a maximum cycloversion of 3.6°, 6.4° and 7.4° respectively. Despite the fact that the ocular counter roll did not fully match the head tilt, the subjects did not perceive the world as tilted.

It had been hypothesized that the vestibular system could be sending signals to the perceptual system, letting the brain know that the head has changed position (7,8). Maxwell and Schor (9) found that an adaptive mechanism exists to compensate for changes in head tilts. Therefore, as the head tilts and the eyes counter roll, the perceptual system adapts so that the world was not perceived as tipped. This perception enabled the observer to appreciate the laterality of the two disparate images and judge stereopsis.

In addition to the compensatory ocular counter roll when the head was tilted, there was a vertical displacement of the two eyes (**Figure 1B**). It has been reported that there is a vertical ocular disparity when the head is tilted (8,10,11); however; this vertical disparity can be compensated with the vertical fusion reflex (10). Four prism diopters (2.3°) was the typical amount of vertical vergence which can be overcome by the visual system (12). Given a horizontal distance between the eyes of 63mm, a head tilt of 10°, 20° and 30° around the AP axis resulted in a vertical displacement of approximately 11, 21.5 and 31.5 mm respectively. When triangulated to a viewing distance of 6 meters, the maximum possible resultant angle was 0.3°. Although Schor and Tylor (13) reported that disparities of more than 0.25° from poor ocular alignment can result in diplopia or stereopsis degradation, if this was the case then our subjects would not have been able to respond to the stimulus at all. Also Ebenholtz and Walchli (14) found that lower stereothresholds were found with head tilt than with object/target tilts.

Vertical fixation disparity, although not measured in this experiment, may also play a part in increasing stereothresholds. Ukwade, Bedell and Harwerth, in 2003, reported that stereothresholds increased with vergence constant error and or vergence variability and the added stress of tilting one's head may cause central suppression, which in turn may allow for an increase in vertical fixation disparity. However, regardless of the resulting binocular conditions,

tilting one's head about the anterior-posterior axis results in an increase in stereothresholds. Our data showed that each subject attained some level of stereothreshold with head tilt; which allowed us to conclude that even if fixation disparity was induced, it was not large enough to cause suppression. Although the larger the FD, the worse the stereothreshold (16), it had also been shown that using prisms to correct naturally occurring fixation disparity failed to improve stereothresholds (17). Even if prisms were added to compensate for the fixation disparity, it may not impact the end result.

Regardless of these factors, the results from this study suggest that tilting one's head increases stereothresholds. Although each of these factors can be eliminated in a revised experimental protocol, such as with a mirrored system (4); such a setup creates an artificial environment. In real life situations, individuals tilt their heads while driving and playing sports. Golfers often tilt their heads when putting on the green. Automobile drivers who have their cell phones tucked between their head and shoulder have their head tilted. Wide receivers have their head tilted as they look back to catch a pass. Some baseball players may adopt a head tilt when they are batting. Although these actions are likely habitual, this study demonstrates the negative effect on an individual's depth perception resulting from the head tilt. In order to optimize stereothresholds and thus performance we suggest individuals maintain a normal upright head position while performing vision critical activities.

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Grand Hyatt, Washington D.C., 2008
James L. Mims III, MD

Second Quarter of 2008
Volume 23 (No.2):
Pages 105-119

Strabology Report of the 34th Annual Meeting of the American Association for Pediatric Ophthalmology and Strabismus

Grand Hyatt Washington
April 2 -6, 2008

Meeting Reported by: James L. Mims III, M.D.

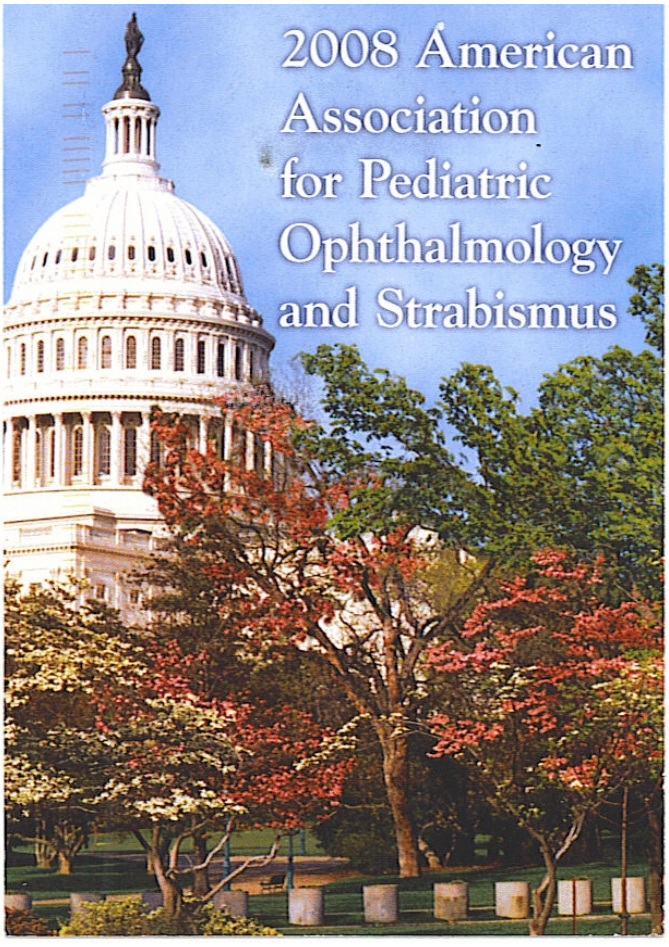
Secretary for Program: Sharon Friedman, M.D.
President: Edward G. Buckley, M.D.
Scientific Meeting Coordinator: Maria A. Schweers, CO.

Memories

Psychologists say that only 10% of an emotional response is due to what is happening at the present time; 90% is due to memories of the past that present experiences stimulate at the moment. Having attended AAPOS Annual Meetings almost every year for 30 years, the memories are incredible, and all of them good where my colleagues are concerned. What a remarkable group of amazingly special people! Patients are my reason for being, and Doctors are my heroes (especially Pediatric Ophthalmologists and Strabologists).

New Officers

The new President of AAPOS, with his term officially starting July 1, 2008, will be Bradley Black MD, taking over from the current President, Edward G. Buckley MD. (Since his term doesn't officially start until July 1, Black wanted everyone to know that until that date the 3 AM phone call should still be directed to Buckley.) The present Vice-President Elect, G. Gail Summers MD, will move up to Vice-President, and the new Vice-President Elect will be David A. Plager MD. (Note: We should be especially grateful for the success of Dr. Plager as head of the Corporate Relations Committee in increasing corporate sponsorships and exhibitors substantially!) Constance "Connie" E. West MD continues as Treasurer. (With David G. Hunter MD, she is the author of the optics cram book used by many new



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ophthalmologists sitting for the boards, **Last Minute Optics**). R. Michael Siatkowsky MD is the New Secretary for Program, taking over from the delightful Sharon F. Freedman MD. As a final parting gift to the AAPOS, Friedman brought in her husband, an incredibly dynamic speaker and non-interventional cardiologist, whose lecture, "Die Another Day – Update on Myocardial Infarction" may have saved a few lives among the membership.

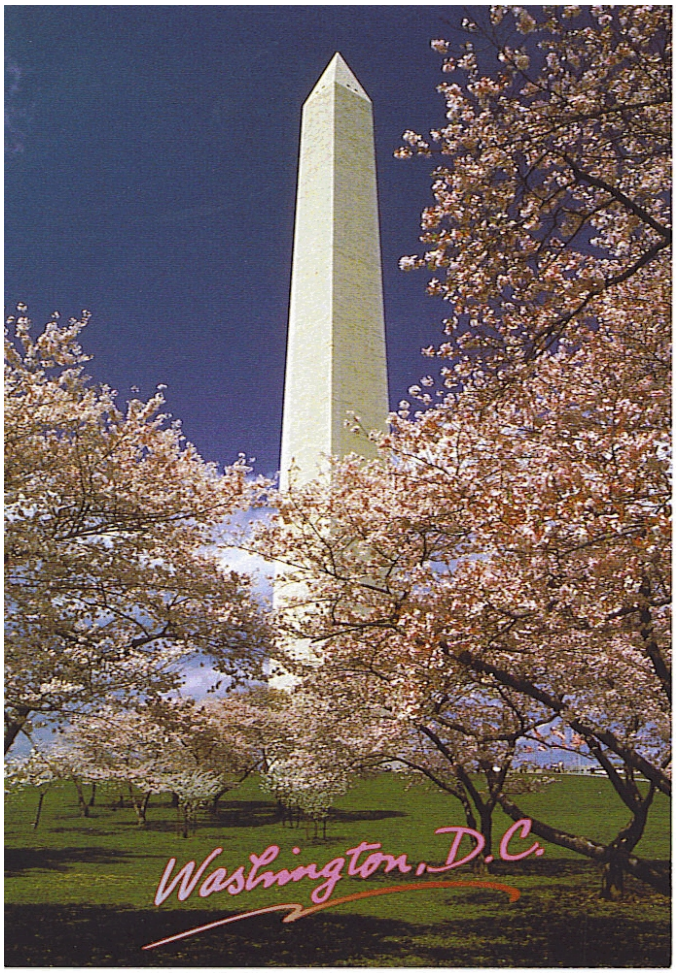
Costenbader Lecture

Not only was Edward G. Buckley MD the President of AAPOS this year, he was also the Costenbader lecturer. In an audiovisual *tour de force* that raised the bar for the rest of the meeting, Buckley presented a series of 33 eyes of 26 patients who had a sutured posterior chamber intraocular lens at Duke University Eye Center. The most important observation was that the 10-0 prolene suture was breaking in many cases at 5 years post-op. He recommended using 9-0 instead, since it is much thicker.

First Prizes: Presentations That Will Impact My Clinical Practice

There were many surgical pearls at the meeting. For this author, two were new and important.

In addition to winning a First Prize, Earl R. Crouch MD along with his son Eric R. Crouch MD and Suzanne Johnston MD, also ran off with the Most Off-the-Wall Innovative Surgical Technique Award for 2008, the poster that got everyone talking, describing 54 patients with esoDuanes with face turns who benefitted greatly from a combination of medial rectus recession of the Duane's eye and lateral transposition of the Duane's eye superior rectus. The astonishing detail is that they did not simultaneously laterally transpose the inferior rectus and did not get any hypertropias after this procedure. Before surgery, the angle of face turn was 15 to 45 degrees (mean 27.5 degrees)



and the pre-op deviation was 10 to 30 ET (mean 22.8 ET). Robert Clark MD (Joseph Demer MD's frequent co-author) told me that he thinks that they avoided inducing hypertropias because the transposed SR has a smaller vertical vector after transposition and the IR, the strongest extraocular muscle, simply overcomes the hyperdeviation tendency.

The other presentation that was the hot topic of conversation at the meeting was given as Paper #2, right after the Costenbader lecture. Paper #2 was by Steven M. Archer MD, highly respected for his statistical acumen. This was a multivariate analysis exploring the question of whether recessions of the medial rectus muscles are more effective for larger near deviations (more effect at near) and whether lateral rectus recessions are more effective for larger distance deviations (more effect at distance). Initial procedures he analyzed included 267 medial

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Pages 105-119

rectus recessions that produced an average of 9% more exoshift at near and 159 lateral rectus recessions that produced an average 34% more esoshift at distance. However, (and this is the key point), a multivariate analysis showed that the pre-operative difference between distance and near deviations is the best predictor of the distance and near response to surgery, *irrespective of which muscles are operated on.* Esotropia tends to be greater at near and exotropia tends to be greater at distance. Thus, the apparent greater effect of surgery on medial rectus muscles at near and lateral rectus muscles at distance fixation is probably an artifact of these preoperative differences. Archer concluded that deviation greater at distance or near fixation should not be the major factor in choosing between medial or lateral rectus muscle surgery.

Workshop: The Best Second Surgery for Common Forms of Pediatric Strabismus

These principles by Steve Archer MD were amply demonstrated by several sets of data presented at the workshop, "The Best Second Surgery for Common Forms of Pediatric Strabismus" A series of 36 patients presented by Mims whose second surgery for recurrent esotropia after previous bilateral medial rectus recessions was a unilateral lateral rectus resection included 6 with very small distance deviations and near deviations of up to 20 ET'. None of these had a consecutive exotropia. In the series of 36 patients, 2/36 eventually had a recurrent ET and 2 had a late consecutive XT (average follow-up 23 mos, range 2 to 153 mos, with all except 5 with at least 6 mos of follow-up). Another data set illustrating the correctness of the Steve Archer MD analysis reported in the second paper of the meeting has already been published (Mims JL. Outcome of 5 mm resection of one medial rectus extraocular muscle for recurrent exotropia. Binocular Vision & Strabismus Quarterly 2003;18(3)143-

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Pages 105-119

150.) In this study, also mentioned at the workshop, 35 children receiving bilateral lateral rectus recessions (4.5 to 8.2 mm) as the first surgery later received 5 mm resection of one medial rectus as the second surgery for recurrent 11-18 XT. At two years after the second surgery, only 4 of 35 had a recurrent XT but eventually 14/35 developed a recurrent XT with the time to failure averaging 42 months.

Eleven additional children receiving unilateral lateral rectus recessions (8-9 mm) as the first surgery later received 5 mm resection of one medial rectus as the second surgery for recurrent 12-14 XT. At two years after the second surgery, 4/10 had a recurrent XT; eventually 6/10 developed a recurrent XT with the time to failure averaging 42 mos. Also, one of these 11 had an early consecutive 20 ET, 25 ET‘. In view of the failure of resection of one MR to be an effective procedure for recurrent XT after previous recession of one LR, Mims conducted a study of the success of recessing the other lateral rectus in this context and presented it for the first time at the workshop. With N = 46, two had recurrent XT and one had consecutive ET by two years after recessing the other lateral rectus. By four years follow-up, six more had recurrent XT, a result much better (11/46 eventual failures) than the result after resection of the ipsilateral medial rectus (7/11 eventual failures).

Other presentations at this workshop included Burton Kushner MD’s advice for recurrent XT and consecutive ET after previous bilateral lateral rectus recessions or previous recess-resect. Mims also reiterated his dose-response surface for recurrent ET after previous bilateral medial rectus recessions (Mims III JL, Wood RC. A three-dimensional dose-response schedule for lateral rectus resections for residual congenital/infantile esotropia after large bilateral medial rectus recessions. Binocular Vision & Strabismus Quarterly 2000:15(1):20-28.) Mims then detailed the flow chart from a publication for a protocol for consecutive exotropia (Mims III JL, Wood RC. Outcome of surgical treatment protocol for late consecutive exotropia following bilateral medial rectus recession for esotropia. Binocular Vision & Strabismus Quarterly 2004;19(4):201-206.)

Finally, David Stager, Jr. gave a blockbuster presentation on recurrent DVD and/or Overaction of the Inferior Oblique after previous surgery for either. One new pearl for this author was to consider less anterior transposition of the IO if you have previously recessed the superior rectus muscles 10 mm with 3 mm of nasal transposition and to consider smaller SR recessions if you have already transposed the inferior obliques anteriorly.

I am grateful for the 450 Strabologist - Pediatric Ophthalmologists who showed up for this workshop and to Greg Hosman, the computer wizard who made the Powerpoint work (see Figure next page, right->)!

Heavy Eye Syndrome Extended to Elderly without High Myopia

Joseph Demer MD PhD and Tina Rutar MD extended the previous concept of esotropia and hypotropia occurring in high myopes due to the lateral rectus slipping inferiorly to a group of four strabismic "elderly" patients averaging 73 years old, 3 with hypotropia and one with esotropia, all of whom had inferior displacement of the lateral rectus due to a degeneration of the "LR-SR ligament." [Most of the time when I dissect the intermuscular septum 5 or 6 mm posterior to the insertion of the LR in anticipation of a large LR recession, I am impressed with this ligament which comes off the dorsal surface of the LR. Also, the intermuscular septum attached to the superior border of the LR is routinely more substantial than the intermuscular septum attached to the inferior border of the LR.] The authors concluded that LR-SR ligament degeneration

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Strabology Report of the 34th Annual AAPOS Meeting
Grand Hyatt, Washington D.C., 2008
James L. Mims III, MD

Second Quarter of 2008
Volume 23 (No.2):
Pages 105-119

(Mims:AAPOS Mtg Report) Some of the equipment required to make powerpoint work! (Note the Mac Laptop in the middle)

The incredible I.T. team that not only made the power point work (usually), but also the most amazing computer light show that I have ever seen for the dinner-dance. Thanks to Miriam Freedman, MD for finding this fellow! (Greg Hosman, Any Screen, Inc., greghosman@mac.com).

permits lateral rectus slippage inferiorly in "elderly" non-myopes, producing strabismus by the same mechanism as myopic "heavy eye" syndrome. [See Ohba M, Kawata H, Ohguro H, and Fukushi N. An unusual case of adult progressive esotropia caused by high myopia. Binocular Vision & Strabismus Quarterly 2008;23:31-36 if you are contemplating operating one of these.]

Christopher S Child MRCOphth, Anthony Khawaja MRCOphth; John J Sloper DPhil FRCOphth; John P Lee FRCS FRCP FRCOphth; Gill GW Aams FRCOphth reviewed the Moorfields experience with the Yokoyama procedure for this condition, in which the lateral and superior rectus muscles

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Second Quarter of 2008 Volume 23 (No.2): Pages 105-119

are sutured together 15 mm behind their insertions. All had eso-hypotropoia in the affected eye associated with high myopia (range -14 D to -19 D). Mean age at surgery was 51.9 years (range 18 to 72 years). At 2 to 4 years post-op, 12 of 17 patients (71/5) had good or satisfactory results. Four required further surgery or Botox® [This was Moorfields, after all.]

Isolated IO Palsy Does Exist - Atrophy or Hypoplasia?

Arthur Jampolsky MD has long maintained that IO palsy does not exist because the nerve to the IO penetrates the IR to reach the IO, and because similar findings would occur with isolated superior oblique overaction or skew deviation, but I have seen a case with severe appropriate head tilt and classic 3-step test in an above average Down's child. After another Pediatric Ophthalmologist had failed to ameliorate the problem with a spacer in the SO tendon, I completed the SO tenotomy and nasally transposed the SR and laterally transposed the IR. In the process of laterally transposing the IR, I had the opportunity directly to visualize the IO and found it to be severely hypoplastic, with the diameter of a spaghetti noodle. The head tilt had been present from a very early age, and presumably congenital. Noa Ela-Dalman MD, Federico G. Velez MD, Joseph L. Demer MD, and Arthur L. Rosenbaum MD measured mean cross sectional area of the affected IO at the midpoint of the IR in 8 patients (N=8) with clinical strabismus patterns of IO palsy, and found 10.2 ±1.05 square mm, significantly smaller than the value of 18.8 ±3.6 mm for controls (N=58)($p<0.00001$) . In the presentation they labeled this as atrophy, but congenital hypoplasia of the IO seems much more plausible.

In 2001 I presented a scientific poster at AAPOS describing three cases of isolated left SR palsy with head tilt and appropriate 3-step test. All three cases were in young children; MRI visualization of the SR was not possible. Since the nerve to the levator muscle penetrates the SR and these three children did not have blepharoptosis, the question arose as to whether these children actually had primary IO overaction with good fusion. They probably had hypoplasia of the SR. Both primary overaction of the IO and primary overaction of the SO are not associated with head tilts to fuse. Indeed, children with either of these primary overactions are generally poor fusers, with less stable alignment horizontally as well as vertically.

Our Fabulous Pioneers

David A. Plager MD made the Difficult Problems Strabismus Workshop even more wonderful than usual by bringing back a group of pioneers in Pediatric Ophthalmology who have "retired". Panelists for this workshop included Eugene Helveston MD, Arthur Jampolsky MD, Anthony DN Murray FRCS, William Scott MD, and Gunter von Noorden MD. (Note: William Murray MD of the Union of South Africa has only retired from being department chairman; he still has a very active private practice.)

Plager began with a classic infantile esotrope with a large, constant ET. (Of course, the PEDIG group settled the issue of when to operate; angles of 40 or larger if constant at age 5 mos and wait until age 7 or 8 mos if the angle is smaller. Eileen Birch PhD found that as long as the infantile ET was intermittent, you should wait, because it will usually spontaneously resolve (Poster #1 at the 2006 Keystone, Colorado, AAPOS meeting.)

Helveston quoted the PEDIG study, and Murray and von Noorden agreed. A second surgery was needed early, a resect LROU. At age 15 a late recurrent ET was treated with a MR re-recession and small resection of the LR. (The resection would be too much in my

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A Medical Scientific e-Periodical

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Grand Hyatt, Washington D.C., 2008
James L. Mims III, MD

Second Quarter of 2008
Volume 23 (No.2):
Pages 105-119

experience, and, sure enough,…..) At age 18 a DXT (or was it a consecutive exotropia?) and a DRHT were treated with recessions of one LR and one SR. Helveston reminded everyone that in his AOS thesis the incidence of DVD was 70 to 80% among infantile esotropes. Jampolsky said that Botox® would have been better, with no late consecutive exotropia developing later. (See: Tejedor J, Rodriguez JM. Management of nonresolving consecutive exotropia following botulinum toxin treatment of childhood esotropia. Arch Ophthalmol 2007;125:1210-1213, in which only 7 cases of consecutive exotropia developed among 2,445 esotropic children. These 2,445 included both acquired and congenital/infantile esotropia.) [Burton Kushner MD, who sat to my right said that other practitioners in Richmond had told him that the Keith McNeer MD cases were all still esotropic, which is why McNeer told me that only 1/36 developed consecutive XT. Maybe - but if Botox® didn't cure infantile ET, then why would the Spaniards use it in 2,445 cases? The truth is probably this: Once surgery has been successfully performed for infantile ET, the position at rest (while sleeping or under a general anesthetic) is more exotropic than normal, and for the "cured" infantile esotrope to have straight eyes while awake, the MR must still retain some degree of the hyperinnervation that it had when the child was esotropic. At the typical ages that late consecutive exotropia occurs (preadolescence and adolescence), the tone of the medial rectus decreases to normal in some infantile esotropes, but the contracture of the LR continues – even in those cases who have not received prior LR resection – due the abnormally exotropic position of the eyes when the patient is asleep. This abnormal contracture of the lateral rectus muscles then produces the consecutive exotropia. See Poster #1 at last year's' AAPOS meeting.]

In contrast, among infantile esotropes straightened with botulinum, the position of the eyes while sleeping or under a general anesthetic would be normal, and not abnormally exotropic. Thus, the lateral rectus muscles would not be abnormally contractured in these patients straightened with botulinum, and the medial rectus muscles would not have to retain any level of abnormal hyperinnervation for the patient to have straight eyes while awake. Then, when they arrive at preadolescence and adolescence, these esotropes straightened with botulinum would almost never develop consecutive exotropia. Mystery solved.

Several cases of Duane's Retraction Syndrome were discussed. Gunter von Noorden MD mentioned that the world literature included three cases of acquired Duane's. All 3 had intracranial tumors, 2 malignant and one benign. Plager presented a case of Duane's with acute onset of diplopia which proved to be multiple sclerosis. To my surprise, not only Jampolsky but also Murray and Kushner (the extra panelist sitting beside me in the audience) advocated small recessions of the ipsilateral MR and large recessions of the contralateral MR in spite of the J AAPOS paper by Mark Ruttum and Zane Pollard with 4 cases of DRS for whom this made the face turn worse! [I abandoned this approach 20 years ago in favor of procedures which directly enhance abduction of the esoDRS eye, such as Scott Foster's (also advocated by Murray) and, when the co-contraction is truly minimal, 2.5 mm resections of the Duane's lateral rectus accompanied by 4.5 mm recessions of the Duane's medial rectus. See the 9 cases of this R&R of the Duane's eye published by Morad, Kraft, and Mims in J AAPOS. (Morad Y, Kraft SP, Mims III JL. Unilateral recession and resection in Duane Syndrome. J AAPOS 2001;5:158-163.) In one case of large angle XT with bilateral DRS Murray advocated large bilateral recessions of the lateral rectus muscles and resections of the medial rectus muscles. (From Joe Demer MD I learned that a moderate exoDRS with a face turn can be well treated with an 8 mm recession

Binocular Vision & Strabismus Quarterly© A Medical Scientific e-Periodical
Strabology Report of the 34th Annual AAPOS Meeting Grand Hyatt, Washington D.C., 2008 James L. Mims III, MD
Second Quarter of 2008 Volume 23 (No.2): Pages 105-119

of the Duane's LR and a 5 mm *resection* of the Duane's MR.)

In a case of severe LR palsy with weakness of the SR and IR (rendering a Scott Foster ineffectual), Jampolsky emphasized that bilateral surgery would be needed. "Vast surgery [large amounts in mm] is needed in a case of this type; to operate one eye would be half-vast surgery." [His comic timing was perfect; was he channeling Phil Knapp?)

In the final case of the workshop, Plager presented only two slides of a child who seemed to have a Double Elevator Palsy of the left eye, but who was not very cooperative for examination. Jampolsky brilliantly deduced that the child had a superior oblique palsy of the other eye, as verified by Plager intra-operatively by the Plager test. (Yes, Paul Romano MD MSO, Plager did repeatedly call it the Plager test, and not the Plager-Helveston Test, with his father-in-law, Gene Helveston MD sitting on the panel next to the podium from where Plager was moderating.)

Earlier in the meeting I had discussed with Plager one of my recent cases of superior oblique palsy in which the Plager test was informative. In this case, although the pattern was completely typical for a unilateral left SOP with a large left hypertropia in right gaze, worse on left head tilt, and with a habitual compensatory right head tilt, the intra-operative Plager test was abnormal on both sides, indicating a "floppy" superior oblique tendon bilaterally (actually due to expansured superior rectus muscle bodies). Remarkably, this child demonstrated a head tilt to the left at the first post-op visit 5 days after large recession of the left inferior oblique with triangular myectomy of the posterior insertional fibers and attachment of the anterior insertional tip of the muscle 5 mm posterior to the lateral end of the inferior rectus, a technique initially presented by Monte Stavis MD several years ago at a T(exas)APOS meeting). By three weeks post-op, this young patient was demonstrating a right hypertropia in left gaze and worse on right head tilt, to match her early onset post-op habitual compensatory left head tilt. Plager said he had seen a similar case, but also confirmed that he would not recess both inferior obliques on the basis of a surprisingly symmetrically abnormal Plager test in a patient with a distinctly unilateral pattern of superior oblique palsy. He would, of course, inform the parents of the surprising finding immediately after surgery, indicating that the identical operation might have to be done on the other eye in a few months. My case is scheduled to have the other (the right) inferior oblique recessed in a few weeks.

More Esotropia

Mario L Galli CO and Gregg Lueder MD described 9 patients who presented before age one year with infantile esotropia and who had 3 or more surgeries for recurrent esotropia. To their credit, these 9 patients represented 3% of children who were operated upon for infantile esotropia during the period of the study. The number of surgeries per patient ranged from 3 to 9 (average 5). All of the horizontal surgeries in six patients were for esotropia, and three patients developed exotropia after four surgeries for esotropia..

Brian G. Mohney MD, Curtis R Louwagie MD, Amy Greenberg MD, and Nancy N Diehl BS of the Mayo Clinic tabulated all cases of infantile esotropia born in Olmsted County, Minnesota, over a 30-year period and concluded that the incidence of congenital esotropia in this population has not significantly changed between 1965 and 1994. The birth prevalence of congenital esotropia during the 30-year period was 25 per 10,000, or one in 403 live births. These authors contend that the reason that pediatric ophthalmologists perceive a decrease in patients with congenital esotropia is that live births in Olmsted county went up 3% in this period, but ophthalmologists increased 108% (from 8,397 in 1965 to 17,464 in 1994). The following table was taken from their poster:

Study Yrs	# ETs (Congenital)	# Surgeries /Patient	Followup (Years)
1965-1974	45	1.8	17 yrs
1975-1984	51	1.9	14 yrs
1985-1994	34	1.6	9 yrs

[What would happen if they extended their study by another decade? Would they find another dramatic decrease, perhaps from 34 down to 20? I urged them to extend their study with a group from 1995-2004, because the middle 1990's was the time that

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Strabismus Quarterly©
A Medical Scientific e-Periodical

Strabology Report of the 34th Annual AAPOS Meeting
Grand Hyatt, Washington D.C., 2008
James L. Mims III, MD

Second Quarter of 2008
Volume 23 (No.2):
Pages 105-119

the March of Dimes began campaigning for all women of child bearing age to take supplemental folic acid (400 mcg daily) and 1998 was the year that the FDA began mandating that folic acid be added to all refined flours, breakfast cereals, etc. Note: Recently there has been concern in the nutrition community that supplemental folic acid may be raising the incidence of breast, colon, and prostate cancer. (See: Amer. J. Clin. Nutr. 2008;87:774, and March 2008 Harvard Men's Health Watch pp3,4.) Thus, it would be important to know if folic acid supplementation has reduced the incidence of infantile esotropia. It should also be noted that smoking during pregnancy has been identified as risk factor for infantile esotropia (Chew E, Remaley NA, Amboli A, Zhao J, Podgor MJ, Klebanoff M. Risk factors for esotropia and exotropia. Arch Ophthalmol 1994;112:1349-1355) and that the March of Dimes also had a major campaign to reduce smoking during pregnancy in the mid-1990's.] We look forward to their findings for the 1995-2004 decade! Also, if you are interested in this subject, check out Dombrow M, Engel HM. Rates of strabismus surgery in the United States: Implications for manpower needs in pediatric ophthalmology. J AAPOS 2007;11:335, a study that, unfortunately, also suffers from a lack of data after 1995. If you are convinced that there has been a demographic change in your practice, study the chapter in Duane's by Mary O'Hara MD and Leonard Nelson MD, Chapter 59, Volume 3, and Engle E. Genetic basis of congenital strabismus. Arch Ophthalmol 2007;125:189-195, and Ling Y. Pediatric ophthalmology in Singapore. J AAPOS 2007;11:3-4.

Also, examine closely the engraving below of the oldest portrait of an "American" in the Smithsonian National Portrait Gallery. Does she have XT? Maybe a DVD? (Suggested by Judy R. during editing - thanks, Judy.) Arthur Linksz MD, in his book, "An Ophthalmologist Looks at Art", pointed out that it was the style at that time to portray ladies looking to the left with a big angle Kappa, but after personally examining several portraits at the gallery, I still think she has a big XT!

Binocular Vision & Strabismus Quarterly© A Medical Scientific e-Periodical
Strabology Report of the 34th Annual AAPOS Meeting Grand Hyatt, Washington D.C., 2008 James L. Mims III, MD
Second Quarter of 2008 Volume 23 (No.2): Pages 105-119

Asians really do have a lot more exotropia, and via the Mexican-Americans, Asian genes are proliferating more rapidly than European genes currently in the United States. According to the U.S. Bureau of Labor Statistics, birth rates for 2006 were as follows: Anglo-Americans 1.7, Afro-Americans 2.1, and Mexican-Americans 3.0. The stable replacement rate is 2.1.

Stephen P Christiansen MD, Danielle L Chandler MSPH, Jonathan M Holmes BM BcH, Robert Arnold MD, Eileen E Birch PhD, Michele Melia Sc M, Michael X Repka MD, Donny W Suh MD, Benjamin Ticho MD, and David K Wallace for the Pediatric Eye Disease Investigator Group found alignment instability to be common, 48%, N=63, in infantile esotropia. They also found 22% stable and weren't certain about 30%. Ocular alignment was classified as "unstable'" if there was a change of 15 prism diopters between any two of four measurements, and stable if all four measurement were within 5 prism diopters. Measurements were made six week intervals for 18 weeks. [What does this do to dose-response curves. Answer: It probably means that you need to base your number of mm on the measurement you make at the pre-op the day before surgery, a truism that the PEDIG group has verified in another of their studies.] The first four members of this group plus Linda Dagi MD and Darren L Hoover MD made a similar study of children with acquired esotropia and found 20% unstable, 39% stable, and weren't certain about 45%.

Agnes MF Wong MD PhD FRCSC, Christina Gerth MD, Linda Colpa OC, Carol Westall PhD, and Tom Wright of Toronto's Hospital for Sick Children compared 7 children with infantile esotropia aligned prior to 11 mos of age, 7 aligned at 11 to 18 mos of age, and 7 visually normal controls and found using motion Visual Evoked Responses that those aligned earlier had normal development of cortical visual motion processing. The Mayo show continued with Chrystia C Lilly, Brian G Mohney MD, Amy E Greenberg MD, and Nanch N Diehl reporting on the natural history of 306 children with accommodative esotropia diagnosed from January 1, 1975 to December 31, 1994. Of these 306, 244 (80%) were fully accommodative and 62 (20%) were partially accommodative. Follow-up was for a median of 9.8 years (range 0 to 29.9 years). 33/244 (13.5%) eventually required surgery among those previously fully controlled with glasses. 7/33 eventually required a second strabismus surgery, and of 62 starting with partially accommodative esotropia 12/62 (19.4%) needed more than one surgery. Noteworthy was the 68/221 (31%) with 5 years or more of follow-up who no longer needed spectacle correction, discontinuing glasses at a mean age of 12 years (range, 2 to 28 years).

Inferior, Superior Oblique Overactions and DVD

Patrick Watts FRCOphth, Roland Bunting FRCOphth, Emma Tippings M Med Sci, and Hasan Al Madfai PhD of Cardiff, Wales, studied spontaneous reduction of primary overaction of the inferior oblique (OAIO) in older children (6.6 $\pm$ 7.7 yrs) receiving bilateral medial rectus recessions. Complete resolution was seen in 13 of 23 cases with + 1 overaction, 5 of 8 cases with +2 overaction, and 1 of 6 cases with + 3 overaction. [This, of course, suggests that OAIO is due to lack of fusion – the torsional drift postulated by Guyton and the strabismogenic amblyopia concept of von Noorden. Still, in younger children with ET and OAIO, it seems a shame not to prevent DVD later and to eliminate the OAIO with certainty at the first surgery by recessing the IO with a RATIO (recession and anterior transposition of the IO) by the Kushner technique (bunching the new insertion at the lateral end of the IR insertion).

Binocular Vision & Strabismus Quarterly© A Medical Scientific e-Periodical
Strabology Report of the 34th Annual AAPOS Meeting Grand Hyatt, Washington D.C., 2008 James L. Mims III, MD
Second Quarter of 2008 Volume 23 (No.2): Pages 105-119

Guillermo Velez MD of Medellin Columbia and his son, Federico G Velez MD of Jules Stein in Los Angeles joined Noa El-Dalman MD in studying the results of 40 surgeries performed for patients with both DVD and an A-pattern strabismus. They point out that bilateral SR recessions (performed for the DVD) will only correct small amounts of A-pattern strabismus (10 PD or less), but that choosing bilateral SR recessions for the DVD is important in cases with more than 5PD of DVD asymmetry. For larger amounts of A-pattern (more than 20 PD up-down difference), bilateral superior oblique temporal tenectomy and RATIO have worked well for them. One side-effect of RATIO can be anti-elevation syndrome with XT in up gaze; so it probably works well to reduce an A pattern. [I would tend to perform bilateral SR recessions of 10 mm, "straight back", and combined with SO tenectomies.]

Continuing his previous passion for the details of oblique surgery, Burton J Kushner MD and Megumi Lizuka MD calculated the effect of severing the SO frenulum connecting the SO and the overlying SR muscle in an attempt to explain why posterior partial tenectomy of the SO tendon (Rosenbaum posterior tenectomy) is relatively ineffective in decreasing the over-depression in adduction associated with OASO, even though this procedure us usually effective for correcting A-patterns associated with mild to moderate SO overaction. Using a scale figure of the anatomy of the SO and SR modified from Orbit® 1.8 (Eidactics, San Francisco CA), they calculated the theoretical change in the contribution of the SO depression force after posterior tenectomy and (coincidental removal of the SO frenulum), and found a substantial decrease in the angle between the anterior fibers of the SO tendon and the antero-posterior axis of the globe. The magnitude of depression of the SO in this position increases to 77%. This reduction in angle, a reduction produced by the removal of the frenulum, makes the SO tendon a more effective depressor in the adducted position. Mystery solved.

More Exotropia

Ahmed Mostafa Kamal MD, Amr Salaheldin Abdelhakeem MD, and Hala Mostafa Eihill MD of Cairo compared 20 patients who underwent bilateral lateral rectus recession and 20 patients who received unilateral recess-resect for basic exotropia. The success rate in both groups was 75% if you use a ±10 PD criterion. Reviewer Burton J Kushner MD was highly critical of the ±10 PD criterion for success, noting that 5 ET with diplopia is a disaster in the surgical treatment of exotropia. Using his own criteria for success (no ET with diplopia, no manifest XT above 6 XT), Kushner tabulated 50% success for their R&R group and 55% for their recess LROU group. [They were using the Ken Wright numbers suitable for divergence excess exotropia for the surgeries. They should have used the (South) Korean protocol for the recess LROU for these basic exotropia patients. (Lee S, Kim JH, Thacker NM. Augmented bilateral lateral rectus recessions in basic intermittent exotropia. J AAPOS 2007;11:266-268). As for recess-resect, the results speak for themselves. Two other objections I have to recess-resect for basic XT is that no one has published any data as to what to do for the second surgery and the narrower palpebral fissure on one side does bother many patients and parents.

Noha S Ekdawi MD, Nancy N Diehl, Kevin Nusz MD, and Brian G Mohney MD, once again using the fantastic Olmsted county registry, followed a cohort of 61 patients with intermittent exotropia for a full 15 years after their initial surgery performed at a mean age of 7.6 years. While only 12 of the 61 underwent a second surgery (10 for recurrent XT and 2 for consecutive ET), the Kaplan-Meier rate of developing 10 or more PD of misalignment

Binocular Vision & Strabismus Quarterly© A Medical Scientific e-Periodical
Strabology Report of the 34th Annual AAPOS Meeting Grand Hyatt, Washington D.C., 2008 James L. Mims III, MD
Second Quarter of 2008 Volume 23 (No.2): Pages 105-119

following surgery was a very discouraging 54% by 5 years, 76% by 10 years, and 86% by 15 years! In other words, while only one in five received a second surgery, at the follow-up after approximately one decade, only two of five patients were successfully aligned!! [Clearly, the time has come to abandon the old ways of inadequate bilateral LR recessions for divergence excess performed at entirely too old an age, and to enlist the aid of the Pediatricians in sending these children in at such an early stage that only the mother can see the XT, even prior to the Pediatrician's being able to see it in his or her 10-foot exam room. The correct age for the first surgery should be 1 year to 18 months, not 4 to 7 years! The first surgery should be a unilateral LR recession of 9 mm in most cases. I am absolutely certain that I and my colleagues following a protocol of very large unilateral lateral rectus recessions performed at a "very early age" are doing very much better than these really miserable results of a now obsolete protocol. Brian Mohney MD and his colleagues at the Mayo Clinic are to be commended for this honest description of just how really terrible the old bilateral recess LROU protocol really is. Consider this list of references:

Dunlap EA, Gaffney RB. Surgical management of intermittent exotropia **Am Orthop J** 1963;3:20-33

Sheppard RW, Panton CM, Smith DR. The single horizontal muscle recession operation: A survey. **Can J Ophthalmol** 1973;8:68-74.

Nelson LB, Bacal DA, Burke MJ. An alternative approach to the surgical management of exotropia; the unilateral lateral rectus recession. **J Pediatri Ophthalmol Strabismus** 1992;29:357-360

Weakley DR, Stager DR. Unilateral lateral rectus recessions in exotropia. **Ophthalmic Surgery** 1993;24:458-460.

Scott EO. Early and late postoperative alignment following unilateral lateral rectus recession for intermittent exotropia. **J Pediatri Ophthalmol Strabismus** 1998;35:146-148.

Dadeya S, Kamlesh. Long term results of unilateral lateral rectus recession in intermittent exotropia. **J Pediatri Ophthalmol Strabismus** 2003:40:283-287

In the South, we would say that this is a slew of references. (A slew is more than a few but less than a lot; it is about as many as several.) Isn't it time we (1) operated as early as the child has the disorder after age 11 mos with a large (8 to 10 mm) unilateral LR recession and (2) Use the augmented (South) Korean augmented recessions cited above for the relatively neglected cases presenting with a basic XT?

Skew Deviation Study with Important Observations in SOP "Controls"

Manoj V Parulekar MD FRCS, Shuan Dai MD, J R Buncic MD FRCSC, and Agnes M Wong MD PhD FRCSC reminded everyone that incyclotorsion of the fundus of the higher eye and excyclotorsion of the fundus of the lower eye in a patient with a large head tilt is pathognomonic for skew deviation and a differentiating characteristic from trochlear nerve palsy (SOP). They studied 10 patients with skew deviation using Maddox rods to document torsion and found a reduction in torsion as the skew deviation patients were placed into a supine position (flat on their backs). **In contrast, none of 14 4th N palsy patients demonstrated a change in fundus torsion when changing from upright to supine position.** This is consistent with the idea that the torsion seen in the affected eye is due to contracture of the ipsilateral inferior oblique, and not due to active contraction of the ipsilateral inferior oblique amplified by hypertrophy of this muscle.

Binocular Vision & Strabismus Quarterly© A Medical Scientific e-Periodical
Strabology Report of the 34th Annual AAPOS Meeting Grand Hyatt, Washington D.C., 2008 James L. Mims III, MD
Second Quarter of 2008 Volume 23 (No.2): Pages 105-119

[Note to Burt Kushner MD: Although you have theorized that "overaction of the inferior oblique" in superior oblique palsy is due to active contraction of the antagonist IO which becomes hypertrophied due to the chronic head tilt, Demer did not find either active contraction or hypertrophy of the ipsilateral IO on his MRI study. In contrast, I have theorized that the ipsilateral IO undergoes only contracture. In our previous discussions (in and out of print), it has been clear that contracture alone would explain the hypertropia in straight contralateral side gaze, but not the hypertropia in contralateral up gaze. This current study by Wong and co-workers offers a new explanation for the hypertropia in contralateral up gaze, commonly known as "overaction of the inferior oblique' observed in superior oblique palsy patients. Because this torsion is present all the time, under varying conditions of innervation, it must be due to contracture of the IO. THE HYPERTROPIA IN CONTRALATERAL UP GAZE IS DUE TO THE EXTORSION OF THE AFFECTED EYE. THE EXTORSION STRETCHES THE SUPERIOR RECTUS (BECAUSE OF THE SUPERIOR RECTUS PULLEY) AND THE EXTORSION GIVES THE SUPERIOR RECTUS (AGAIN, BECAUSE OF THE LOCATION OF THE SUPERIOR RECTUS PULLEY) IN THE EXTORTED EYE AN ABNORMAL ADVANTAGE IN PRODUCING ELEVATION IN ADDUCTION IN THE UP GAZE, ADDUCTED POSITION. Prove me wrong.

Superior displacement of the MR pulley in the extorted eye would add to the classical pattern, but Clark, Miller, and Demer previously demonstrated that the displacement of the MR pulley is too little to explain the overaction. Also, expansure of the paretic SO is more important than contracture of the antagonist IO in determining in which direction of head tilt the hypertropia will be great.]

Note to the reader: If you want to join in on this argument, you might want to review these references *[We offer BV&SQ's correspondence pages for any who do wish to pursue this controversy -Ed PER]*:

Donahue SP, Lavin PJM, Hamed LM. Tonic ocular tilt reaction simulating a superior oblique palsy. **Arch Ophthalmol** 1999;117:347-352.

Kono R, Demer JL. Magnetic resonance imaging of the functional anatomy of the inferior oblique muscle in superior oblique palsy. **Ophthalmology** 2003;110:1219-29.

Mims III JL. Superior oblique palsy. **Ophthalmology** 2004;111:412-413 (letter to editor, with Demer's reply)

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 superor oblique palsy. **Binocul Vis Strabismus Q** 2003;18:15-24.

Khawam E, El-Dairi M, Al-Haddad C, Younis M. Inferior oblique overaction/contracture following retrobulbar anesthesia for cataract extraction with a positive Bielschowsky head tilt test to the contralateral shoulder. A report of one case. **Binocul Vis Strabismus Q** 2004;19:247-250. And correspondence by JLM III BVSQ 2005;20:8-9

Clark RA Miller JM Demer JL. Displacement of the medial rectus pulley in superior oblique palsy. **Invest Ophthalmol Vis Sci**. 1998;39:207-12.

Kushner BJ. Ocular torsion; rotations around the "Why: axis. Costenbader Lecture, **J AAPOS** 2004;8:1-12.

Kushner BJ. Multiple mechanisms of extraocular muscle "overaction." **Arch Ophthalmol** 2006;124:680-688. And subsequent JLM III correspondence

Binocular Vision &
Strabismus Quarterly©
A Medical Scientific e-Periodical

Strabology Report of the 34th Annual AAPOS Meeting
Grand Hyatt, Washington D.C., 2008
James L. Mims III, MD

Second Quarter of 2008
Volume 23 (No.2):
Pages 105-119

Whew! I have to stop now and prepare for my son's wedding on the top of the Arsenal in New York City's Central Park!

James Mims III, MD

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.

The next meeting of the AAPOS will be April 17-21, 2009 at the Hyatt Regency, San Francisco, California. *[BV&SQ hopes to reappear for this one, so look for us in the exhibit hall wherever it may be, with more meeting special offers - Ed PER]*

FINAL (repeat) KUDOS: The incredible I.T. team that not only made the power point work (usually), but also the most amazing computer light show that I have ever seen for the dinner-dance. Thanks to Miriam Freedman, MD for finding this fellow! (Greg Hosman, Any Screen, Inc., greghosman@mac.com).

On the facing page: Reporter Mims snapshots of the Saturday night dinner dance in D.C., montaged by your editor.

Binocular Vision &
Strabismus Quarterly©
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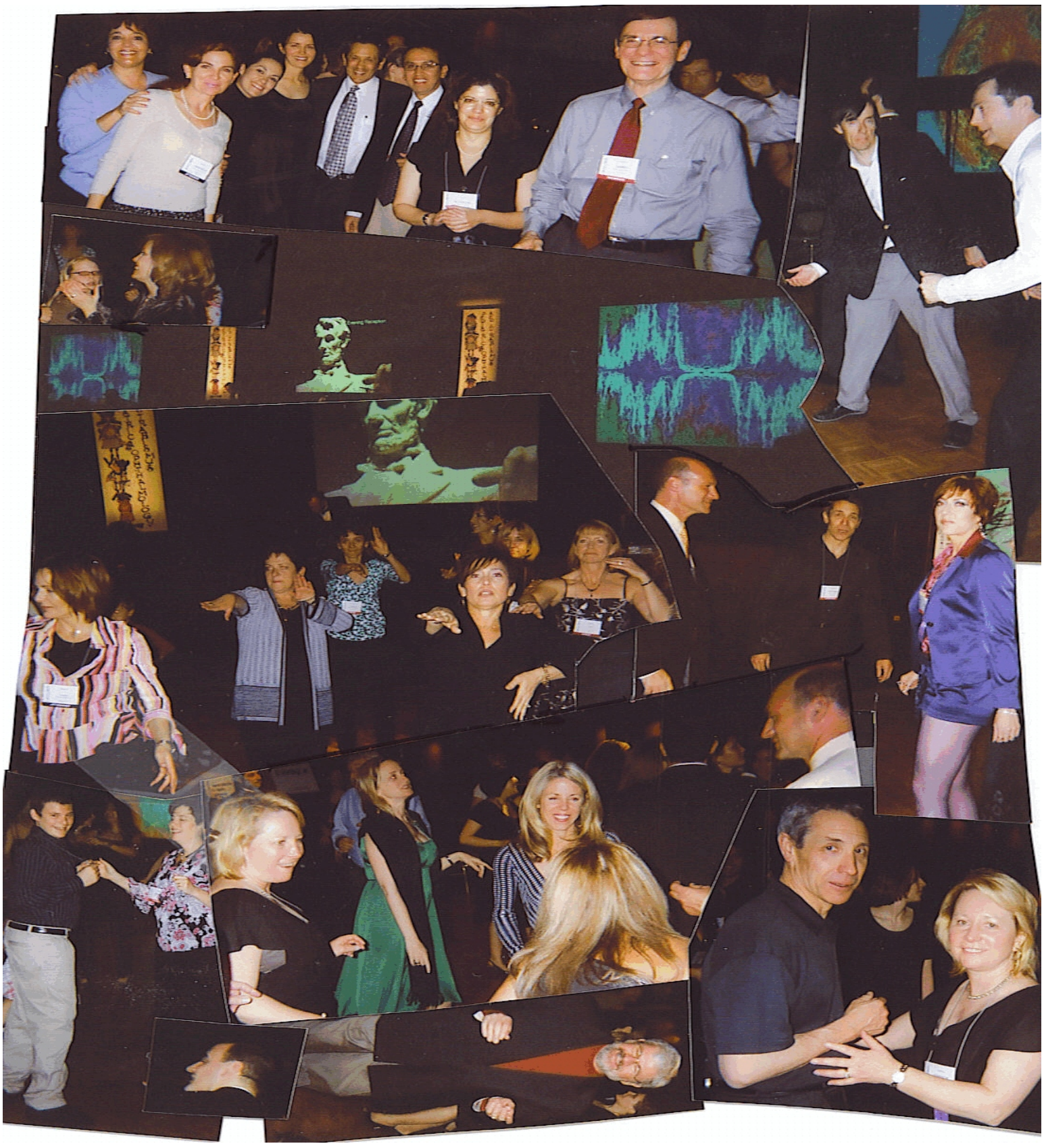
Strabology Report of the 34th Annual AAPOS Meeting
Grand Hyatt, Washington D.C., 2008
James L. Mims III, MD

Second Quarter of 2008
Volume 23 (No.2):
Pages 105-119



Binocular Vision &
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ABSTRACTS

Second Quarter of 2008
Volume 23 (No. 2)
Pages 120-121

Vision / Visual Acuity / Amblyopia

from the AAOs Academy Express April 16, 2008. **Very Early Screening Yields Better Visual Outcomes in Amblyopia Treatment.** This retrospective review of children whose amblyopia was detected in a state wide photoscreening program found that children who screened positive before age 2 had better visual outcomes than those whose vision problem was detected between ages 2 and 4. Treatment success in the younger children averaged about 1 logMAR line better and the proportion of children failing to reach a visual acuity of 20/40 was significantly less in younger children (5%) than in the older children (17%). (Arch Ophthalmol, April 2008)

Comparative Efficacy of Penalization Methods in Moderate to Mild Amblyopia. Tejedor J, Ogallar C. Am J Ophthalmology 2008; 562-569. [Authors Abstract edited-PER]

Purpose: To compare... pharmacologic and optical penalization in the treatment of moderate to mild amblyopia.

Design: Randomized clinical trial.

Methods:... two to 10 year old children with strabismic or anisometropic amblyopia (visual acuity [VA] in the amblyopic eye at least 20/60)... measure... using ...(logMAR) crowded Glasgow acuity cards were randomized into two groups of therapy (n=35 in each group), 1% atropine, and optical penalization with positive lenses, after stratification by cause of amblyopia.. after retinoscopic refraction, and deviation angle were measured by the simultaneous prism and cover or Krimsky test. Stereoacuity ...Titmus fly test and Randot preschool or Randot circles stereoacuity est. Change in VA... after six months ... main outcome measure; stereoacuity .... secondary outcome

Results:.... **Average improvement in VA of the amblyopic eye was larger in the atropine than in the optical penalization group (3.4 and 1.8 logMAR lines, respectively), as well as average improvement in interocular difference of VA(2.8 and 1.3 logMAR lines, respectively). Better stereoacuity, but non[statistically]significantly different, was detected in the atropine group..**

Conclusions: Atropine penalization may be considered more effective than optical penalization with positive lenses. (Dr. Jaime Tejedor, Dept Ophthalmology, Hospital Ramon y Cajal, C. Colmenar km 9100, Madrid 28034),

Binocular Vision

Binocular Adaptation to Near Addition Lenses in Emmetropic Adults. Screenivasan V, Irving EL, Bobler WR. Vision Research 2008; 48:1262-1269. [Authors Abstract]

Near addition lenses are prescribed to pre-presbyopic individuals for treatment of binocular motor problems such as convergence excess and to control the progression of myopia. To date, no investigation has looked at the complete sequence of binocular motor responses during a period of near work with +2 D lenses. This investigation evaluated changes to accommodation and vergence responses when young adults sustained fixation at 33 cm with +2 D addition lenses. In addition, the effect of the accommodative vergence cross-link (AV/A) on the magnitude and the completeness of binocular adaptation to these lense were evaluated. The results showed that +2 D lenses initiate an increase in exophoria and convergence driven accommodation. The degree of the initial induced phoria was dependant upon the magnitude of the AV/A ratio. Vergence adaptation occurred after 3 min of near fixation and reduced the exophoria and convergence driven accommodation. The magnitude of vergence adaptation was dependent upon the size of the induced phoria and hence the AV/A ratio. The completeness of adaptation was seen to vary inversely with induced exophoria and thus the AV/A ratio. (All authors: School of Optometry, University of Waterloo, 200 University Ave West, Waterloo Ontario Canada N2L 3G1)

Ocular Dominance Diagnosis and Its Influence in Monovision. Seijas O, DR, Liano PG, de Liano RG, Robert CJ, Piedrahita, Diaz E. Am J Ophthalmol 2007; 144:209-216.e1 [Authors Abstract]

Purpose: To analyze the response of normal emmetropic subjects to different ocular dominance tests and to analyze the influence of this response in surgically induced monovision.

Design: A prospective study of diagnostic accuracy was carried out to analyze the different tests to determine ocular dominance, without a gold standard test.

Methods: Nine different tests were carried out in a group of 51 emmetropic subjects to determine both motor and sensory ocular dominance. For analysis, patients were divided into two groups according to age. Normal ophthalmologic examination results were the inclusion requirement, with normal binocular vision and good stereoacuity.

Results: A significant percentage of uncertain or ambiguous results in all tests performed was found, except in the hole-in-the-card and kaleidoscope tests. When the tests were compared, two by two, the correlation or equivalence found was low and was much lower if tests were compared three by three.

Conclusions: No clear ocular dominance was found in most studied subjects; instead, there must be a constant alternating balance between both eyes in most emmetropic persons, but not in those with pathologic features. This fact would explain the great variability both between and within different kinds of tests. Also, it would establish that the monovision technique is well tolerated in most patients, with unsuccessful results only in those patients with strong or clear dominance. Consequently, it seems appropriate to evaluate patient's dominance before monovision surgery to exclude those individuals with clear dominance. (Dr. Olga Seijas, c/o Infanta Maria Teresa, 18.5° A, 28016 Madrid, Spain)

Results of Ocular Dominance Testing Depend on Assessment Method. Rice ML, Leske DA, Smestad CE, Holmes JM. J AAPOS 2008 in press. [Authors Abstract]

Purpose: We developed a near ocular dominance test modeled after the distance hole-in-the-card test and assessed both test-retest reliability of four tests of ocular dominance and agreement between tests.

Methods: Forty-six subjects aged 18 to 78 years with visual acuity 20/40 or better in each eye were enrolled from a primary care practice. All subjects had normal eye examinations, with the exception of refractive error, and were examined in their habitual correction. Subjects were tested twice each with the distance hole-in-the-card test, new near hold-in-the card test, near convergence test, and the Pediatric Eye Disease Investigator Group fixation preference test.

Results: There was excellent test-retest reliability for each ocular dominance test. Nevertheless, there was only moderate to slight agreement between each possible pairing of tests.

Conclusions: Results of ocular dominance tests vary depending on both the testing distance and the specific activity performed as part of the testing procedure. (Dr. Holmes, Mayo Clinic Ophthalmology E7, 200 First St SW, Rochester MN 55905-0001)

ABSTRACTS

Binocular Vision & Strabismus Quarterly©
A Medical Scientific e-Periodical

Second Quarter of 2008
Volume 23 (No. 2)
Pages 120-121

Aniseikonia

Modeling of Lateral Magnification Changes Due to Changes in Corneal Shape or Refraction. Langenbucher A, Seitz B, Szentmary N. Vision Research 22007; 47:2411-2417 [Authors Abstract]

Background & Purpose: Especially after corneal surgery, the lateral magnification of the eye providing the retinal image size of an object is a crucial factor influencing visual acuity and binocularity. The purpose of this study is to describe a paraxial computing scheme calculating lateral magnification changes (ratio of the image sizes before and after surgery) due to variation in corneal shape and spectacle refraction.

Calculation strategy: From the 4x4 refraction and translation matrices the system matrix representing the entire 'optical system eye' and the pupil matrix describing the sub-system from the spectacle correction to the aperture stop were defined for the state before and after surgery. As the chief ray is assumed to pass through the centre of the aperture stop, the 2x2 matrix of the lateral magnification ratio from preoperative to postoperative is described by the 2x2 sub-matrices of the respective pupil matrices. The cardinal meridians can be extracted by calculating the eigenvalues and eigenvectors.

Working example: Vertex distance 14 mm, measured distance between corneal apex and aperture stop 3.6 mm, keratometry 39D +D/O° to 47 D +3D/30° and refraction 3.5 D -5 -5 D/5° to -4.0 D -3.5 D/25° preoperatively to postoperatively. The matrix of magnification ratio from preop to postop yields (0.8960 - 0.0085; 0.0074 0.9371) and the eigenvalues decomposition provided a 10.7% minified image at 170.1° and a minified image of 6.1% at 78.7°, which both are clinical relevant.

Conclusion: We presented a straight forward computer based strategy for calculation of retinal image size changes using 4x4 matrix notation. With this model the meridional changes in lateral magnification from the preoperative to the postoperative stage or between followup stages can be estimated from keratometry, refraction, vertex distance and anterior chamber depth, which might be important for binocularity and vision tests in corneal surgery. [no proprietary interest]. ((Dr. Langenbucher, Dept Medical Physics, Friedrich-Alexander-University Erlangen-Nurnberg, Henkestrasse 91,D-91051, Erlangen, Germany. Fax:49-9131-852-2824)

Strabismus Pathophysiology

Variabilty of Stereoacuity in Intermittent Exotropia. Hatt SR, Mohney BG, Leske DA, Holmes JM. Am J Ophthalmol 2008; 556-561.e1 [Authors Abstract]

Purpose: Distance stereoacuity is used to monitor deterioration of intermittent exotropia (IXT), but variability of stereoacuity [so tested and applied] has not been studied rigorously. The purpose of this study was to assess the variabiliy of stereoacuity over one day in children with IXT.

Design: Prospective cohort study.

Methods: Twelve children with IXT were recruited. Stereoacuity was assessed using the Frisby Davis Distance test and the Distance Randot test at distance, and the Frisby and Preschool Randot tests at near. Tests were repeated three or four times over the day, with at least two hours between assessments. The main outcome measure was variable stereoacuity defined as a change by two or more log levels between any two time points over the day.

Results: Variable stereoacuity at distance was found in five (42%) of 12 patients. Four (33%) of 12 patients demonstrated variable results using the distance Randot test, three of whom also showed variable results using the Frisby Davis Distance test. One patient had variable results using the Frisby David Distance test only. Nine (75%) of 12 patients completed near stereoacuity testing; two (22%) of nine showed variable near stereoacuity. Two (22%) of nine showed variable results using the Preschool Randot test, one (11%) of whom also had variable results using the Frisby test. In some cases, **stereoacuity changed from measurable stereoacuity on one assessment to nil on another.**

Conclusion: Nearly half of children with IXT show marked changes in stereoacuity over the course of a single day. When based on isolated measures, an apparent change in distance stereoacuity between visits should be interpreted with caution. (Dr. Holmes, Ophthalmology W7, Mayo Clinic, Rochester MN 55905)

Season of Birth, Natural Light, and Myopia. Mandel Y, Grotto I, El-Yaniv R, Belkin M, Israeli E, Polat U, Bartove E. Ophthalmology 2008; 115:686-692. [Authors Abstract edited-PER] **Purpose:** To investigate the possible roles of season of birth and perinatal duration of daylight hours (photoperiod) in the development of myopia. **Design:** Retrospective, population-based, epidemiological study.

Participants: A total of 276,911 adolescents (157,663 males, 119,248 female) 16-22 years old. All were Israeli-born conscripts to the Israeli Defense Forces who were examined during the 5 year period 2000 through 2004.

Methods: Noncycloplegic refraction was determined by autorefractometer and validated by qualified optometrists. Myopia, defined on the basis of right eye spherical equivalence, was classified as mild (-0.75 to -.299 diopters [D]), moderate (-3.00 to -5.99 D), or severe (-6.00 D or worse). The photoperiod was recorded from astronomical tables and classified into 4 categories. Using multivariate logistic regression models, we calculated odds ratios (ORs) for several risk factors of myopia including season of birth.

Main Outcome Measure: The OR for photoperiod categories as risk factors for myopia.

Results: Overall prevalences of mild, moderate, and severe myopia were 18.8%, 8.7% and 2.4%, respectively. There were seasonal variations in moderate and severe myopia according to birth month, with prevalence highest for June/July births and lowest for December/January. On multivariate logistic regressions, the ORs of photoperiod categories for moderate and severe myopia were highly [statistically] significant and demonstrated a dose-response pattern. Odds ratios for severe myopia were highest for the shortest versus the longest photoperiods (1.24; 95% confidence interval, 1.15-1.33; P<0.001). **Mild myopia was not associated with season of birth or perinatal light exposure.** Other risk factors were gender (1.14 for female), education level, 1.32 for age above 12), and father's origin (1.31 for Eastern vs Israeli origin).

Conclusion: Myopia in this population is associated with birth during summer months. The exact associating mechanism is not known but might be related to exposure to natural light during the early perinatal period. (Dr. Yossi Mandel, Selim and Rachel Benin School of Computer Science and Engineering, Hebrew University of Jerusalem, Jerusalem, Israel)

Abstracts selected by the Editor, of interest to our readers.
Publication here does not constitute endorsement.

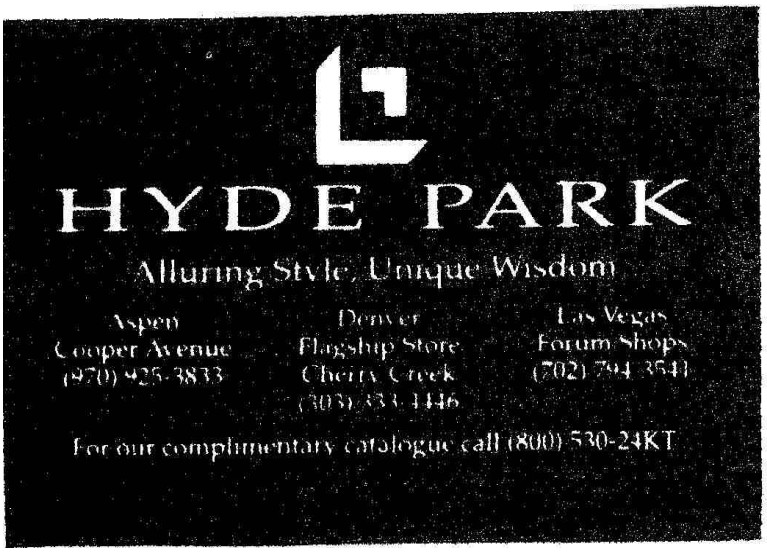
Binocular Vision &
Strabismus Quarterly©
A Medical Scientific e-Periodical

Second Quarter of 2008
Volume 23 (No.2):
Pages 122-127

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

(Prehistoric) Since 1985

Stereoscopic 3D Movies and TV are Here and Radically Changing Entertainment and Audience Bbehavior; Loss of Binocular Vision causes Perception Problems? Gaze Perception and Interpretation; Looking at Babes.

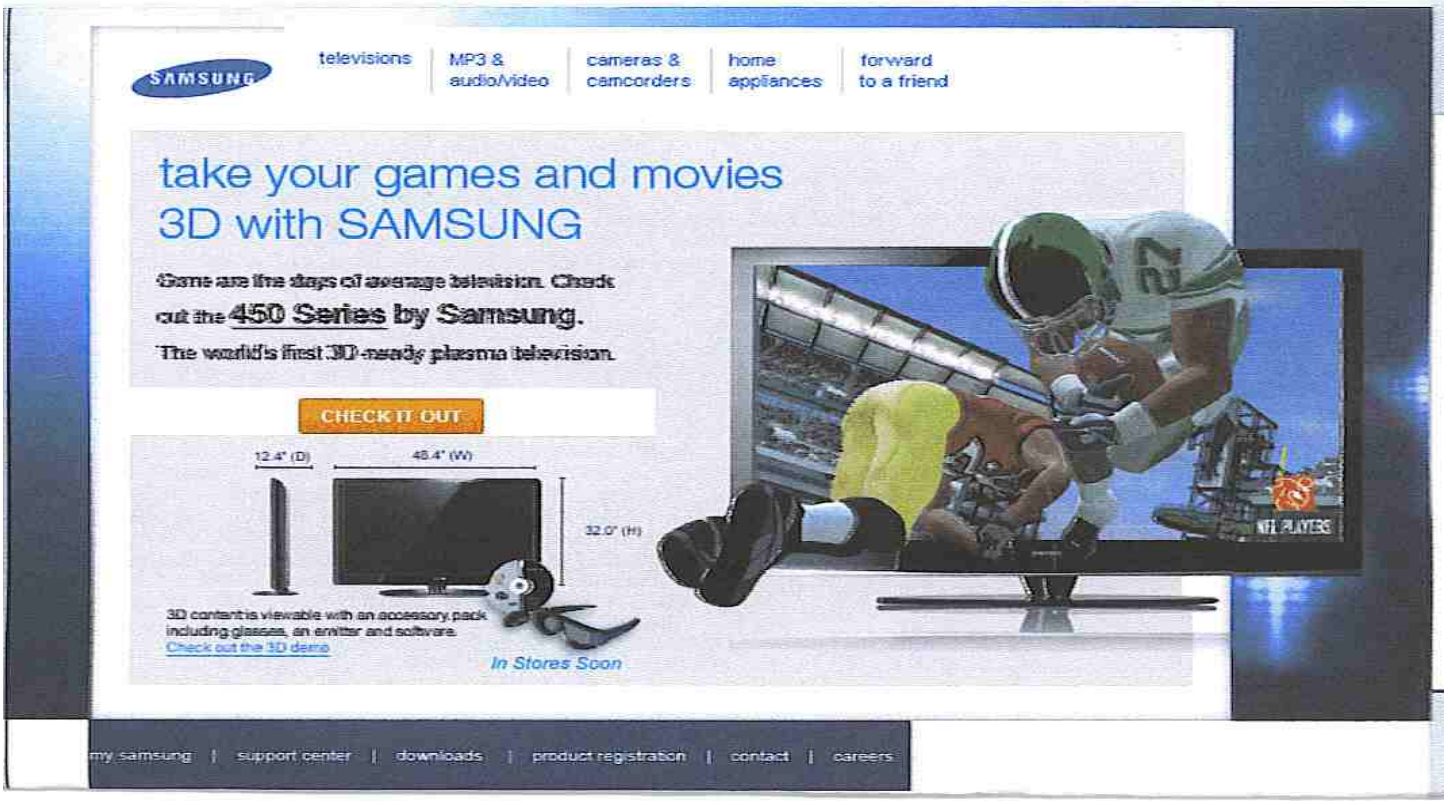


BINOCULAR VISION

Stereoscopic 3D Movies AND TV are HERE

Stereoscopic depth perception remains the epitome of binocular vision. And soon even now, you can have full depth most anywhere AS A REGULAR PART OF YOUR AT HOME ENTERTAINMENT.

The head of Dreamworks movies, in an CNBC ad running now says ALL his movies will be 3D by 2009. Here, look!



Binocular Vision &
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Hyde Park Editorial

Second Quarter of 2008
Volume 23 (No.2):
Pages 122-127

Binocular Vision &
Strabismus Quarterly©
A Medical Scientific e-Periodical

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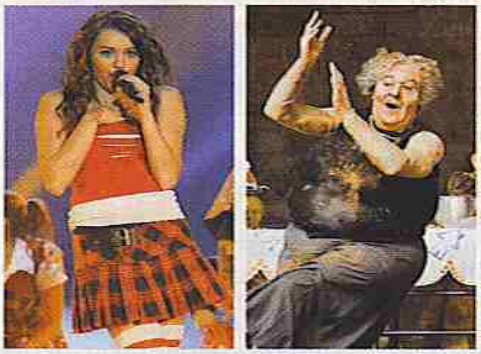
Second Quarter of 2008
Volume 23 (No.2):
Pages 122-127

CONCERT MOVIES

They Can't Take Requests

Audiences are giving standing ovations and waving cell phones. So what if the musicians aren't there?

PRETEEN GIRLS RECENTLY HAD their Woodstock. It lasted 74 min. and probably involved an overconsumption of Junior Mints. Shut out of the sold-out live event, 2007's *Hannah Montana/Miley Cyrus: Best of Both Worlds Concert Tour*, thousands of girls lined up in February and March to put on 3-D glasses for the movie version. And as they watched, Cyrus' concert-movie audience did something remarkable: they behaved as if it were a real show. Singing along, dancing, reaching for confetti that was falling only onscreen, the *Hannah Montana* fans were, yes, 8-year-olds on a sugar high. But they were also moviegoers in the vanguard of a new kind of theatrical experience, one in which tricked-out cinemas serve as digital-era concert venues.



Playing to the 'plexes *Cyrus, left, and the Met's Philip Langridge in* Hansel and Gretel

Supposedly, Americans are abandoning shared cultural pursuits for loner entertainments on our iPods and HDTVs. But thanks to technological advances, concert films are starting to envelop audiences in a way nearly as dramatic as live events, at a fraction of the price. And audiences—and the market—are responding. Acts as disparate as U2 and the Metropolitan Opera are appearing this month in multiplexes all over the world. Even Martin Scorsese is giving a nod to the audience's higher sensory appetites, releasing his Rolling Stones film, *Shine a Light*, in the larger-than-life IMAX format.

"There's a fantastic collective high we're seeing in the theaters," says Catherine Owens, a co-director of *U23D*, which was filmed during Irish band U2's 2006 Vertigo tour. "It reflects the joy and exuberance you see from the audiences who are hearing the show live [in the movie]." *U23D* makes the most of its dimensionality, plunging you into the middle of teeming stadium crowds, without the elbow in your ribs or the drunk "Woo hoo!" girl in your ear. And unlike $70 nosebleed seats, the $17 movie tickets get you close enough to Bono's outstretched hand to nearly feel him graze your cheek. Some fans are showing up for the film ready to take part—during a glittering shot of a crowd holding up thousands of cell phones, movie audiences have been lifting their own devices in the air.

The almost tactile drama of the new music movies is a product of digital progress—advances in 3-D, smaller HD cameras and bolder audio. "You get all that intimacy, but you get a big sound to it, and suddenly you have something completely immersive," says Stephen Walker, the director of *Young @ Heart*, a quirky (2-D) documentary about a New England senior citizens' chorus that covers songs by the Clash and James Brown. Walker shot 81-year-old Fred Knittle singing Coldplay's *Fix You* with five small cameras at a Massachusetts theater. Because it was both unobtrusive and ubiquitous, Walker's crew was able to capture Knittle's spare, moving performance—accompanied by the hissing of his oxygen tank—with a closeness that would have been impossible using giant film cameras.

It's not just pop music that's rewiring the multiplex. New York City's Metropolitan Opera has sold 685,000 tickets to its HD performances this season, more than double what it sold last outing. Not bad, considering it's projected to sell 820,000 tickets to the opera-house performances this year. Because each show is broadcast live, says Met general manager Peter Gelb, "it makes people feel like they're part of this global opera community." Perhaps that's why the audiences are spontaneously applauding arias and standing for their favorite singers during curtain calls. The tenor can't hear the ovation, but it's not really for him anyway. It's for the guy in the eighth row who's never been that close to *Nessun dorma* before and wants to savor the moment.

—BY REBECCA WINTERS KEEGAN ■

Here's a followup to the stories about 3D movies and 3D stars and performers we ran in the last issue of Hyde Park.

This is the most remarkable aspect of 3D performances on movie screens (and presumably on home TV too). It transforms not just the experience but it also transforms the behavior of the audience too, to that of a real life experience!

We (both me and us) rarely go to movies or even watch them on TV and the ast live musicperformances we went to were back at UF in the 80's. Now, however we look forward to experiencing a 3D music presentation at the movies or on TV, and we may even be willing to "Pay per view" too.

Too bad one must still wear stereo googles or rather goggles. Presume they must be Polaroid like our stereotests.

And that Samsung ad sounds like we might have to buy yet anther new flat screen TV that can handle whatever the stereo signal is going to be... only $999.

Even 3D PDFs...->>

Binocular Vision &
Strabismus Quarterly©
A Medical Scientific e-Periodical

Hyde Park Editorial

Second Quarter of 2008
Volume 23 (No.2):
Pages 122-127

Benefits of Using 3D Objects in a PDF

PDF Professional lets you embed 3D objects in your PDF files and edit them inside the container PDF. Basic editing and display options are also available.

This can be particularly useful if you work in the 3D/CG industry (for instance as a 3D modeler, artist, or animator); or if you are an architect/engineer needing to present work in a portable fashion (the creator 3D application does not have to be installed on target machines).

Related Topics

Another Case of New Loss of Binocular Vision and Stereopsis

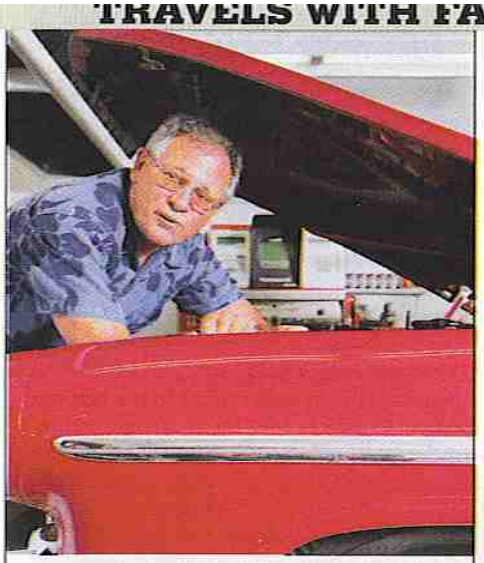
TRAVELS WITH FARLEY/BY CORY FARLEY

BMW Drivers: Take Heed

YOU MAY KNOW THE OLD joke about the difference between BMW drivers and porcupines. If you don't, send me an e-mail, and I'll provide the punch line, but I don't think I can print it here, even in these lax times.

The humor is rooted in the notion that drivers of certain German cars behave as though they were above the law, or at least exempt from the customs that make society run smoothly. I've never bought into that, but I'm changing my mind.

I've been motoring around lately with monocular vision. I can drive safely (or else I wouldn't drive at all), but some things I'm used to doing on automatic pilot take concentration. For someone who's been driving a long time, this temporary wake-up isn't a bad thing. When you examine your habits, you may be surprised at how sloppy some of them have become. Also, you may notice the habits of other drivers, which is how the Bimmer Brigade caught my eye. Porsche people,



too, to be fair, but there aren't enough of them to matter. On the West Coast, BMWs are nearly as common as Toyota Camrys, and it's astonishing how many are driven hyperaggressively. By which I don't mean well but, rather, stupidly.

I don't need mail about this, okay? I acknowledge that BMWs are exemplary cars, and I know many good drivers enjoy them prudently. By which I don't mean slowly but, rather, not stupidly.

It's the rest, that fringe 90 percent, who have captured my attention. I've never seen so many tailgaters, erratic lane swappers and bad-decision recidivists as I've noticed in BMWs in the last three weeks.

Got to be me, you're thinking: BMW drivers haven't changed in 21 days.

Probably not—but I'm seeing them now, and I'm convinced they've changed in 20 years. Once upon a time, Bimmers were enthusiasts' cars, bought mainly by people who appreciated their capabilities. Now, for many, they're just another status symbol to check off the life list.

You could compare it with what happened to pit bulls, mellow and rewarding dogs for many generations. Now the creature gets blame that should fall on its mishandlers, and many communities have restricted or banned the animals outright.

An early warning to the forward-looking 3 Series owner, if such there be.

—cfarley@crain.com

ONLINE: Don't miss the latest from columnist and West Coast editor Mark Vaughn at **autoweek.com**

Binocular Vision & Strabismus Quarterly© A Medical Scientific e-Periodical
Second Quarter of 2008 Volume 23 (No.2): Pages 122-127

(*Continued from prior page:)* A Comment: Readers of *BV&SQ* are familiar with your faithful Editor's descriptions of his own new loss of binocular vision and stereopsis due to a vitreous bleed from a suspended vessel following retinal detachment laser surgery: Binocul Vis Strabismus Q 2003; 51, 101,174, 253.

And the citation of that experience in these pages: (Stereo Sue: Regaining binocular stereoscopic vision in adulthood. BVSQ 21:160) which turned out to be relatively rare solitary, and isolated reports in the literature of this sort of happening, as pointed out in the last reference. So when we ran across another such report, we thought it should be added to the literature.

Do note that this author is a "car-nut", a writer for a car-mag, no MD, but do listen to what he says.

"I've been motoring around with monocular vision..., this contemporary wakeup isn't a bad idea... You may notice the habits of other drivers... [regarding the vast majority of BMW drivers:] I've never seen so many tailgaters, erratic lane-swappers and bad decision recidivists as I have noticed in BMW's in the last three weeks [since I have become monocular.].

As the author notes " BMW drivers haven't changed in 21 days."

Therefore we suspect that his new moncularity includes a loss of stereoscopic vision depth perception and that without it, his fellow drivers seem much closer and more threatening than they used to, especially when driving aggressively.

Loss of stereoscopic binocular vision may cause a warping of perception.

Your Editor in his trips to California in the last several years was overwhelmed with both the aggressiveness and proficiency of drivers there which he has witnessed no where else in his world wide driving experience! Considering the density and volume of the traffic, this seemed only a necessary and appropriate adaptation to their situation When traffic volume reaches choking limits, the only solution is more speed and more cars per unit distance/length (=tailgating and "aggressive" driving) to increase the number of cars the roads can swallow and pass.. Otherwise traffic will simply come to a halt. I was fully binocular on those trips!

VISION AND SEEING

from **Clinical Neurophysiology** 2008 in press:

FACING THE GAZE OF OTHERS.. George N, Conty L. Summary: Others' gaze constitutes a rich and essential social signal, which is decoded by taking into account other aspects of the face as well as the social context. Since the perceptions of averted gaze and direct gaze trigger distinct cognitive processes, the studies on gaze perception have focused separately on these two gaze directions. The perception of averted gaze induces orienting of spatial attention in the gazed-at-direction as well as joint attention processes while direct gaze or gaze contact signals interest directed at the observer's self and is often the preliminary to interindividual interactions. Studies in cognitive neuroscience focused first on averted gaze perception. However, recent studies have emphasized the asymmetries in

Binocular Vision &
Strabismus Quarterly©
A Medical Scientific e-Periodical

Second Quarter of 2008
Volume 23 (No.2):
Pages 122-127

the processing of direct versus averted gaze. This has led to a growing interest in the neural substrates of direct gaze perception. This issue has recently started to be actively addressed in our group using fMRI, MEG, EEG and source reconstruction methods. These studies emphasize that the perception of direct gaze elicits early processes that are related to face and eye movement encoding as well as to emotion and theory-of-mind. (CRNS, 47, Boulevard de l'Hopital, 75651 Paris, Cedex 13, France)

from *The Wall Street Journal* April 4, 2008 "Science Journal" by Robert Lee Hotz. **Some Scientists Argue We Are Built to Coo at the Sight of a Baby.** "Our brain can't help itself. ... whether or not we claim to like children.. Our neurons reflexively respond to an infant's big eyes, broad forehead, button nose and tiny chin. ... Using a technique called magneto-encephalography that measures brain signals, the Oxford researchers found that a baby's face can seize our attention in milliseconds, activating an unusual mental organ called the *fusiform gyrus* that responds to human faces. Moreover, these distinctive infant features, unlike the mature features of an adult, trigger a sense of reward and good feeling in a seventh of a second. Picture Bambi's saucer-size eyes or those of Mickey Mouse. ... we are probably all hard-wired to respond and care for babies, to help us perpetuate the species. ... the brain's intimate knowledge of faces is a byproduct of its ability to capture th visual essence of any object. 'You can show that parts of the brain most selective for faces are also responsive to cars in a car expert and birds in a bird expert' ... found four clusters of expert brain cells. One responds to faces; another just to places; a third to body parts, such as feet, knees, elbows and hands. There also is brain tissue devoted just to the visual appearance of written words - and that intrigues researchers on both sides of the debate, because humanity hasn't been reading or writing long enough for evolution to lend a hand. 'Letters and words could not be innate' ... That suggests something fundamental about the flexibility of the mind. Nature and nurture work together to shape out perceptions. To our eyes, every face is a unique volume in the library of human nature. We read its language at a glance, fluently translating a curled lip, raised eyebrow or averted gaze. 'Thee are billions of faces in the world, and we can recognize them all and tell them all apart'. ... So attuned are we to the pattern of eyes, nose and mouth that we can see faces where none exist: in cloud banks or rock formations on Mars, and even in the shape of a cinnamon bun said to resemble Mother Teresa. When that neural ability falters, as in autism, we can find friendly faces threatening. In a rare disorder called prosopagnosia, we can't recognize faces at all. ... located in the neurochemical essence of our face expertise in a strip of temporal lobe tissue about two inches long and three-quarters of an inch wide., ... consisted almost entirely of neurons that responded just to faces. It's innate." (*Sciencejournal@wsj.com*)

next issue will be Labor Day-ish -PER

Website of the Aniseikonia Inspector: http://www.opticaldiagnostics.com/products/ai

Optical Diagnostics

Clinical software in optometry and ophthalmology

Aniseikonia Inspector 3™

Product description

The Aniseikonia Inspector™, version 3, is a Windows software program for the clinical management of aniseikonia. It contains:

- a new aniseikonia test based on the latest research
- a unique design module to calculate correcting prescriptions (aniseikonia and anisophoria corrections)

For eye care professionals new in aniseikonia management or with an occasional aniseikonia patient, the software is also setup for easy consultation with Optical Diagnostics, including the downloading of new aniseikonia correcting prescriptions.

Why this product is of importance to you

- Attract more patients (you will be surprised how many aniseikonia patients there are).
- Increase revenue by prescribing iseikonic lenses.
- Stand out from your competition with the ability to manage aniseikonia.

Bruce Wick, OD, PhD (testimonials)
... and I find that it greatly simplifies aniseikonia management. Most patients can be tested with minimum instructions. Additionally, calculating an iseikonic prescription is made very easy. ...

Hardware/software requirements

- Desktop PC with color display
- Windows 98SE up to Windows Vista
- USB port (for the dongle)
- At least 64 MB of internal memory
- Screen resolution of 1024x768 or higher
- Color depth of 16.7 million colors (i.e. 24 or 32 bits)

(Check color depth and screen resolution by running this small program)