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Official Journal of POMMM-POMMM and SASS-
Pediatric Ophthalmologists for the Medical Management of Myopia
Scientists for the Abrogation of "Statistical Significance = p≤0.05"

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ARNOLDI: Next Generation Eye Care: The View Through the Prism (Guest Editorial)

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MATTA, SINGMAN, BRUBAKER and SILBERT: Auto-Objective Accommodative Measurements as a... New Method of Pediatric, Strabismus and Amblyopia, Vision Screening.

***** CASE REPORTS With Management and Outcomes *****

GONORAZKY and GAMIO: A Doubly Paradoxical Vertical Eye Deviation with an A Pattern Strabismus in Plagiocephaly

MIMS III: Three Similar but Unique Cases of Isolated Superior Rectus Extraocular Muscle (EOM) Palsy Strabismus, ... with Large Abnormal Head Tilts (Postures, AHP)

***** REVIEW *****

KHAWAM and FAHED: A Review: The Determination of Visual Acuity in Infants and Preliterate Children

HYDE PARK EDITORIAL: More AUTOSTEOSCOPIC STILL and MOVIE Fuji CAMERAS; Lanzhou; RFID, and a bunch of CAVEATS

THIRD Quarter, 2011
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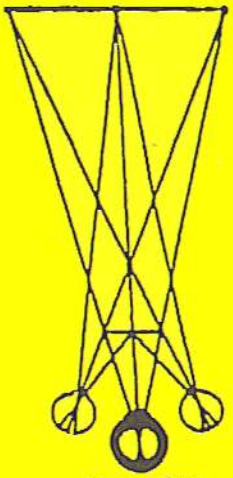
Fall
Spring



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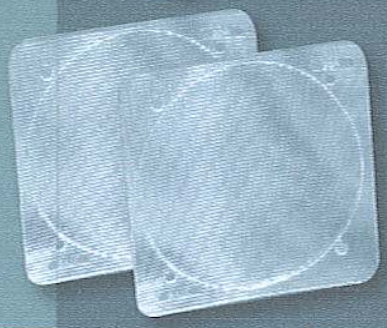

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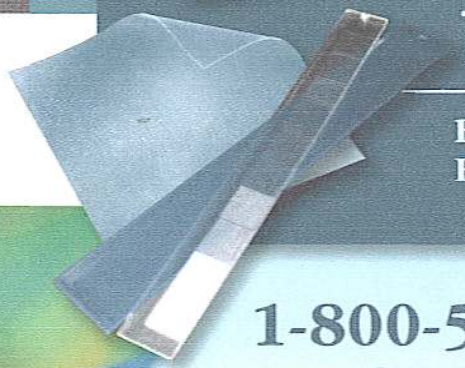

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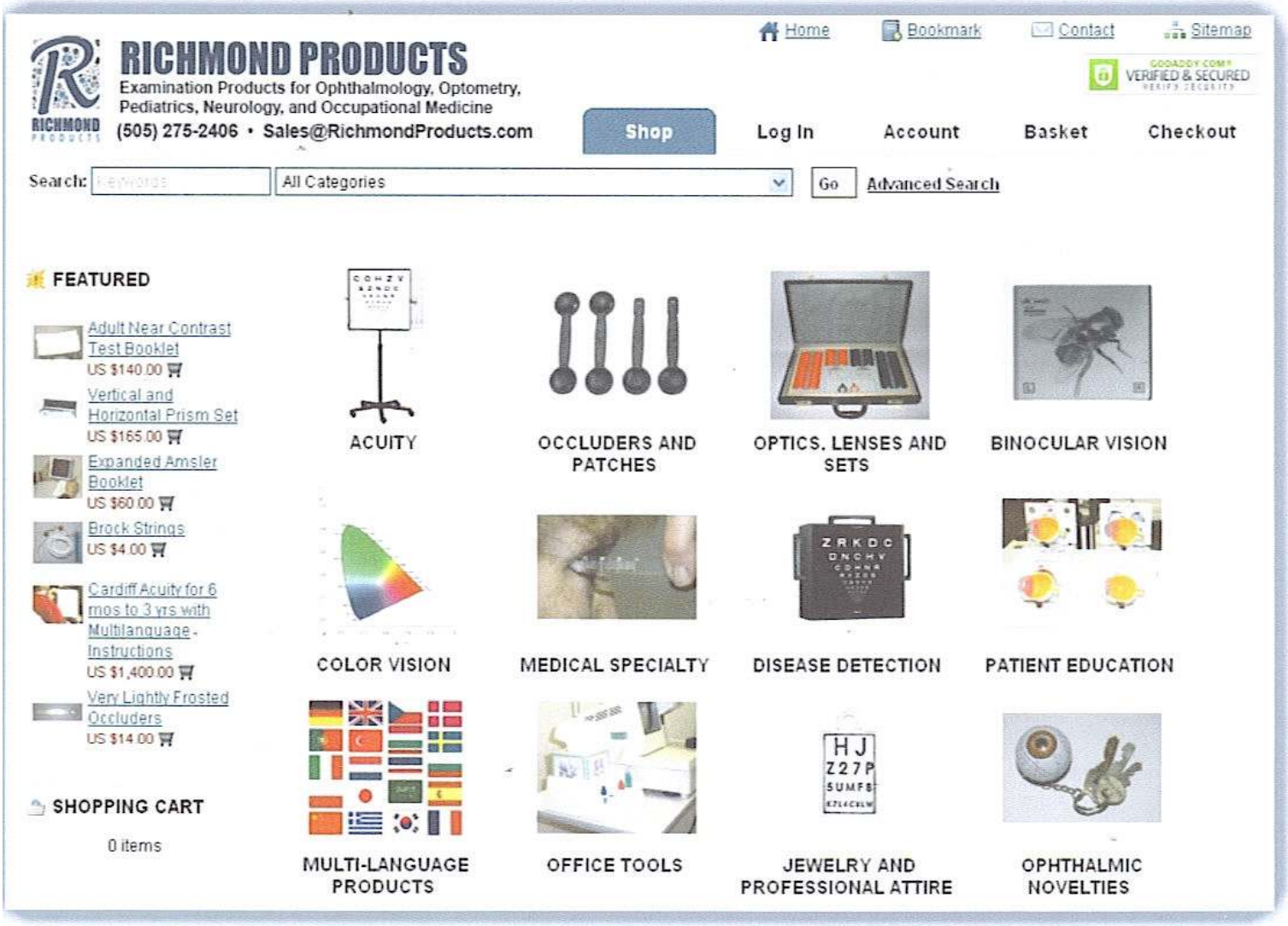

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September 20, 2011

Dear Colleagues and Friends,

The 2012 International Orthoptic Association Congress scheduled to be held in Toronto, Canada June 26 -29, promises to be another excellent IOA meeting with plans well underway. The 2012 IOA Congress will be held in conjunction with the Canadian Ophthalmological Society meeting. I am pleased to announce that AAPOS, ISA and CLADE will all be holding symposiums. Your attendance and input can help us make Toronto the top strabismus conference of 2012. Please consider submitting an abstract. **Abstract submissions are open now and close November 1, 2011**. Mark these dates in your diaries, review your research and clinical work and resolve to attend and to make a presentation. Click on the following link to see abstract submission guidelines at: ABSTRACT GUIDELINES

Looking forward to seeing you in Toronto in June 26-29, 2012!

Sincerely,

Karen McMain
Chair IOA Congress Organizing Committee

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

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

BINOCULAR VISION & STRABOLOGY
Quarterly, Simms-romano's

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

EDITOR **THIRD Quarter of 2011**
Paul E. Romano, M.D., M.S.O **Volume 26, Number 3**
MEDLINE Abbr. Binocul Vis Strabolog Q Simms Romano NLM ID: 101556982

Information for Authors can be found on the web site (binocularvision.net) or by sending an email to judyatbv@vail.net and a PDF copy will be sent to you.

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EDITORIAL: **STRABOLOGist Physician Extenders**? YES !... Auto-Screening; Doubly Paradoxical Strabismus; Big Head Tilts, MarqQ

IN THIS ISSUE

First. Welcome to **Kyle Arnoldi, C.O., C.O.M.T.**,, now -Jolley (but she indicated a desire to retain her maiden name I.D.as an author, *and that's a good idea as indexes track only names, not people)* who responded positively to our invite to join our Editorial Board and who also agreed to look at the future for her fellow orthoptists and other Eye M.D. *"**PHYSICIAN EXTENDERS**" (we do love that term as it is broad enough to include P.A.s (…Assistants, Orthoptists, Ophthalmic Technicians, and even Optometrists, who will not like to be so classified we are sure. The widespread use of the term P.A.- our local Orthopod offices list 7 M.D.s and 7 P.A.s, -one for each M.D.!... and the P.A. licensing business, throughout the rest of the medical and surgical subspecialties, raised the question of if and how ophthalmology might follow suit. But except for formal licensing of our several "extenders", ophthalmology has actually been way ahead , as usual, of everybody else.)* See and read on the next page:

Next Generation Eye Care: The View Through the Prism*. *Arnoldi K. Binocul Vis Strabolog Q Simms-Romano's 2011; 26(3):137-138;

*Evidence Based Scientific Article: **Auto-Objective Accommodative Measurements as a Valid and Reliable New Method of Pediatric, Strabismus and Amblyopia, Vision Screening. Matta NS, Singman EL, Brubaker C, Silbert DI. Binocul Vis Strabolog Q Simms-Romano's 2011; 26(3) 145-145.***

Oh! "AUTO-"!!!! AND! "OBJECTIVE" !!!!! HEAVENS !... ? Screening, of children ...wouldn't it be???. Hold your breath for the results, will it work? How about:..... "**ALL** *(-ed caps and bolded)* children measuring -1.25D of sphere or higher (less negative), or measuring +1.25D of astigmatism or more without correction were found to have amblyogenic factors based on the standard, AAPOS referral criteria." This was a retrospective chart review conclusion. Now they must test the hypothesis also going forward. You could too. Looks very promising!

A Doubly Paradoxical Vertical Eye Deviation with an A Pattern Strabismus in Plagiocephaly: Management and a Case Report with Outcome. Gonorazky M, Gamio S. Binocul Vis Strabolog Q Simms-Romano's, 2011; 26(3) 146-152.

Certain ocular motility problems are expected for this maldevelopment of the skull. In this case, just the opposite appeared. Excellent illustrations and presentation.

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People & Places: Guest Editorial Kyle Arnoldi, CO, COMT

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WELCOME TO NEW EDITORIAL BOARD MEMBER,

KYLE ARNOLDI, CO, COMT

Kyle has twenty-six years experience in orthoptics, and strabology, and also pediatric and neuro-ophthalmology as an orthoptist, educator, and clinical researcher.

Most recently she was elected to and served four outstanding years as the President of the American Association of Certified Orthoptists (AACO) from 1998 to 2002.

Kyle had received the Richard G. Scobee Award for Excellence in Orthoptic Teaching in 2002; was awarded the AACO Lancaster Medal in recognition of "meritorious contributions to orthoptic excellence" in 2004; awarded the AAPO&S Honor Award in 2010, and the AAO Achievement Award in 2010. She delivered the Scobee Memorial Lecture in 2000; the John-Pratt Johnson Lecture in 2004; and the Burian Lecture in 2004.

Kyle has 34 scientific articles published in peer-reviewed journals; has authored one book and two book chapters; delivered over 68 lectures and workshops, and has participated in multiple symposia.

Kyle is currently Associate Editor of the American Orthoptic Journal, and Chair of the AACO's Education Committee.

We are very proud to have her join us after having (and now proudly claiming that "we" [as in "both of us"] did !) assist(ed) with her initial training as an orthoptist and strabologist and OT at the University of Florida a "few" years back.

Please do enjoy her following Invited Guest Editorial on the future of orthoptics which we invited her to write and to which invitation she has she graciously accepted.

Guest Editorial: Next Generation Eye Care: The View Through the Prism. Kyle Arnoldi, C.O. COMT

As of August 2011, the U.S. Census Bureau has estimated that the population of the United States is increasing by one person every 12 seconds. In addition, improvements in health care have resulted in greater survivability of at-risk infants, as well as

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People & Places: Guest Editorial Kyle Arnoldi, CO, COMT
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longer life spans. In anticipation of an expanding and aging population, the ophthalmologist's office and surgical suite have become much more efficient. In addition, the number of ophthalmologists graduating from residency programs is increasing. By further enhancing patient care efficiency, without sacrificing quality of care, the ophthalmologist will be able to effortlessly meet the future demands of patient care.

Many other surgical subspecialties, such as neurosurgery and plastic surgery, have successfully utilized physician extenders to improve efficiency and quality of care. Some have suggested developing an ophthalmological counterpart to these physician extenders: a completely new eye care professional, a Physician's Assistant who has successfully completed a post-graduate fellowship in ophthalmology. Others have pointed out that there is already an ophthalmological paradigm for this system in place and functioning successfully. The prototype is the team of pediatric ophthalmologist and orthoptist, comprising what is arguably one of the most efficient subspecialty eye care teams in practice.

Orthoptists have long functioned as highly-skilled physician extenders, requiring only general physician supervision (as defined by the Medicare Carrier Manual, Section 2050). The U.S. Department of Labor, Employment and Training Administration (ETA) list Orthoptists (profession 29-1199.05) under the category of Health Diagnosing and Treating Practitioners. This is the same category shared by Nurse Practitioners and Nurse Anesthetists. The ETA divides jobs into zones according to the extent of preparation needed to enter the field, the knowledge, skills, and experience necessary, the tasks, work activities, work context, and tools and technology used in the execution of duties. There are five such "Job Zones", and the ETA has categorized Orthoptics in the highest of these, Zone Five.

Orthoptists are educated and certified in ophthalmic diagnostic techniques and interpretation, and non-surgical management of many ocular conditions. In the United States, orthoptic practice has largely been limited to the specialty of pediatric ophthalmology and strabismus. But around the world, orthoptists have always had a much broader role in ophthalmology. In addition to what is considered routine orthoptic practice (including vision screening, assessment of special needs, and assessment and rehabilitation in neurological disorders), orthoptists worldwide work with ophthalmologists in many subspecialty areas, including low vision assessment and management, glaucoma assessment (perimetry, tonometry, keratometry, and biometry) and stable glaucoma management, ultrasound and visual electro-diagnostics, ophthalmic photography, retinoscopy and refraction including the prescription of corrective lenses, and assisting in ophthalmic surgery. [See www.internationalorthoptics.org for more information.]

Economic, political, and scope of practice conditions unique to the United States have limited the practice of orthoptics and the number of orthoptists in this Country. Due in part to an increase in demand, five new orthoptic programs have opened across the United States over the past two years! Also, the number of orthoptists certified per year has risen dramatically over the past five years. But there is a potential for even greater growth that could benefit all of ophthalmology! In order to maximize potential and cost-effective care, orthoptists would need to be licensed similarly to P.A.s and nurse practitioners. This important next step is not one that orthoptists can undertake alone.

Imagine a boat in the middle of an ocean. This boat is seaworthy, but has no sail, no engine, not even an oar with which to power it. The boat does, however, have a rudder with which the passengers deftly navigate the waters. The winds and currents are sometimes favorable. Occasionally there are predators in the water. At other times, larger ships pass and the boat is able to ride the wake. There are about 225 highly skilled people on this boat, and they have been at sea for over 60 years, making slow progress through the changeable waters. The name of this boat is "American Orthoptics". This craft needs only a little push from our ophthalmologist colleagues to move forward in a direction that will allow us to support the AAO in its mission to provide state-of-the-art eye care to all those in need, now and in the future.

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Editorial:

P. E. Romano, MD, MS Ophthalmology

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Three Similar but Unique Cases of Isolated Superior Rectus Extraocular Muscle (EOM) Palsy Strabismus, Presenting with Large Abnormal Head Tilts (Postures, AHP). Mims III JL. Binocul Vis Strabolog Q Simms-Romano's 2011; 26(11):154-169.

You will be exhausted, like the author, by the time you get to the end of these three extraordinary cases of strabismus. The similarities are more remarkable. So is the author's memory for not totally repressing the memories of these cases for the difficulties he had managing them! He accomplished wonders, surgically and psychologically and emotionally for himself, his young patients and their parents in the extended long course of their treatments. No wonder"beautifully straight" was his favorite "outcome".

A Review: The Determination of Visual Acuity in Infants and Preliterate Children. Khawam E, Fahed D. Binocul Vis Strabolog Q Simms-Romano's 2011; 26(3):170-179.

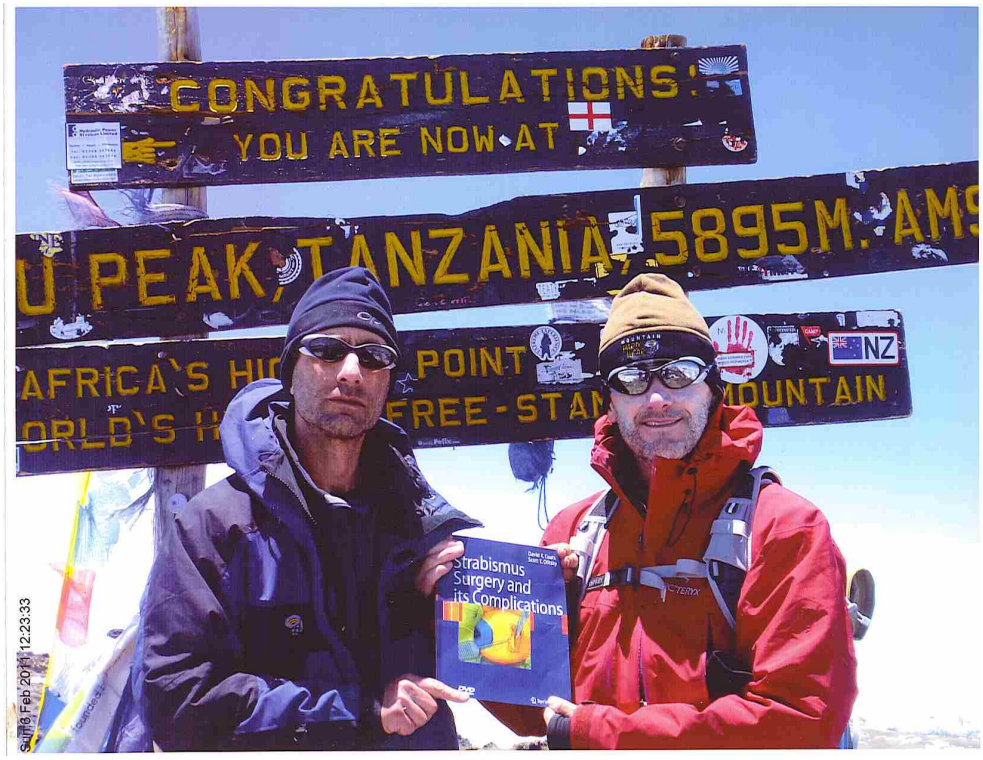
A superb review and setting out of the first author's accumulated 45+ years of vast experience in strabology and pediatric ophthalmology since his first year or so of rotating strabology fellowships in the United States, a real pioneer in our field(s) (and surviving his home environment in Lebanon).

What is "**MarqQ**" ? catch the last couple of pages of Hyde Park again, all you cyclists. It is our abbreviation for life rule 3 or maybe 2point5. But now that is really intended for all of us.

All the Aspens in Summit County went Gold 2 days ago when real Gold left!! -per

---

ERRATUM: ***In the last issue the editor misidentified his old friends and BV supporters on the summit of Mount Kilimanjaro: (Part of the aging brain-memory problem, it is believed). So here they are again, correctly this time:*** **Yes, that is Scott Olitsky on the left and David Coats on the right.**



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Utliizing Automated Objective Accommodative Measurements As A New Method of Pediatric Vision Screening, **NS Matta, CO, CRC**, EL Singman, MD, Phd, C. Brubaker,COA, ROUB, DI Silbert, MD FAAP
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Auto- Objective Accommodative Measurements as a Valid and Reliable New Method of Pediatric, Strabismus and Amblyopia, Vision Screening

NOELLE S. MATTA, CO, CRC, ERIC L. SINGMAN, MD, PhD,
CHRISTINA BRUBAKER, COA, ROUB,
and DAVID I. SILBERT, MD, FAAP

from the Vision Science Department, Family Eye Group, Lancaster, Pennsylvania

ABSTRACT: ***Purpose:*** Recent technological advances in photoscreening devices have improved their performance for pediatric vision screening. Monocular noncycloplegic autorefractors have also been used but cannot assure that accommodation is held constant between the two eyes. In this study we utilized a simple child's near autorefraction without correction on the open field Grand Seiko autorefractor to determine if it alone could be a viable method of pediatric vision screening to detect amblyopia risk factors.

Design: Retrospective chart review.

Participants: Fifty-two consecutive children with known amblyopia risk factors were enrolled into this study.

Methods: Children had their accommodation measured at 1/3 of a meter without glasses correction.

Main Outcome: In our study children with amblyopia or amblyopia risk factors were found to have abnormal readings indicating either poor ability to focus, or high refractive error. All children measuring -1.25D of sphere or higher (less negative), or measuring +1.25D of astigmatism or more without correction were found to have amblyogenic factors based on the standard, AAPOS referral criteria.

Conclusion: Children with amblyopia or amblyopia risk factors have classifiably abnormal autorefraction readings at near on the Grand Seiko binocular open field autorefractor. Measuring near autorefraction utilizing the Grand Seiko autorefractor may be a new and viable option for pediatric vision screening in the medical home(defined as the patients primary care doctor, which in this case could be a family doctor or a pediatrician).

Received for consideration February 11, 2011; accepted for publication March 22, 2011

Correspondence to: Noelle Matta, Family Eye Group, Vision Science Department, 2110 Harrisburg Pike, Suite 215, Lancaster PA 17601.
Email: NoelleMatta@gmail.com

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INTRODUCTION

Pediatric vision screening is divided into objective and subjective testing. Subjective testing, involves measuring vision with an eye chart, which requires cooperation from a child and may be more difficult in young children. Objective testing detects amblyopia risk factors such as significant refractive error, or strabismus requiring less cooperation from a child. Currently available devices include binocular photoscreening systems such as the PediaVision/plusoptiX (2,3), Iscreen (4) and Visiscreen (5).

Two monocular autorefractors, the Retinomax (6) and SureSight (7) have also been studied as vision screening devices. A reported disadvantage to these devices is that readings for each eye are taken separately, and accommodation cannot be controlled. A third autorefractor the Grand Seiko Autorefractor (GSAR) which differs significantly from these other two devices has some potential advantages as a vision screening device. It is an open field autorefractor that has the ability to take a refractive measurement at various gaze distances while both eyes have an unimpeded view (8). For example, a target can be set at 10 feet to obtain an autorefraction reading at distance or positioned at 1/3 of a meter from the patient's eyes to measure an autorefraction under accommodative demand. Although the measurements are taken on each eye separately, the patient remains binocular while accommodating on the target, thus accommodative effort can be held constant between the two eyes. This should give the device an edge over monocular autorefractors, giving it some of the advantages of a binocular photoscreener. Specifically, an open field autorefractor could be expected to be less likely to produce artifactual readings of anisometropia due to differential in accommodation between the two eyes. The device is also more likely to reflect true anisometropia, a risk factor for amblyopia, since the nonamblyopic eye likely drives the level of accommodation effort for both eyes. The device might better refer accommodative esotropia as compared to a monocular autorefractor, as the device might have difficulty obtaining readings or give an aberrant reading in an esotropic eye due to it's poor alignment which would also lead to a referral.

We set out to explore if the Grand Seiko Autorefractor used with an accommodative target at 1/3 of a meter could accurately identify children with amblyopia and amblyopia risk factors.

MATERIAL AND METHOD

Prior to starting this research we received Institutional Review Board (IRB) approval through the Lancaster General Hospital. We received a waiver of consent due to the low risk of this research and followed appropriate Health Insurance Portability and Accountability Act of 1996 guidelines.

Fifty-two children with confirmed amblyopia or amblyopia risk factors seen over a two-month period in a pediatric ophthalmology practice were included in the study. Patients had their near non-cycloplegic refraction measured at 1/3 meter on the Grand Seiko auto refractor.The children did not wear spectacle correction and the device was operated by either a certified orthoptist (NM) or certified ophthalmic technician (CB). There were no exclusion criteria.

The patient was seated comfortably on a chair with their head on the chin rest. The

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patient's forehead was pressed against the headrest and they were asked to keep their teeth together and not talk. A small light box with 20/70 letters (near vision) was placed in line with the center of the patients face at eye level, 1/3 meter from the patient. The patient was asked to focus on a letter and keep it as clear as possible. Testing took approximately 30-45 seconds in total. For each eye, the device measured five readings, and averaged these readings.

All children had a pediatric ophthalmology exam on the same day by the same pediatric ophthalmologist (DS). A cycloplegic exam and refraction had been performed within the past 6 months or was performed that day. Patients were considered to have amblyopia or amblyopia risk factors on the comprehensive examination based on the **American Association for Pediatric Opthalmology and Strabismus (AAPOS) referral criteria guidelines:**

anisometropia (spherical or cylindrical) > 1.5 D;

any manifest strabismus;

hyperopia > 3.5 D in any meridian;

myopia magnitude > 3.0 D in any meridian;

any media opacity > 1 mm in size;

astigmatism> 1.5 D at 90 degrees or 180 degrees > 1.0 D in oblique axis (> 10 degrees eccentric to 90 degrees or 180 degrees);

blepharoptosis ≤ 1 mm margin reflex distance

RESULTS

Accommodation at 1/3 of a meter in an emmetrope with normal accommodation and no accommodative lag would be 3 diopters. The corresponding measurement on the GSAR would then be expected to be -3.00 diopters. In reality there frequently is some variability in normal patients and some accommodative lag, thus we have found a reading of -2.00 D or less negative to be indicative of abnormal accommodation. A hyperopic or myopic child without anisometropia and without amblyopia would be expected to have the ability to accommodate normally on a target at 1/3 of a meter either accommodating more for a hyperope to bring it into focus, or for a mild myope to relax accommodation to keep the image in focus, and thus would be expected to have normal readings with the Grand Seiko autorefractor. With high hyperopia, high myopia, high astigmatism or amblyopia with poor accommodation, this would not be the case, and the non cycloplegic AR readings would be expected to be abnormal.

Fifty-two children were included in this study, for a total of 104 eyes. The noncycloplegic autorefractor readings at 1/3 meter were compared to the cycloplegic refractions of the children. The children were classified as having amblyogenic factors based on their cycloplegic refractions. This was then correlated with the noncycloplegic Grand Seiko autorefraction readings to create cutoffs to predict the presence or absence of amblyopia risk factors.

Of the 104 eyes, nine had an "NA" reading indicating that, despite good cooperation, the machine could not obtain a reading (in all cases due to an eso or exotropia). No children with normal binocular

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alignment received an "NA" reading. Seventeen eyes had no significant refractive error. Forty-five eyes had significant refractive error and amblyopia (vision of 20/40 or worse) and 33 eyes had significant refractive error and no amblyopia (vision 20/30 or better). These were the sound eyes in amblyopic children. Children were between the ages of 3 and 14 years old (mean age 5 years old).

All eyes identified as "positive" for amblyopia risk factors had one or more of the following measurements on the Grand Seiko Autorefractor (**see also Table, below**)

A sphere of between -1.25 to 0.00 diopters

A hyperopic sphere

A sphere of -6.00 diopters or more myopia

A cylinder of +1.25 diopters or more

A "NA" (unable) reading on either eye

All eyes **without** amblyopia risk factors had the following characteristics on the GSAR:

A sphere of between -1.50 to -0.25

A cylinder of +1.00 diopters or less.

:

TABLE: Representative examples of children screened and Findings and Results

	Cyclo RX OD	Cyclo RX OS	GSAR OD	GSAR OS	Diagnosis
Patient #1	+1.75 +2.50	+1.00 +2.75	-3.25 + 2.75	-3.25 +3.00	Bilaterally high astigmatism and amblyopia
Patient #2	+6.50 +1.00	+6.50 +1.00	-1.25 sph	Unable	Accommodative esotropia, tropic during testing
Patient #3	+4.50 sph	+1.75 sph	+1.75 +0.25	-2.00 +0.25	Anisometropic hyperopia and amblyopia right eye
Patient #4	-0.25 +1.50	-7.75 + 2.50	-3.50 +1.75	-12.25 +3.25	High astigmatism and amblyopia both eyes, anisometropic high myopia left eye
Patient #5	+4.75 +0.50	+5.50 +0.50	+1.75 +0.50	+2.50 +0.50	Bilateral high hyperopia and amblyopia

LEGEND for Table.

Cyclo RX OD = Cycloplegic refraction of the right eye, Cyclo RX OS = Cycloplegic refraction of the left eye, GSAR OD = Accommodative readings on the Grand Seiko Auto Refractor at 1/3 of a meter of the right eye, GSAR OS = Accommodative readings on the Grand Seiko Auto Refractor at 1/3 of a meter of the left eye.

DISCUSSION

Children with amblyopia or amblyopia risk factors were noted to have classifiably abnormal readings of non-cycloplegic near auto refraction when tested on the Grand Seiko. Abnormal readings included subnormal accommodation, high myopia, high astigmatism or an "NA" reading for a tropic eye. Generally, poor accommodation at 1/3 of a meter on the Grand Seiko was found to be highly correlated with high levels of hyperopia, either amblyogenic or deemed to be potentially amblyogenic under the AAPOS referral criteria. The cylinder readings of the GSAR also were very effective in predicting amblyogenic levels of Astigmatism. All patients with a tropia were quickly failed, as the device was unable to obtain a reading on them because of the binocular viewing condition of the test which would not mask a tropia as would be normally expected in a monocular environment. The GSAR was also quite effective in screening for high levels of Myopia.

Studies have showed refractive error as the cause of amblyopia in up to 47-78% of the children (10,11). Given the high prevalence of refractive amblyopia, a device such as the Grand Seiko open field autorefractor could potentially be very cost effective in screening for amblyopia in the pediatric/medical home. Commercially available binocular autorefractors typically employ a pay per click model, costing 8-10 dollars per use making it costly for a pediatrician to use the device. The GSAR can be purchased outright, and unlike the binocular photoscreenersdoes not require pay per click. Without recurring costs, it could be useful and very cost effective for large pediatric groups and clinic populations.

Using an autorefractor to measure accommodation at 1/3 meter appears to be a useful option for pediatric vision screening. This study identified preliminary referral criteria to use with the GSAR in order to screen for amblyopia. Further studies should be performed to evaluate the GSAR as a screening device to further test these referral criteria. The GSAR has the advantage of allowing for measurement of refraction in either eye while fixating binocularly on an accommodative target an advantage as compared to typical monocular autorefractors. It is a relatively inexpensive and durable tabletop machine. It can be purchased outright, not requiring pay per click, and not incurring recurring costs. These characteristics may make it an ideal device for screening in the pediatric/medical home.

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Case Report with Management and Outcome

A Doubly Paradoxical Vertical Eye Deviation with an A Pattern Strabismus in Plagiocephaly: Management and a Case Report with Outcome

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from the Departments of Ophthalmology, Niño Jesús Children's Hospital, Tucumán and ** the Ricardo Gutiérrez Children's Hospital, Buenos Aires, Argentina*

ABSTRACT: Anterior plagiocephaly is a craniofacial anomaly related to premature unilateral synostosis. We present a case of anterior plagiocephaly with vertical strabismus, overaction of the contralateral superior oblique muscle and an A pattern. A detailed ophthalmic examination and radio-imaging were done. The patient underwent strabismus surgery and resolution of the strabismus was obtained.

Plagiocephaly has been reported to simulate ipsilateral superior oblique muscle paresis. We report a rare occurrence of contralateral superior oblique muscle overaction in an adult with anterior plagiocephaly.

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INTRODUCTION

Plagiocephaly involves the unilateral premature fusion of the coronal suture during the intrauterine development. Unilateral coronal suture stenosis provokes a shortening of the orbital roof on one side(1). Plagiocephaly is known to be associated with mechanical pseudo paralysis of the ipsilateral superior oblique (SO) muscle with upshoot in adduction, with ipsilateral overaction of inferior oblique(IO)(1,2). A V-pattern strabismus is more common (3).

Several explanations have been proposed for these motility abnormalities:

1. The shortened orbital floor forces the globe to rest forward on the inferior oblique and inferior rectus muscles (4).
2. The shallowed medial orbital wall increases the angle (54 degrees) between the SO tendon and visual axis and eliminates its mechanical advantage as a depressor (5).
3. Some amount of the thus advantaged IO overaction leading to a V pattern may be related to anomalous muscle vectors because of the excyclotorsion of the globe (6,7).

We present a case of right sided anterior plagiocephaly with vertical strabismus, doubly paradoxical contralateral superior oblique dysfunction and A pattern.

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CASE REPORT

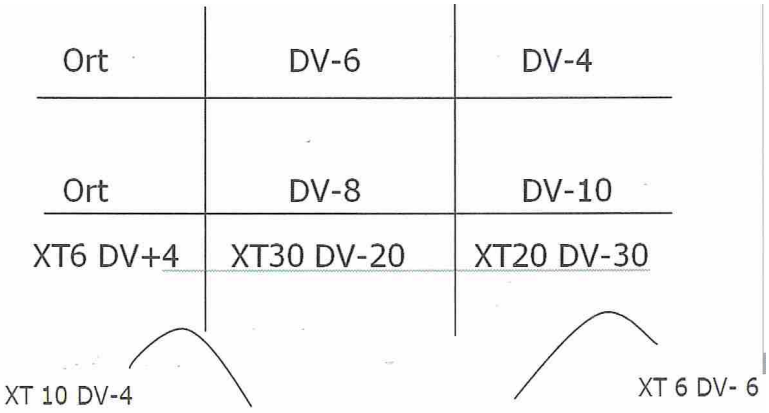
A 30 year-old female presented to us with complaints of strabismus since childhood. She was a product of full-term caesarean delivery with normal birth weight.

Visual acuity in both eyes was 20/20 unaided, with right fixation preference. Ocular motility examination showed a hypertropia in the left eye, a superior oblique overaction in the right eye, **(Figure 1, Below)** and a dissociated vertical deviation (DVD) OU. An A pattern of 25 prismdiopters (pd) was noted. No hemifacial hypoplasia was mentioned by the patient.

Figure 1 (Gonorazky and Gamio): *Patient upon presentation: Right superior oblique eye muscle overaction, (Right,Top frame) and an A pattern strabismus on vertical gaze.*

Preoperative strabometry measures (Binocular deviation in the cardinal gaze positions) were obtained in pd with the alternate prism cover test. **(Figure 2 Below)**.

Figure 2 (Gonorazky and Gamio): *Patient's Pre- operative strabometry measures in cardinal gaze positions at ca 1 meter distance with alternate prism cover test, in pd's: (DVD ou)*



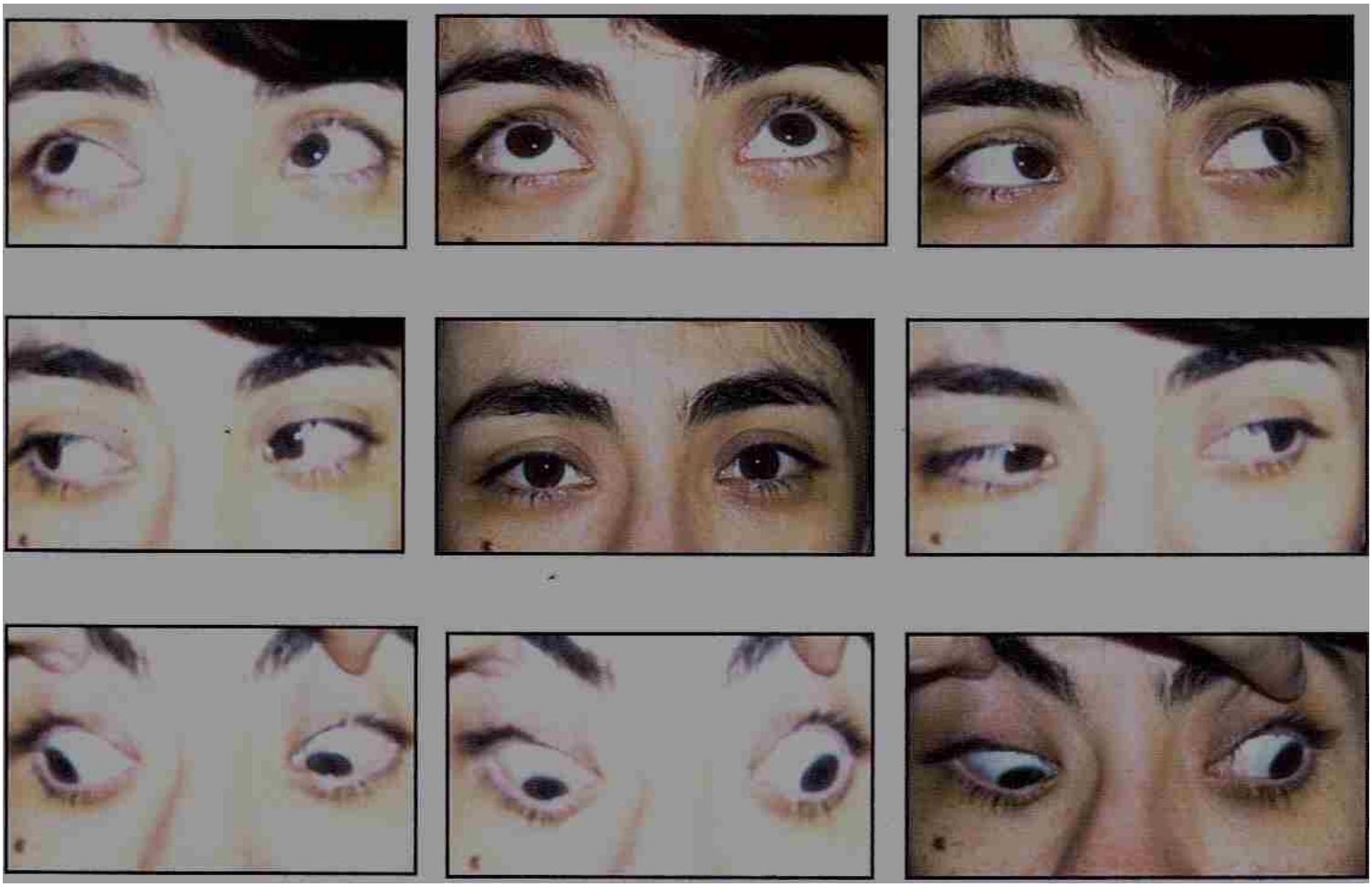


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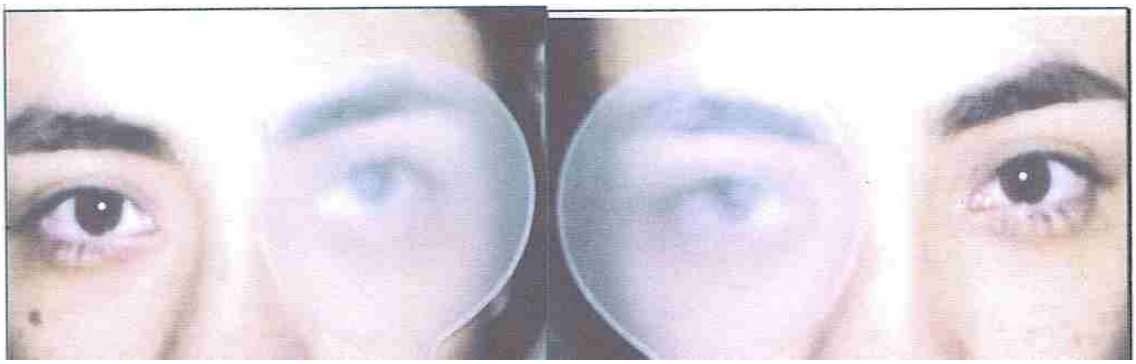
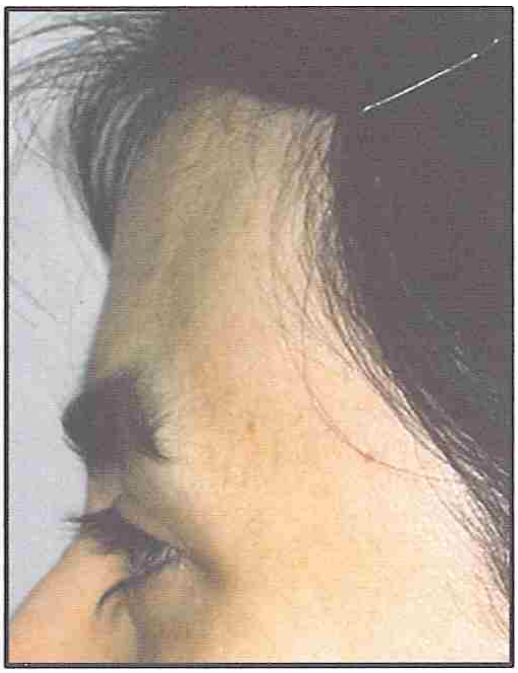
Figure 3: RIGHT -> (Gonorazky and Gamio):*Patient on presentation: Bielschowsky head tilt phenomenon (Test) was negative. (No abnormality).*

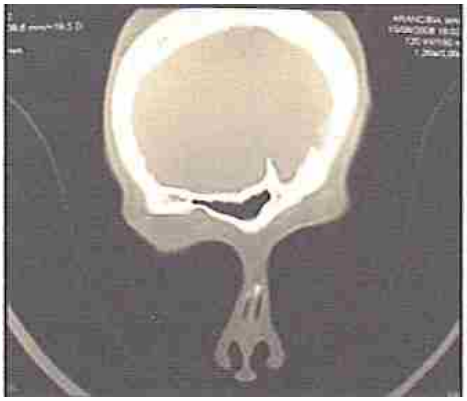


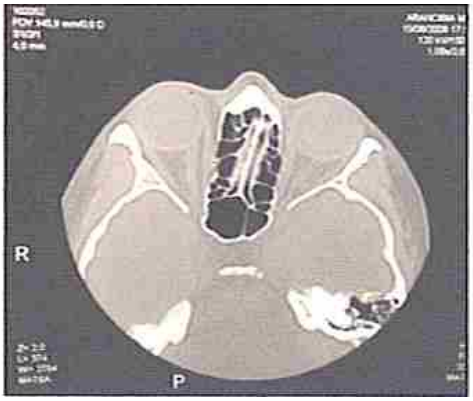
<-Figure 4: <- (Gonorazky and Gamio):*A translucent occluder of Spielmann was used to diagnose the bilateral DVD.*

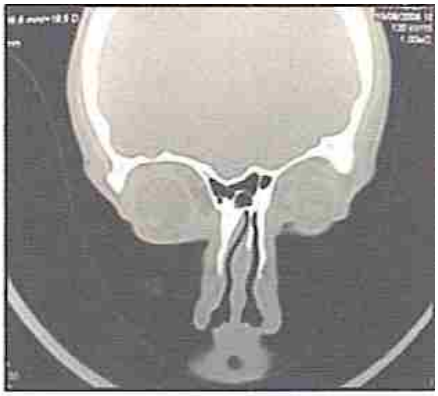


<-Figure 5: <- (Gonorazky and Gamio):*Flattening of the frontal bone on only the left side of head <-nearest frame*

Below:Figure 6: (Gonorazky and Gamio):*CT scan see text below.*







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A computed tomography (CT) scan and a resonance magnetic image were ordered (RMI). A left-sided frontal plagiocephaly was confirmed (**See Figure 6 Above/prior page and Figure 7, Below**)

The upper axial CT scan above shows the left-sided flattening and distorsion of the skull, and the shortened and narrowed left orbit. The lower RMI below shows the left sided frontal plagiocephaly.

Figure 7: (Gonorazky and Gamio): *RMI (Resonance Magnetic Imaging) confirming frontal plagiocephaly.*

Surgical Management of Strabismus

After induction of a general anesthetic, an intraoperative forced duction test was performed, and it was negative in both eyes.

Patient then underwent a recession of the right superior oblique tendon for the right superior oblique overaction.

After surgery, she was binocularly well aligned in primary position postoperatively. (**SEE Figure 8, for Strabometry below**) However, the right superior oblique muscle still showed mild overaction but there was no longer any significant pattern strabismus. The bilateral DVD persisted postoperatively unchanged. (**See Figure 9, Top, next page**)

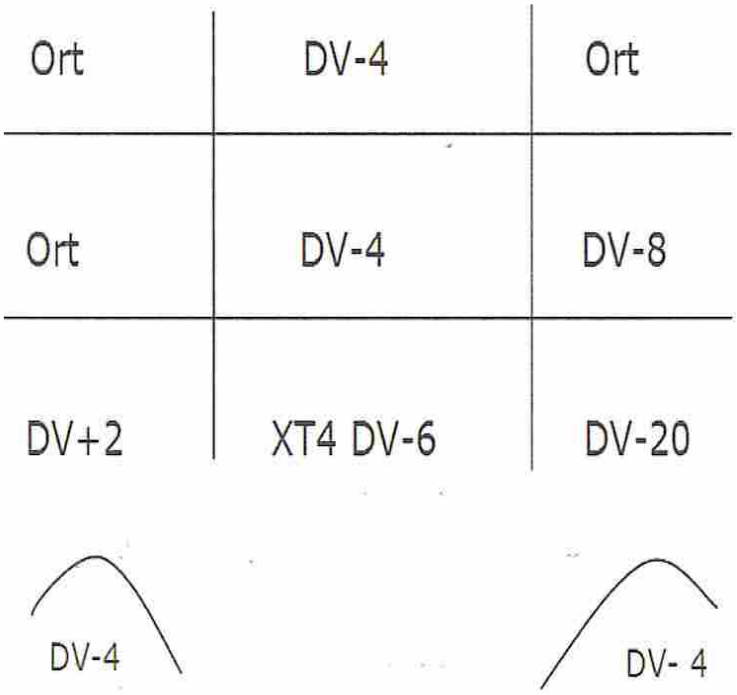
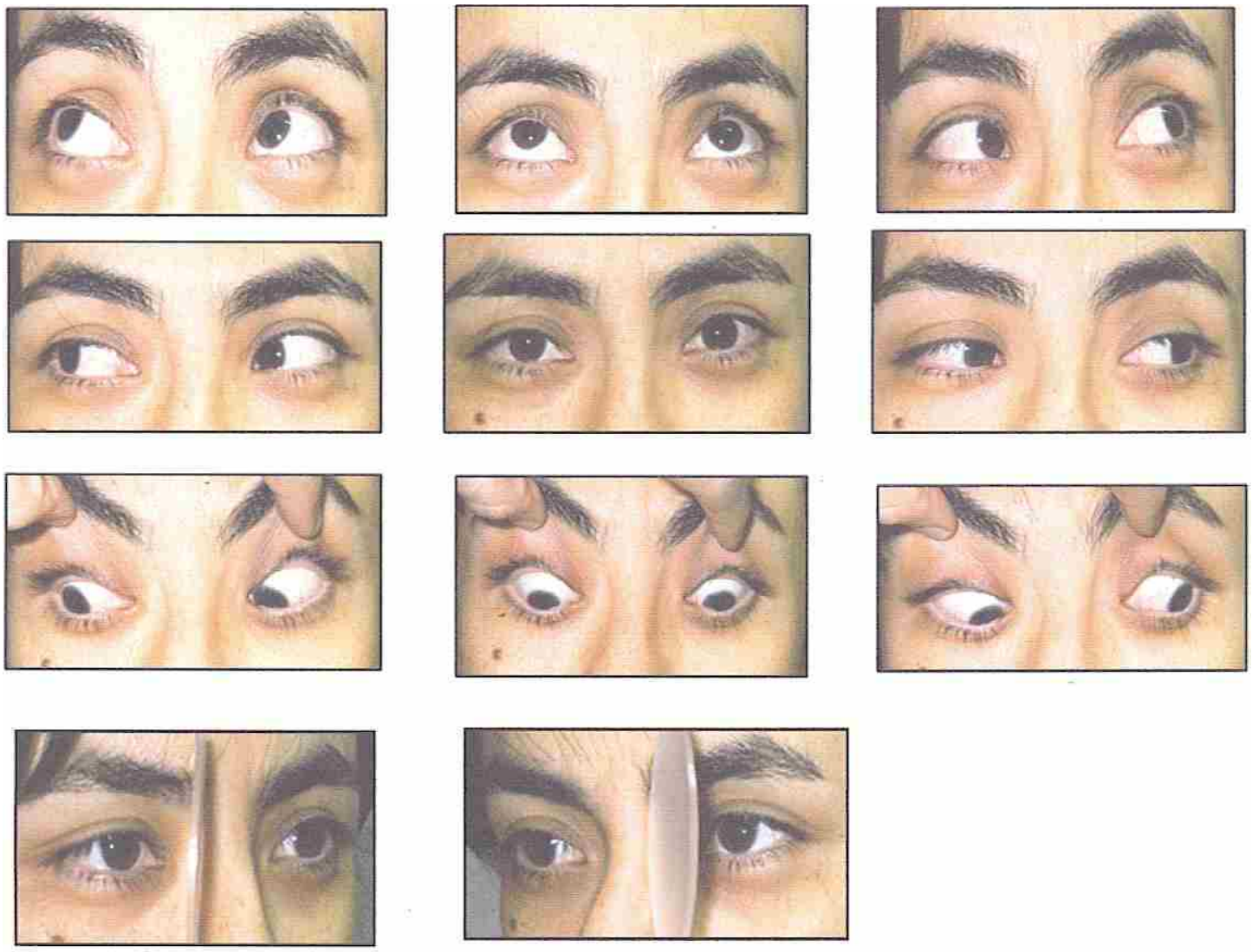


Figure 8: (Gonorazky and Gamio): *Post- operative strabometry measurements were obtained with alternate prism cover test.*



ABOVE:

Figure 9: (Gonorazky and Gamio): *Postoperative pictures showing eyes binocularly well aligned in primary position, residual slight right superior oblique overaction, small residual A pattern. DVD persisted postoperatively unchanged, demonstrated on lowest two frames, behind the translucent occluder used in the preoperative Figure 4.*

DISCUSSION

Plagiocephaly is a cranial synostosis caused by premature closure of one half of the coronal cranial suture. It is typically manifested by asymmetry of the face of a varying degree with vertical strabismus on the affected side and tilting of the head to the sound side. Plagiocephaly is known to be associated with ipsilateral overaction of inferior oblique. V-pattern strabismus is more common in both esodeviation and exodeviation, reported rates range from 59 to 100% (3)(4). Several explanations have been proposed, enumerated in the Introduction (Page 146) .

Tay, et al., found high prevalences of strabismus (88.9%) and V-pattern (55.5%) in craniofrontonasal dysplasias (8)

Brown and coworkers (9) studied with anthropometric methods the relationship between orbital malpositioning and strabismus in plagiocephalic children and established a quantitative correlation between the degree of orbital anomalies (vertical displacement, intorsion, and frontodisclination) and the hypertropia in the nasal field on the involved side.

Macinthosh, et al. (10), reported that manifest strabismus in the primary position was found in 57.6% of the cases. In 55.9% of them this occurred contralateral to the fused suture, strabismus was on the ipsilateral side in 26.5 % of the cases. These results are contrary with apparent findings in the literature but are not statistically significant (P=0.0872) for strabismus occurring more frequently on the nonsynostotic side. Esotropia with a vertical component was most common, found in 61% of all cases with strabismus. Apparent inferior oblique overaction was found in the 50.8% of the cases, with this occurring bilaterally in 23 % of them.

Jethani, et al. (11), published the occurrence of contralateral superior oblique muscle overaction in three children with anterior plagiocephaly. Two cases underwent a unilateral recession resection surgery with posterior tenectomy of the superior oblique for two of them. (The third patient did not want to undergo any surgical intervention.)

Our patient had left-sided plagiocephaly and right-sided (contralateral) superior oblique overaction. The surgical decision was based on this report of this uncommon situation.

In our patient, ocular motility examination showed hypertropia of the plagiocephalic left eye, an A pattern with XT in downgaze. And a bilateral DVD. The A pattern usually correlates with bilateral superior oblique overaction or DVD. In our patient the hypertropia was increased on left and down gaze, while on right gaze she was binocularly aligned. Pre- and postoperative Bielschowsky head tilt test did not show a superior rectus contracture. The restoration of normal binocular alignment was good in primary position. Recession of the right superior oblique tendon is an accepted procedure for 30 pd or more A pattern which our patient had.(12)

The right-sided inferior oblique was not recessed since the patient did not show any significant inferior oblique overaction.

Strabismus in craniofacial anomalies is a most challenging problem. The ophthalmologist has to assess unique motility patterns. Treatment should be specific for each case.

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Three Similar but Unique Cases of Isolated Superior Rectus ExtraOcular Muscle (EOM) Palsy Strabismus Presenting with Large Abnormal Head Tilts (Postures, AHP) James L. Mims III, MD
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Case Reports with Surgical Outcomes (Results)

Three Similar but Unique Cases of Isolated Superior Rectus ExtraOcular Muscle (EOM) Palsy Strabismus, Presenting with Large Abnormal Head Tilts (Postures, AHP)

James L. Mims III, M.D.

from the University of Texas Health Science Center and The Methodist Children's Hospital, San Antonio, Texas

ABSTRACT: ***Purpose:*** To report 3 rare cases (seen over 15 years) of isolated superior rectus (SR) palsy in binocularly fusing pediatric patients presenting with appropriate head tilts.

Patients and Method: All 3 children (ages 11, 16, and 34 mos) presented with large right head tilts and secondary overactions of the right inferior oblique indicating LSR palsy. All 3 children received recessions of the antagonist left inferior rectus (LIR) 8 to 9 mm with 3 mm of nasal transposition to prevent exotropia in down gaze.

Results: All 3 children had zero head tilt 4 weeks after their LIR recessions of 8 to 9 mm, but all 3 children developed a significant contralateral left head tilt three months after their LIR recessions. Two of the 3 then three-stepped to produce a pattern of "previously occult" SR palsy. These 2 received recessions of the RIR 5.8 to 6.5 mm. One of the 3 had a pattern that indicated LIR weakness; his LIR was advanced 2.5 mm from a 9 mm recession to a 6.5 mm recession. No significant head tilts remained or developed anew after the second surgery, but two of the three cases eventually developed apparent primary overactions of the inferior obliques and received successful weakening procedures of the inferior obliques.

Due to inclusion in each case of special handling of the intermuscular septa and Lockwood's ligament (for details see later text), none of the 3 children had lower lid retraction after the large IR recessions.

Conclusions: In view of the fact that the superior division of the 3rd Cranial Nerve also innervates the adjacent levator and these three cases have had no blepharoptosis suggests that these apparently palsied superior rectus muscles may have been **congenitally hypoplastic**. Classic MRI (Magnetic Resonance Imaging) of the EOM by the techniques of Demer, to confirm this hypothesis, have not been available in these children, because of the current technical limitations of such diagnostic imaging in the case of young children who cannot maintain steady fixation for the time required..

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INTRODUCTION

Isolated superior rectus palsy is extremely rare, seen less commonly than isolated palsies of any other extraocular muscle. See Discussion, paper page 168 for a complete background for this statement.

No series of patients with isolated SR palsies fusing with head tilt could be found in the strabology literature. Isolated left superior rectus palsy (LSR) would traditionally be associated with a habitual right head tilt and is due to hypoplasia or possible isolated paresis of one extraocular muscle, the LSR.

The purpose of this report is to describe the strabismus pattern and clinical course of 3 children with isolated LSR palsies presenting at 11, 16, and 34 months of age with substantial right head tilts. Incredibly, all 3 children presented within a twelve-month period to one pediatric ophthalmology practice. All were diagnosed with the classical Parks 3-step test (including Bielschowsky head tilt tests).

To verify the credibility of the reporting pediatric ophthalmologist, it should be mentioned that two other new cases of classical superior oblique palsies were diagnosed in this practice within three months of the presentation of these 3 cases of isolated LSR palsy.

PATIENTS AND METHODS

Case Number One

Figure 1 Top, next column, is an enlargement of a tiny one-inch by one and half-inch photo supplied by a Chinese orphanage to a young, childless Chinese-American couple. Based on this photo, they decided to adopt this cute baby, and flew to China to pick up the baby from the orphanage. What they did not know is that this snapshot had been selected from a series of photos taken of this baby, and all of the other photos showed a mysterious, large, right head tilt. *This* one did *not* show the head tilt, because the child's eyes are directed sharply to the right, out of the field of action of the LSR. (*Can't you just imagine the officials of the orphanage sitting around a table going over these photographs and speaking Chinese, rapidly and excitedly, as they worry over sending the only photo that does not show a large right head tilt !.)*

Figure 1 *(Mims III): Case 1: Adoptive nursery photo in infancy in China prior to adoption into Texas, United States. Ocular motility status appears grossly within normal limits for infancy in this single photo.*

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Figure 2 Right, -> shows the newly adopted girl at age 16 months just prior to her first surgery. She routinely had a large right head tilt of 18 to 30 degrees (0T). On passive right head tilt she was orthophoric on alternate cover test (no shift of either eye, on alternate fixation), and on passive left head tilt,..[*Ed note: "passive" = Not voluntary on command; gazes, in abnormal head postures, head tilts, and cardinal directions of gaze are evoked and invoked involuntarily in the patient by the ocular following reflex induced by gentle manual rotation by the examiner of the patient's head in each direction while patient maintains attentional fixation following a target*]... she demonstrated 8 prism diopters (P.D.)of right hypertropia (8RHT). (All strabometry in this report was conducted at semi "near" examiner arm's length by prism cover-uncover and alternate cover tests while patient fixated a small toy (held on the examiner's tongue) glued to a tongue depressor, or at moving Fresnel lenticular images fixed on the examiner's eye glasses.)

Figure 2 (Mims III): *Case 1 at age 16 months just prior to the first surgery. Note voluntary right head tilt. See Text.*

She also had 2 + OARIO (OverAction of the Right Inferior Oblique) but NO OALIO (ditto Left...). Other strabometry P.D. measurements in the four straight vertical and horizontal cardinal positions on near fixation and in primary position: (P.D.)

22 RHT

2 RH 14 RHT 22 RHT

4 RHT

She underwent an 8 mm recession of her LIR (left inferior rectus muscle, antagonist to her paretic left superior rectus LSR), combined with 3 mm of LIR nasal transposition (to prevent any consequent exotropia in down gaze).

The Stavis technique was to used to reconstruct the lower eyelid fascia as follows: The corners of the intermuscular septum at the ends of the LIR insertion received pre-placed 8-0 plain "catgut" sutures and were subsequently reattached (sutured) to the ends of the original LIR insertion after the recession was completed. Then, a similar material mattress suture was placed into the tissue which had been immediately inferior to the anterior end of the IR prior to recession (Lockwood's ligament), and this tissue was attached to the original insertion of the IR. Note the absolute lack of lower eyelid retraction in **Figure 3, next page, top, left column**, a photograph taken 4 weeks after her first eye muscle surgery.

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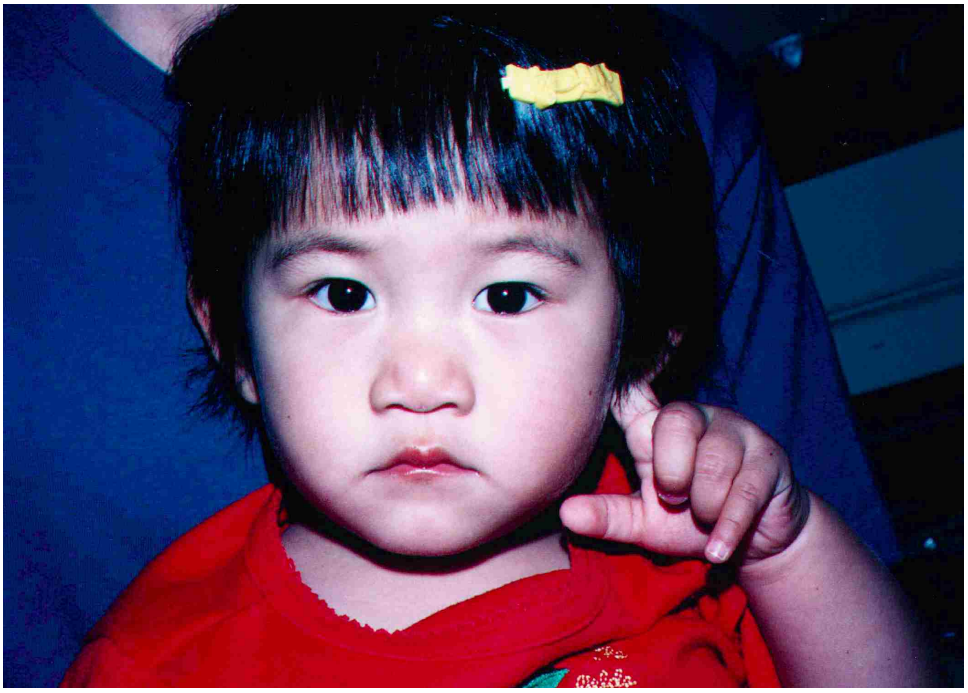


<- LEFT: Figure 3 (Mims III)*: Case 1 at age 17 months four weeks after her first eye muscle surgery. Note symmetry of lower lid margins. See Text.*

BELOW:Figure4 (Mims III): *Case 1 at age near 20 months, three and a half months after her first eye muscle surgery. Note that head tilt has now switched to the opposite side. See Text.*

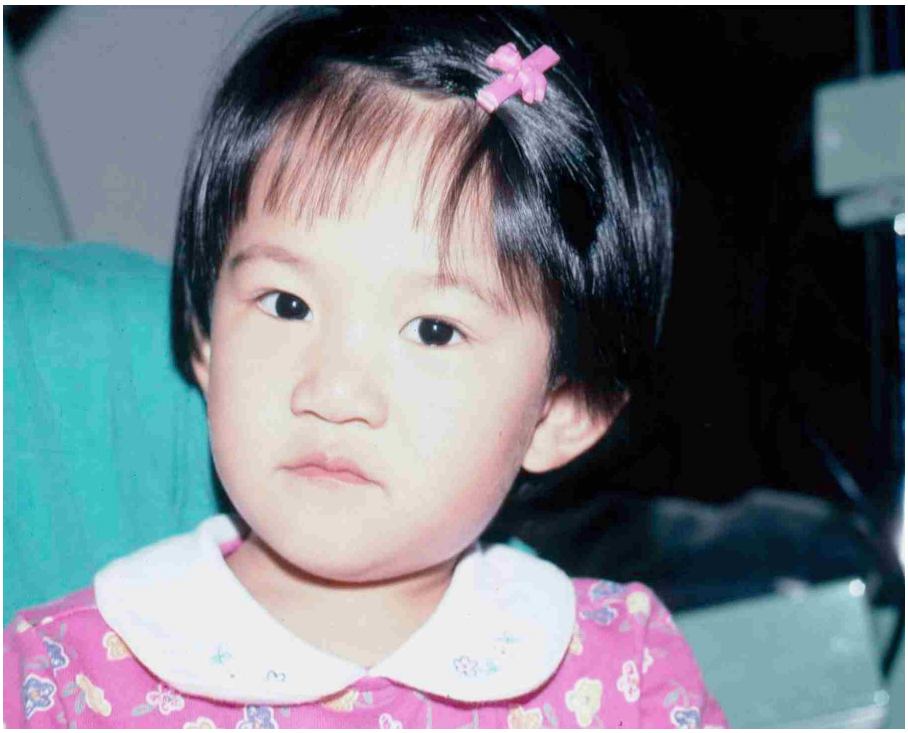
At this time the passive head tilt test results were phoric and symmetrical, 2 LH on right head tilt and 2 RH on left head tilt. Her P.D. measurements, all phorias now, in the four straight and primary gaze positions were:

	2 LH	
3 LH	ortho	3 RH
	2 LH	

Strabometry:

13 LHT	10 LHT	ortho
10 LHT	7 LHT	2 LH
11 LHT	4 LH	5 LH

Three and one-half months after the 8 mm recession of the LIR, Case Number One had a habitual 20 degree *left* head tilt (**Figure 4 ->**), a tilt the opposite of the right head tilt she had at initial presentation, (an "Overresponse/Overcorrection"). On passive right head tilt, she had 12 LHT and on passive - her now preferrred - left head tilt she had 4 LH. Her cover test measurements suggested a previously "occult" RSR palsy!! Here are her strabometry measurements 3.5 months after the 8 mm recession of her LIR: (*see next column*).



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Therefore, she then received a second eye muscle surgery which was symmetrical on the second eye to that done on the first eye and was again a 6.5 mm recession of the RIR with 3 mm nasal transposition combined with the previously described Stavis technique for reconstruction of the fascia of the lower lid.

Figure 5, right-> is her appearance one year after her second eye muscle surgery, now at age 3 years. Note, again the absence of any suggestion of lid retraction of her right lower lid. She *now* had no significant habitual head tilt, i.e., no more than the very small right tilt seen in this Figure, small enough and inconsistent enough that it was no longer noticed by the family.

On passive right head tilt she had 2 X; on passive left head tilt she also had 2 X. Her P.D. measurements were:

2 LH	3 LH	9 RH
ortho	2 RH	9 RH
ortho	2 E	4 RH

Three and one-half years after her second IR recession, this child, Case Number One, developed, rather suddenly, a 12 RX(T), 10X' that was almost perfectly comitant. This new deviation responded well to her third eye muscle surgery, a single 9 mm recession of her RLR.

About 6 months later, now at her age of almost 6 years, she developed classic primary overaction of both of the inferior obliques with no new head tilt, and no hypertropias on passive head tilt testing. These both responded well to 14 mm recessions of the inferior obliques (i.e., 14 mm behind the insertion along their natural pathways) with triangular resections of the posterior insertional fibers and re-attachment of the anterior insertional fibers 5 mm posterior to the lateral end of the *original* IR recessions, of both obliques, her fourth eye muscle surgery and the fourth and fifth eye muscles to receive surgical attention..

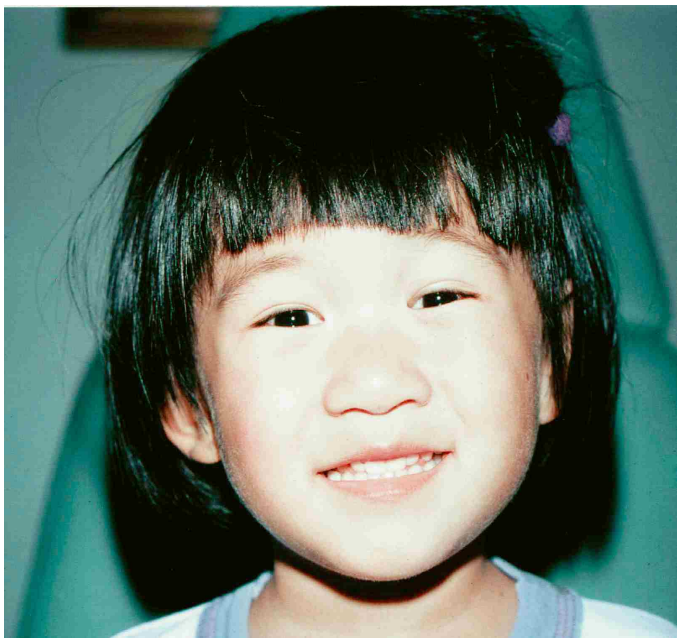

***Figure 5 (Mims III)**: Case 1 at age 3 years, one year after her second eye muscle surgery for her second (of her now bilateral) IR palsy. Note symmetry and normality of both lower lid margins after significant IR recessions. See Text.*

Finally, 4 months after both of her IOs were recessed in her fourth operation, at age 6 years, she developed yet another exotropia (but not a recurrence of the previously surgically treated comitant one - this new one was very incomitant): there was an exotropia and 6-Prism Diopter left hypotropia present *only* in left gaze.

This was treated successfully at her fifth eye muscle surgery with recession of her left lateral rectus 7 mm with 4 mm of supraplacement of the new insertion.

Figure 6, BELOW shows the cardinal positions of gaze which were photographed almost three years postoperatively, in June 2006 when she was nearly 9 years old, 2.5 years after her fifth and last strabismus surgery.

Now, four years after **Figure 6** was taken and seven years after her most recent strabismus surgery and now also 13 years old, she retains **beautifully straight eyes** (*happy, relieved, attending and reporting author and surgeon's opinion, no scientific standards given for this quantification or qualification of outcome, or result, other than strabometry in next column -Ed)*

with no more than 3 LHT or 4 XT in any of the 9 cardinal gaze positions, and with some binocular fusion and without diplopia.

Her low grade school myopia corrects to 20/20, each eye. Her strabometry measurements, in P.D.s are::

2 RhypoT	4 XT	ortho
3 RhypoT	2 LHT	ortho
2 XT	3 LXT	
3 RhypoT	3 LHT	2 RhypoT

She is doing well academically now in the 8th grade.

Figure 6 (Mims III): *Case 1: Latest photo cardinal gaze positions, see text above*

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Case Number Two . ***Figure 7 (Mims III):*** *See text below.*

Case Number Two presented at age 11 months with a large 17 to 45 degree right head tilt, best illustrated by the center photograph in **Figure 7, above**. Although the other photographs in the classic 9 cardinal positions of gaze were not possible for all 9 positions in this 11 month-old baby, the reader may be able to discern about 25 prism diopters of hypotropia in left gaze and the absence of a vertical deviation in right gaze in **Figure 7, above. Figure 8, next page,** convincingly shows the large left hypotropia on passive (see prior definition, page 158) left head tilt that is absent on passive right head tilt.

P.D. strabometry measurements were reliable and as follows:

20 RHT

orthoT 16 RHT 25 RHT

3 RH

Her initial surgery was an 8 mm recession of the LIR with 3 mm nasal transposition and the aforementioned (see Case 1) Stavis technique for the lower lid fascia and Lockwood's ligament.

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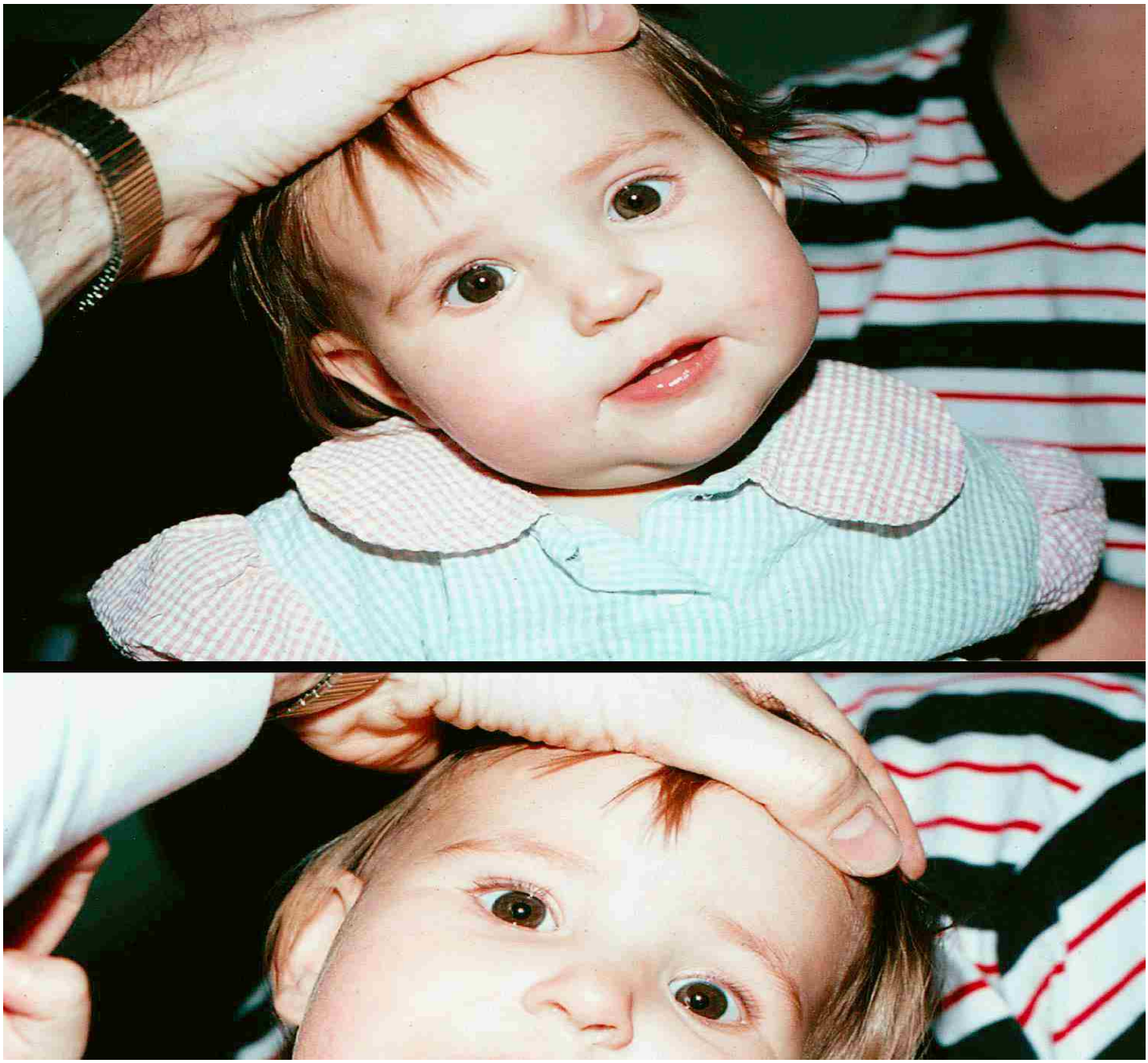
Figure 8 (Mims III): *Case 2, see text.* Six *Also: Note corneal light reflections (CLRT).*



weeks after the 8 mm recession of her LIR, she now had no significant habitual head tilt, and on passive right head tilt she now had 8 LH and on passive left head tilt she had 6 LH. These were her cover test measurments 6 weeks after her first surgery:

	4 LH	
5 LHT	4 LH	1 LH
	ortho	

Four months after the 8 mm recession of her LIR, her mother brought in a snapshot of her sitting on a bench in the

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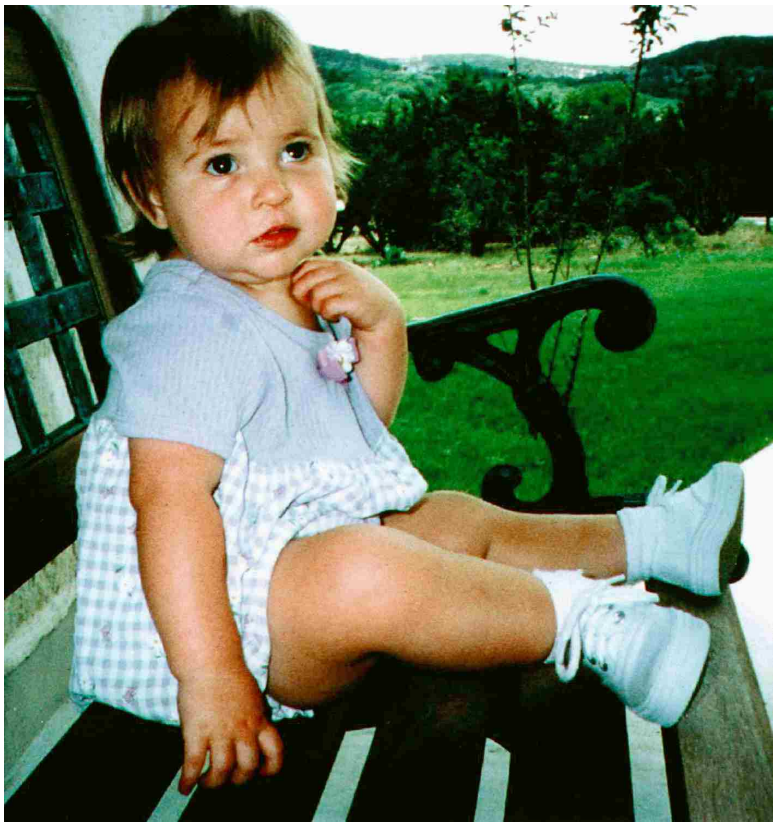
park (**Figure 9, right ->**). It clearly shows a large LHT on right gaze. By this time, she had a habitual 5 degree *contralateral left* head tilt and a 22 degree right face turn. Passive right head tilt was 6 RH and passive left head tilt 2 LH. Occult *bilateral* SR palsies (again). P.D.x 9:



20 LHT	12 LH	2 LH
17 LHT	6 LH	3 LH
16 LHT	8 LH	3 LH

A 5.8 mm recession of her RIR was performed with nasal transposition and the Stavis modification. One year after the second surgery, she was very improved. See **Figure 10 directly below:**

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Figure 9 (Mims III): *Case 2, see text.*

She had the strabometric cardinal gaze positions seen in **Figure 10, prior page** and these P.D. measurements:

6 LH	2 X	1 RH
6 LH	2 LH	2 X
9 LH	4 LH	2 X

By two years and 4 months after the second surgery, however, the preoperative large LHT seen in **Figure 9, prior page,** that was worse in right gaze, had returned, and although minimal right head tilt was again now present, only a 4 LHT was present on passive right head tilt and 3 ET on passive left head tilt. Her cardinal gaze position measurements were now (in P.D.):

10 LHT	4 LHT	3 ET
10 LHT	8 LHT	5 LET
7 LET	7 LET	
8 LHT	7 LET	7 LET

Then, for this recurrence of her RSR palsy strabismus pattern, her right inferior rectus was re-recessed further, moving it from 5.8 mm to 7.7 mm posterior to its original insertion.

But only three months later, she developed what appeared to be a new primary overaction of the RIO and an even larger esotropia than previously seen, as follows:

(*see next column*)

8 LhypoT	10 LhypoT	20 LhypoT
10 LhypoT	10 LhypoT	16 LhypoT
	14 ET	3 ET
3 LXT	2 H	2 LH

After consultations with Burton Kushner MD and David Guyton MD, the RMR (Right Medial Rectus muscle) was recessed 5 mm and the RIO was recessed 14 mm along its natural pathway with triangular myectomy of the posterior insertional fibers of the IO and attachment of the anterior insertional fibers 5 mm posterior to the lateral end of the RIR.

By three months after this 14mm recession of the RIO, the LIO began to overact. At this point she was 4 yrs and 3 mos old, and for her fifth eye muscle surgery received a recession of her LIO by a technique identical to that which had been used for the RIO. Just prior to this fifth operative intervention she had these nine strabometric measurements:

10 LHT	7 LHT	6 LHT
	4 LET	2 LET
8 LHT	4 LHT	2 LHT
	3 LET	
2 E	2 LET	3 LET

Seven months after this recession of her second and other IO, she then developed a recurrence of her small recently surgically corrected esotropia (7 ET, 13 ET') at the age of 4 years and 10 months. After cycloplegic refraction to confirm and re-measure her refractive error, she was given

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glasses with +2.50 D. sphere add (flat top segment) for each eye.

These plus add spectacles controlled her esotropia, and, indeed, one year later she began to develop a small consecutive 3 X' in down gaze. This exodeviation was then controlled by a gradual reduction of the plus power in the lenses of her glasses, and her glasses were removed and discontinued completely by age 10 years, 6 years after her last strabismus surgery.

Her visual acuities without optical correction are 20/25 OD and 20/20 OS. Her latest strabometry measurements, (in P.D.s) made at her most recent visit at age of 12 years 7 months (= 8 years and 4 months after her fifth and last strabismus surgery) were:

1 X

ortho 1 X 2 RXT

4 RXT

See **Figure 11, Case 2, below**.

The 4 RXT in down gaze is asymptomatic; she reads comfortably for long periods of time, and is making very good grades in school.

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Case Number Three

Case Number Three presented at age 34 mos. He was not appreciative of attempts to photograph him looking in the various important strabometric cardinal gaze positions, but his presenting 14 degree right head tilt and 25 degree left face turn can be seen well in **Figure 12, directly below**.

His secondary overaction of the RIO (over-elevation in adduction right eye) can be seen grossly in **Figure 13, right**. (*Also Note and compare vertical eccentricity of corneal light reflections (CLRTs, Hirschberg Test for confirmation -Ed*)

Case Number 3 received a 9 mm recession of his LIR for his LSR paresis after the author awoke at 3 AM the night prior to his first surgery and realized that his head tilt was "going the wrong way" (for an RSO palsy)(Right Superior Oblique palsy), his initial diagnosis and indication for surgery.

His preoperative strabometry:

22 RHT

2 LH 8 RHT 30 RHT

8 RHT

Six weeks after the 9 mm recession of his LIR with 3 mm of nasal transposition and with reattachment of the corners of the intermuscular septa to the nasal and lateral ends of the IR insertion and bringing Lockwood's ligament forward to the original insertion of the IR, he had a most satisfactory result: no significant head tilt and no lid retraction of the left lower lid. See **Figure 14, top, right column, next page**,. Strabometric measurments, in P.D., were all heterophoric as well: *(see next page)*.

***Figure 13 (Mims III),below**: Case 3, On presentation, showing RIO overaction*

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Figure14 (MimsIII) right> *Case 3: Six weeks postoperatively after first eye muscle surgery (see also text prior page). All strabometry was heterophoric at this time.*

(Also note and compare excellent vertical and horizontal symmetry of the corneal light reflections (CLRTs, as in the Hirschberg Test. -Ed)

Strabometric measurements, in P.D., were all heterophoric as well:

	1 LH	
2 LH	1 LH	1 LH
	2 LH	

However, just 7 months after the recession of his LIR 9 mm, he had developed a significant 12 degree *left* head tilt (to the opposite side from his preoperative abnormal head posture).

See **Figure 15, right ->**.

His strabometry measurements now were also larger(in P.D.) Although still all phoric:

2 X	2 LH	4 LH
ortho	4 LH	6 LH
2 LH	3 LH	7 LH

In an attempt to "treat the pattern", considering this to be a somewhat delayed

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"over-response/ overcorrection". He then received a surgical correction: an advancement of his previously 9 mm recessed LIR by 2.5 mm, placing it now just 6.5 mm posterior to the original insertion of the LIR.

Fifteen months after this partial advancement of the LIR, he still had an 8 degree left head tilt (See **Figure 16, right**) and these measurements:

2 X	ortho	5 RH
3 LH	3 LH	1 RH
6 LH	6 LH	2 X

We judged the 6 LH in down and down right gaze (3 and 6 p.d. respectively) too small to warrant a recession of the RIR. He was, however, then given glasses with 3 Prism Diopters of base-down prism in the left lens, and he accepted the otherwise plano spectacles readily. This was surprising considering his young age of 4 years 3 months and the absence of any refractive error. See **Figure 17, right->**.

Some years later, he stopped finding the glasses useful at age 11 or 12 years; as he had apparently learned to suppress his left eye in those positions of gaze where he had that small LHT.

At his last visit, his visual acuities without optical correction are 20/25 for each eye. Strabometry 11 years after his second and last strabismus surgery were:

4 LHT	1 LH	2 RHT 2 RXT
4 LHT	2 LH	1 RH
1 LHT	3 LHT*	1 LXT

*He has no difficulty reading for prolonged periods and is doing well academically in the ninth grade.

DISCUSSION AND CONCLUSIONS

Isolated superior rectus palsy is extremely rare, seen less commonly than isolated palsies of any other extraocular muscle. Although both von Noorden and Prieto-Diaz report in their comprehensive text books that they have seen such cases in practice, NO published reports of isolated SR palsy with appropriate head tilt could be found.(1,2) As pointed out by von Noorden (1), the head tilt is usually to the sound side, as in these cases, and SR palsy is usually associated with weakness of the homolateral levator palpebrae. The absence of blepharoptosis in these three cases suggests that the primary defect has been **hypoplasia of the SR**, since the nerve to the SR also innervates the levator *after* piercing the SR from its ventral side. These patients have not received MRI to visualize their superior rectus muscles (because young children cannot fixate long enough for MRI exposures), and Rosenbaum and Metz (3) have reported another anatomic possibility in one case: an abnormal insertion of the SR near the superior border of the SO. It should be noted that there was no mechanical EOM restriction found at surgery in these three reported patients.

Surprisingly, Bielschowsky did not see head tilts in his patients for whom he had diagnosed SR palsy. He writes, "I have not been able to find out why the head tilting is of no use in palsies of the vertical rectus muscles. According to my experience, paresis of the superior oblique or inferior oblique is in all cases at the bottom of ocular torticollis."(Reference 4, page 76) Perhaps the very few of his patients who had SR palsy were adults who had also lost fusion unlike these three cases who had binocular fusion. The only case of "SR palsy" included in his published lectures is on page 83, Figure 38. This patient is obviously an older gentleman who had the ability to supraduct well in adduction but who was content to hold his head straight up and who had an obvious manifest hypotropia in the primary position.

Perhaps all Bielschowsky's patients with SR palsy had unilateral central deficiency of up gaze, also known as "Double Elevator Palsy", a condition with no head tilt clinically. (See the Discussion, in Reference 5.)

Ed Raab MD, in a discussion of these cases, mentioned the possibility that these children had primary overaction of the inferior oblique (rather than secondary) with perfect enough binocular fusion that they were more comfortable (maintaining fusion by or) with face turns and head tilts, citing a published unconventional approach to the use of the 3-step test.(6) By this thinking, when the habitual head tilt "goes the wrong way", the primary pathology could be overaction of an inferior oblique muscle rather than paresis of the other eye's SR muscle. This analysis should be considered, since two of these three cases did develop obvious primary overaction of the inferior oblique years (*but*) after their initial inferior rectus recession. Against this interpretation is the common observation that infantile esotropes with primary inferior oblique overaction do not have head tilts, a distinction taught and popularized by Marshall Parks MD. Also, strabismic amblyopia comes *before* (preceeds) unilateral overaction of the IO in many patients. None of these three patients here reported had any significant amblyopia.

When these cases were early their histories and had undergone only one or two of their surgeries, Parks' Fellowship Program alumnus, Ed Raab, indicated, in response to my initial presentation of these cases as a Scientific Poster at the 1995 Annual Meeting of the AAPOS (American Association for Pediatric Ophthalmology and Strabismus) that the Bielschowsky - Parks classic 3-step test yielded less dramatic results in vertical rectus palsies than it did in superior oblique palsies, but was still valid to make the diagnosis of superior or inferior rectus palsy.(7) A head tilt "the wrong way" in cases of SR palsy has been explained as being used by the patient to separate the diplopic images as far as possible. (8) The cover test measurements indicate clearly that this was not happening in these cases.

The finding of the "previously occult" palsy of the SR (like Hermann's masked bilateral SO paralysis, Reference 9) of the other eye in two of three cases developing over time suggests that this could be an overcorrection phenomenon, since late overcorrection after IR recession, per se, is well known.(10) A similar overcorrection idea was mentioned by Saunders and Roberts (9), and discussed elaborately in a large series by Ellis, Stein, and Guyton.(11) Two of the three cases responded well to recession of the other eye's IR, and one to partial advancement of the initial IR recessed.

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A Review: The Determination of Visual Acuity in Infants and Preliterate Children E. Khawam, MD and Daoud Fahed, MD
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Review

A Review: The Determination of Visual Acuity in Infants and Preliterate Children

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from the Department of Ophthalmology, American University of Beirut Medical Center, Beirut, Lebanon

ABSTRACT: In the field of pediatric ophthalmology, assessment of visual acuity is important and necessary in determining treatment plans for children with both functional as well as organic amblyopia, and also to monitor the effect and success of treatment.

We shall review the qualitative/subjective tests, as well as the objective/quantitative tests described in the literature for assessing visual acuity, and we shall outline the complexity of vision and its impact on the objective tests.

The main purpose of our paper is to present **our own scheme** of determining visual acuities in infants and pre-literate children, a scheme we believe is simple, effective, implies no extra costs, applicable to infants and young children, and almost infallible in detecting severe amblyopia.

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The purpose of this presentation is to show a simple clinical subjective mean, within the reach of all clinicians, to determine the visual acuity in infants and preliterate. The purpose is also to show the inaccuracy of the psychophysical and electrophysiological objective means to detect visual acuity. We will also show how to detect infallibly any significant amblyopia in the pediatric age group.

We will begin by describing the qualitative/subjective means and the quantitative/objective means to determine visual acuity (VA) in infants. We will then outline the complexity of vision and the reflection of this complexity on the objective, quantitative, and sophisticated acuity tests. Finally, we will describe our own way of assessing VA and unmasking amblyopia in infants and preliterate children.

OUTLINE

I. Qualitative Subjective Determination of the VA

a. Traditional binocular fixation pattern testing (BFPT).

b. By the ability to fixate a target.

c. By the ability to follow a target.

d. Four diopter prism light test, or six diopter prism toy test.

II. Quantitative Objective Determination of Visual Function

a. Optokinetic nystagmus (OKN)

b. Grating acuity testing:

i. Preferential looking.

ii. Visually-evoked potentials.

III. Complexity of Vision

a. Sensory input to the retina.

b. Sensory input to the visual cortex.

c. Motor output to the extraocular muscles.

d. Role of the higher neurological centers.

IV Inaccuracy of the OKN and the Grating Acuity Tests.

V. Our Way of Assessing VA in Infants and Preliterate:

a. The ability to fixate and follow a target.

b.The traditional binocular fixation pattern testing.

c. The four diopter prism-light and six diopter prism-toy tests.

d. The monofixation pattern testing.

VI. Conclusion

I. QUALITATIVE SUBJECTIVE DETERMINATION OF THE VA

a. Traditional binocular fixation pattern testing (BFPT)

It is subjective, easily performed, reliable, and reproducible. It is the most widely used clinical test in the pediatric age groups to a) rule out amblyopia, and b) determine VA in babies (1).

The validity of this test has been documented with both objective psychophysical and electrophysiological tests, as well as with the correlation to VA of older children with the same fixation patterns.

It consists of determining whether the child has a '*central'* and '*steady fixation*' and whether, and how long, he/she '*maintains*' fixation.

Upon covering the fixating eye, one observes the deviating eye's behavioral

response. If the child refuses to fixate, we call it '*Afixation*' –a term Urist coined. In that case, VA is around 20/800. In case fixation is '*wobbly and unsteady*', VA is between 20/400 and 20/800. When the child has a '*central and steady fixation*', we should determine whether he/she will '*hold fixation*' when both eyes are open: if the child does not hold fixation, the VA level is around 20/200. We call this '*Fix*'. If the child holds fixation briefly –say 1 to 3 seconds- we call it '*Strong Prefer*', and that represents a VA around 20/70 to 20/80. If the deviating eye fixates the target up to a blink, we call it '*Moderate Prefer*' and that represents a VA level of 20/30 to 20/50. If, under binocularity, the child holds fixation with his deviated eye through a blink, we term it '*Prefer*'. In that case, fixation is equal, and the child has 20/20 vision in both eyes. If the child, on his own, occasionally alternates fixation spontaneously he/she not only has equal and normal vision in both eyes, but also his/her chances of deteriorating and reverting to stronger grades are minimal or nil.

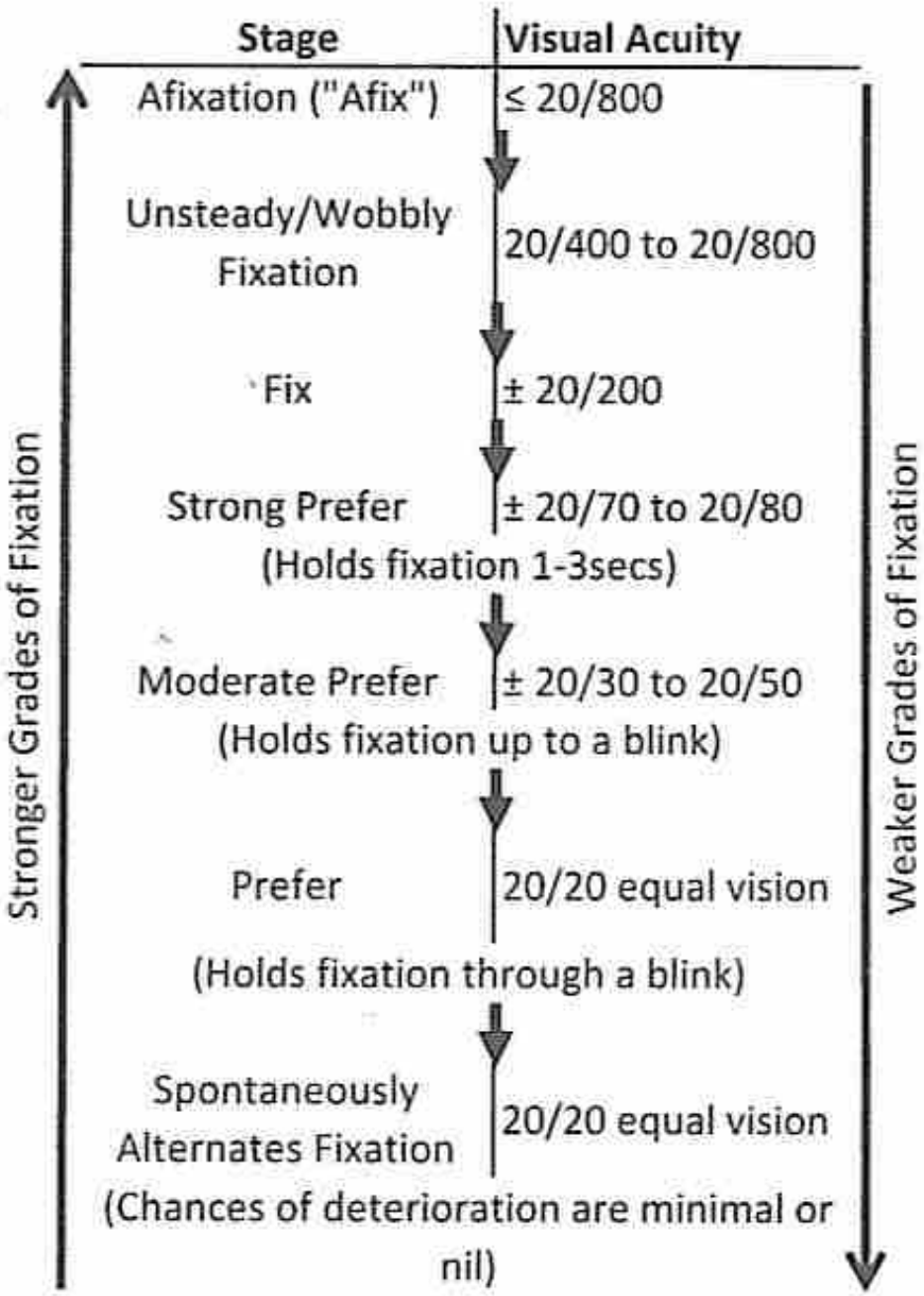

Table: Different grades of VA levels encountered in patients with strabismus and during occlusion therapy for amblyopia

The following table (**refer to theTable, above right this page**) summarizes the different grades we encounter in patients with strabismus and the evolution to stronger or weaker grades during amblyopia therapy.

If the child, upon occlusion therapy, reverts to stronger grades of fixation patterns upon discontinuing occlusion or decreasing the dose of occlusion, the observer knows he/she should resume or increase the dose of occlusion respectively.

Limitations of the BFPT:

1. Esotropia less than 10PD (2): Binocular fixation pattern technique may demonstrate "strong grades" of fixation patterns whether or not patients are actually amblyopic. This might happen occasionally. We however, believe the inaccuracy here is related to the inexperienced observer who has difficulty in appreciating minute eye movements of less than 10PD of deviation.

2. Severe limitations of deviation: In paralysis, in co-contraction syndromes such as Duane Syndrome, and in severe restrictions, the BFPT can only be tested in the field of gaze away from the fields of limited movements. In immobile globes, only the monocular fixation pattern of '*Fix*' or '*Afix*' can be assessed.

3. Age: We believe this subjective means of determination of VA needs some cooperation and cannot be done before the age of one or two months.

4. Absence of Strabismus: In such cases, obviously, the BFPT cannot be done due to absence of fixation movements. However, one can induce a small vertical deviation by using a small vertical prism (of 5- to 7-PD) placed base-up, or base-down before the fixing eye (3).

5. Ocular Organic Lesions (such as media opacities, and/or retinal or optic nerve lesions): In binocular organic lesions, and especially in the absence of strabismus, the role of BFPT is very limited. It can only determine the fixing eye with better VA. It has a more significant role in unilateral ocular organic lesions: It can determine the sound eye and its VA, as well as the VA of the affected eye, by inducing a small vertical deviation using a small vertical prism, placed, as mentioned above, base-up or base-down before the fixing eye.

6. Lack of Alternation in Patients Treated for Strabismic Amblyopia[4] Despite Equalization of VA. Ever since the basic work of Hubel and Wiesel on animal experiments, the concepts of "the sensitive period" (5), "cortical competition"(6)and the neurophysiological changes in the visual cortex and the lateral geniculate nucleus (7) were clarified.

All cortical cells are potentially connected to both eyes ("Binocular cortical neurons"). If both eyes are functioning equally, the cortical neurons are binocular, that is connected with each one of them. When one eye predominates, "cortical competition" (6) takes place and the number of cortical neurons connected to the deprived eye diminishes in relation to the severity of amblyopia. Following very early patching, the number of cortical neurons connected to the deprived eye increases; and when VA is equal in both eyes, the number of cortical neurons connected to either eye is the same.

Campos (4) studied patients with strabismic amblyopia who, following treatment, achieved equal VA in both eyes. Most of his patients who were able to alternate fixation had begun treatment before the age of 5 years. All patients aged less than 2 years were able to alternate fixation after treatment when VA was equal in both eyes. No patient was able to obtain alternate fixation if

treatment started after 6 years of age. The number of patients who could alternate fixation, when VA was equal in both eyes, decreased gradually between 2- and 6- years of age. Pattern visual evoked responses (VER) were recorded from each eye of his patients. The VER from the previously-amblyopic eyes of the patients without alternate fixation was markedly reduced compared to that of the sound eye. Whereas in patients who had alternate fixation, there was no difference in the VER between both eyes. He concluded that the reduced amplitude of the pattern VER from the nonalternating, formerly amblyopic eye presumably results from the reduced number of cortical cells –due to the cortical competition concept described by Hubel and Wiesel(6).

In patients who do not achieve alternate fixation, despite equalization of VA in both eyes, the BFPT may therefore point towards occlusion therapy despite the absence of amblyopia.

b. By the ability to fixate a target

One can demonstrate monocular visual fixation in infants starting at birth -or at around 1 week of age, and continuing throughout all the preliterate years. A penlight should never be used as a target, since, in our experience, infants are very photophobic. Instead, the examiner should use an interesting, attractive toy, preferably electrically-mobile, but not too noisy. The examiner's face is a very attractive alternative to toys and attracts most infants' attention.

c. By the ability to follow a target

The examiner, again, uses an attractive toy or his/her own face to appreciate the '*following behavior*'. Like the fixation behavior, '*following*' can be assessed in infants beginning at few days of life and throughout all the preliterate years. However, one should not expect an infant less than 3 months of age to follow a target with smooth pursuit eye movements, but rather with coarse, jerky, hypometric saccades.

d. Four diopter prism light test, or six diopter prism toy test

The 4PD base-out light test, like the BFPT, is an extremely widely-used diagnostic test in strabismus. It is highly recommended for the detection of small suppression central scotomas and for the diagnosis of bifoveal fixation. It is therefore an indirect mean of assessing stereopsis. We also find it helpful in detecting malingerers. It was introduced by Irvine (8) and popularized by Jampolsky (9). Severe, atypical responses to this test have been well described and illustrated by Romano and von Noorden (10). The principle and technique are well described in the above mentioned literature (9,10).

We use a 6PD toy-test on infants, a diagnostic test based on the exact same principle of the 4PD light test, since we found infants refusing to cooperate with penlights, but responding with great cooperation to attractive toys.

We compared the 4PD light-test and the 6PD toy-test on over several thousand cooperative children and found total correlation between the two tests (unpublished data).

II. QUANTITATIVE OBJECTIVE DETERMINATION OF VISUAL FUNCTION

The so-called visual recognition tests require the child to recognize standard

optotypes such as those incorporated in the Snellen Chart. These methods concern older children and adults. In infants and preliterate, there are three methods currently used for determining resolution acuities:

a. Optokinetic nystagmus (OKN)

Nystagmus is elicited by passing a succession of black-and-white stripes through the patient's field of vision. The visual angle subtended by the smallest stripe width that still elicits an eye movement is a measure of visual acuity.

Aulhorn and coworkers (11) were the first to use this method of acuity testing in newborns. Other investigators refined the method (12). Still other authors (13) offered valuable suggestions on how to standardize the testing procedure and how to evaluate the responses in this method.

OKN testing has several limitations (14). The most important limitation is that the target stimulus must be presented under rigidly-standardized testing conditions, with pre-set, controlled ambient lightning and a pre-determined speed of target presentation to stimulate both central and peripheral vision.

These requirements make it difficult to repeat the test with the OKN drum in the clinical setting. Moreover, the OKN response requires both normal sensory input and normal motor output[15]. An infant with normal sensory input will have a poor OKN response if any motor problem exists.

b. Grating acuity testing

The following two methods of visual resolution tests rely on the child's response to the presence of stripes and are therefore often referred to as grating acuity tests. The child's response to the gratings either takes the form of a behavioral activity, such as a change in fixation –the "preferential looking technique", or his response to the gratings results in electrical activity in the visual cortex –the "Visually-Evoked Cortical Potential (VEP)".

i. Preferential looking

This psychophysical technique is based on the fact that an infant's attention is more attracted by patterned stimuli, rather than by a homogeneous surface. Consequently, if offered the choice between a patterned stimulus (for example black-and-white stripes) and a homogeneous background, an infant will prefer to look at the patterned stimulus –as long as the pattern grating is above the VA threshold.

The most widely-used test is one of several variations of preferential looking: "Forced-choice preferential looking" (16), "Operant-preferential looking (17), and more recently, the acuity card procedure (18, 19).

By determining the smallest grating the patient will fixate on, a resolution acuity can be determined.

ii. Visually-evoked potentials

This electrophysiologic test measures the electrical response of the cortex to stimulating stripes of various widths. It has been refined since its original description (20). However, despite convincing evidence of its validity in assessing VA, its usefulness is limited because it is a sophisticated test requiring expensive equipment and technical expertise (15).

III. COMPLEXITY OF VISION

Vision is such a complex function that we can neither rely on the psychophysical tests (preferential-looking, acuity card testing, OKN), nor on the electrophysiologic tests (VER) to determine visual acuities.

It is our purpose to identify and clarify the different aspects of vision: the sensory input to the retina and then to the visual cortex, the motor output to the extraocular muscles (EOM) and the role of the higher neurological centers in discriminating and using the visual information in a useful manner.

a. Sensory input to the retina

Light is the normal stimulus for vision (21). When rays of light from an object of regard, strike a retinal area of one eye of a person, he/she not only perceives light sensations –he/she rarely recognizes them as such- but is also aware of the direction and localization of the origin of this light.

b. Sensory input to the visual cortex

The retina - thanks to the constant, innate, intrinsic arrangement of the visual directions of its retinal areas in relation to each other, and in relation to the principle visual direction of the fovea - sends information to the brain on the origin and location of objects in space, and their relationship to each other independently of one's own position (21). In other words, it is the brain that identifies and localizes the object of regard. Linksz said: "*We see with our brain, not with our retina. But the first step in the elaboration of the information received by the eyes takes place in the retina*" (22).

c. Motor output to the EOMs

The appearance of an object in the periphery of the visual field attracts attention and the eye is turned towards the object so that its image will fall on the fovea. This movement is extremely precise: A signal from the retina transmits to the brain the information about the visual direction, relative to the foveal visual direction, of the peripherally-seen object. Corresponding impulses are then sent to the EOMs to perform the necessary ocular rotations. This function of the retinal elements may be characterized by saying that each retinal point has a retinomotor value (RMV). We previously reported on this at length in a previous paper (23). This RMV of the retinal elements increases from the center to the periphery. The RMV of the fovea itself is zero: once an image is on the fovea, there is no incentive for an ocular rotation. The fovea, therefore, in addition to its other functions, is also the retinomotor center.

d. Role of the higher neurological centers

Detecting that a pattern is present, and detecting its origin and location are not enough. The visual system should also be able to perform the more complex task of discriminating what the pattern is and to use this information in a useful manner (24). Such a task relies on higher centers in the brain.

IV. INACCURACY OF THE GRATING ACUITY TESTS

a. Preferential looking

If the child's visual cortex perceives a pattern, the child should make a motor response: a behavioral activity consisting in an ocular movement, such as a change in fixation. However, if the child has

neurological abnormalities in the higher centers where motor responses are processed, he/she will have no motor output/response, and will thus be considered blind - despite having a normal VA.

b. OKN

The accuracy of an OKN response also requires both normal sensory input and normal motor output. An infant with a normal sensory input will have - as in preferential looking testing - a poor OKN response if a motor problem exists.

c. Visually-evoked potentials

If a child's occipital cortex can detect a pattern because of a normal sensory input, neurons will be firing in response to the stimulating gratings. But, if neurological impairment in the higher centers preclude using that visual information in any useful manner, he will be considered to have normal VA. Yet, is that child not functionally-blind?

Add to the above-mentioned inaccuracies of the grating acuity tests, many other pitfalls and drawbacks that are cited in the literature:

• The method of preferential-looking has been tested extensively: It was found to be suitable in children up to the age of 4 months. Older infants are too easily distracted (25). Moreover, these methods are time-consuming: the acuity card testing, which is the fastest, requires approximately 36 minutes for testing monocular or binocular acuity (19).

• OKN responses could be elicited in the presence of cortical blindness (26). Therefore, this test must be interpreted cautiously, since subcortical mechanisms may be involved.

• Studies (27) have shown that ocular diseases affect grating acuity differently than recognition visual acuities.

• Other studies concerning vision development (24) suggest much faster maturation than do studies that use behavioral tests of preferential-looking and OKN. Evoked potentials determined 20/20 Snellen VA at 6-months of age, whereas studies based on tests similar to preferential-looking showed only 20/50 VA at 1-year of age with a slow improvement to 20/20 by the age of 4-5 years. OKN estimates VA in newborns to be around 20/400, and reaches 20/30 by the age of 1½ to 2½ years.

• Moreover, grating acuity tests were found to overestimate VA compared with recognition VA testing in many of the ocular diseases that affect children.

So, most clinicians, including our team, have found these tests to be insufficiently reliable, and they continue to rely on assessment of fixation behavior.

V. OUR WAY OF ASSESSING VA IN INFANTS & PRELITERATE CHILDREN

In view of these irregularities and lack of correlation between the different objective quantitative psychophysical and electrophysiological means of determining VA, and also in view of the expensive equipment some tests require, the technical expertise and the rigid standardized conditions required by other tests; we, for several years, have adopted the following clinical protocol. We feel this protocol is reliable, reproducible, easy, inexpensive, and requires no sophisticated instruments. We found it most accurate in a) assessing VA and b) almost infallible in detecting amblyopia.

a. The ability to fixate and follow a target

Fixation and following of a target can be demonstrated in infants beginning a few days of life as well as throughout all the preliterate years. A proper target, such as a small mobile toy, the observer's, or the mother's face- are the best fixation targets. As far as the '*following'* reflex is concerned, we do not expect a young infant to follow a target with smooth, conjugate pursuit movements, but rather with coarse, jerky, hypometric saccades and uncoordinated ocular movements. Conjugate and parallel ocular movements rapidly develop and reach to an adult level at 3- or 4-months of age (28).

b. The traditional binocular fixation pattern testing

Its reliability, reproducibility, accuracy and validity are recognized by all clinicians. This technique can be used beginning 1- or 2-months of age. In case of absence of strabismus, we induce a small vertical deviation by a small vertical prism placed base-up, or base-down before the fixing eye.

c. The four diopter prism light and six diopter prism toy tests

These two tests do not determine VA in infants directly, but demonstrate the presence –or absence, of a central scotoma; hence they assess VA indirectly in the fixing eye and can detect some decrease in vision in the eye with a central scotoma. We use these 2 tests in the absence of strabismus, or when the angle of deviation is very small.

Unilateral scotoma in visually-immature children is an evidence for the presence of amblyopia, provided it is demonstrated always in the same eye.

Infants rarely cooperate with the 4PD-light test. However, we experienced no difficulty in accurately evaluating the 6PD-toy test that can be done beginning few days of age.

d. The monofixation pattern testing (MFP)

In case a central scotoma is demonstrated in 1 eye, we proceed with the MFP by occluding the foveally-fixating eye.

A. If the eye with a central scotoma has a steady fixation, vision in that eye can vary between '*fix*' (around 20/200) to any of the '*Prefer*' grades listed in Table 1. In that situation, one can start amblyopia therapy or proceed with more accurate determination of VA by creating a small vertical deviation with 6- to 7-PD base-up, or base-down placed before the fixing eye and proceed with the BFPT.

B. If the eye with the central scotoma has an '*Afix*' or an unsteady fixation, no need to use any further tests and occlusion therapy should obviously be started immediately.

VI. CONCLUSION

The above scheme of determining VA is simple, effective, implies no extra cost, and is applicable to infants and young children. It is within the reach of all resident physicians and clinicians. We believe it completely eliminates severe amblyopia, although an amblyopia-free world is impossible.

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ABSTRACTS

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Vision / Visual Acuity / Amblyopia

The Dependence of Crowding on Flanker Complexity and Target-Flanker Similarity. Bernard J-B, Chung STL. J Vision ARVO 2011. [Authors Results & Conclusions]

Our results showed that (1) letter identification error rate increases with flanker complexity up to a certain value, beyond which error rate becomes independent of flanker complexity; (2) the increase of error rate is slower for high-complexity target letters; (3) error rate increases with target-flanker similarity; and (4) mislocation error rate increases with target-flanker similarity. These findings, combined with the current understanding of the faulty feature integration account of crowding, provide some constraints of how the feature integration process could cause perceptual errors.
(jb.bernard@berkeley.edu)

Eye Contact in Patient-Centered Communication. Gorawara-Bhat R, Cook MA. Patient Education & Counseling 2011, in press. [Authors Conclusions]

A comprehensive understanding of elder patient-physician interaction needs to include both - "listening" and "looking" - components of patient-centered commun-cations. *(No Author communication given)*

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

Perceptual learning has a small but significant therapeutic impact on both PT (patched) and NPT (never patched) juvenile eyes, which is most likely to have clinical values for eyes with mild amblyopia. Early diagnosis and treatment are most important and effective.
(Cong Yu. Email: yucong@bnu.edu.cn)

Visual Perception and Saccadic Eye Movements. Ibbotson M, Krekelberg B. Review Article. Current Opinion in Neurol, In press. Available online June 7, 2011.
Highlights
• Responses in many visual areas are reduced during but also just before saccades.
• After each saccade responses are often increased for 200-400 ms.
• Perisaccadic visual input that is not seen is not lost, it can be retrieved.
• As yet, the link between neural and behavioral perisaccadic changes is indirect.
(No Author communication given)

Acupuncture May be as *(or more? -ed)* Effective as Patching in Children with Anisometropic Amblyopia. Arch Ophthalmol, December 2010. [Abstracted from the AAO's Academy Express]

This prospective, single-center study included 83 children, aged 7 to 12 randomized to two hours of daily patching in the sound eye or five weekly sessions of acupuncture. After 15 weeks, acupuncture demonstrated an equivalent treatment effect compared with patching, and was statistically superior. Amblyopia resolved in 41.5% of the acupuncture group compared with 16.7% of the patching group. More of the acupuncture group achieved a two line or more improvement in BSCVA compared with patching (75.6% vs. 66.7%).

Binocular Vision

Repair of Blowout Orbital Floor Fracture by Periosteal Suturing. Noda M, Noda K, Ideta S, Nakamura Y, Ishida S, Inoue M, Tsubota. Clin Exp Ophthalmol 2011;

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39:364-369. [Authors Abstract condensed-PER]

"... periosteal suturing without silicone plates or one of minimal size was predetermined. ... Conventional surgery with silicone plates after this [failed]... was required in 2/7 (29%) type 2 cases and 3/5 (50%) type 3 cases. Eye movements were improved postoperatively in all eyes, and a complete range of eye movements was achieved in 6/7 (86%) cases with complete periosteal closure, 1/3 (33%) of cases with partial closure and 2/5 (40%) cases without closure. In conclusion, periosteal suturing can minimize the need for silicone plates especially for anterior or middle orbital floor fractures. *(Dr. Makoto Inoue.(Inoue@eye-center.org)*

Binocular and Monocular Depth Cues in Online Feedback Control of 3 D Pointing Movement. Hu B, Knill DC. ARVO 2011. [Authors Conclusions]

...**Thus, binocular cues from the finger are critical to effective online control of hand movements in depth.** An optimal feedback controller that takes into account the **low peripheral stereoacuity and inherent ambiguity in cast shadows can explain the difference in response time in the binocular conditions and lack of response in monocular conditions.** *(Dr. Hu. Bhu@cvs.rochester.edu)*

One Eye or Two: A Comparison of Binocular and Monocular Low-Contrast Acuity Testing in Multiple Sclerosis. Pineles SL, Birch EE, Talman LS et al. Am J Ophthalmol 2011; 152:133-140 [Authors Conclusions]

Binocular summation of acuity occurs in MS but is reduced by optic neuritis, which may lead to binocular inhibition. Binocular summation and inhibition are important factors in the QoL (Quality of Life) and visual experience of MS patients, and may explain why some prefer to patch or close 1 eye in the absence of diplopia or ocular misalignment. *(Laura Balcer, Dept Neurology and Ophthalmology, University of Texas Southwestern Medical Center, Dallas, Texas)*

Strabismus Pathophysiology

Expansion of the CHN1 Strabismus Phenotype. Miyake N, Demer JL, Shaaban S, Andrews C, Chan W-M, Christiansen SP, Hunter DG, Engle EC. Invest Ophthalmol Vis Sci 2011; 52:6321-6328.

Hyperactivating mutations in the CHN1gene can cause supraduction deficits in the absence of Duane retraction syndrome.
http://www.ivos.org/cgi/content/abstract/52/9/6321

Biomechanical Analysis of X-Pattern Exotropia. Brandner M, Buchberger M, Kaltofen T, Haslwanter T, Hoeranter R, Langmann. Am J Ophthalmol 2011; 152:141-146. [Authors Conclusions]

In case of X-pattern exotropia, recession and resection of 2 horizontal muscles can be used as a first line therapy, leading to a simplification of the therapy. *(Dr. Martina Brandner, Dept Ophthalmology, Medical University Graz, Graz, Austria)*

Do Subtypes of Graves' Orbitopathy Exist? Regensburg NI, Wersinga WM, Berendschot TJM, Potglieser P, Mourits MP. Ophthalmol 2011; 118:191-196. [Authors Conclusions]

Of these GO patients, 25% have orbital fat and MVs within an age-specific reference range. An increase of the FV is seen in only 14% of GO patients and characterized by proptosis. Muscle

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enlargement occurs in 70% of patients and is associated with older age, higher TBII values, more proptosis and impaired motility. *(Dr. Regensburg, Orbital Centre, Dept Ophthalmology, Academic Medical Center, University of Amsterdam, Meibergdreef 9, 1105 AZ Amsterdam, The Netherlands.)*

Stereopsis / 3D

The Zone of Comfort: Predicting Visual Discomfort with Stereo Displays. Shibata T, Kim J, Hoffman DM, Banks MS. J Vision ARVO 2011. [Authors Abstract edited -per]

...public concern about potential adverse effects associated with prolonged viewing... [focus] on how vergence-accommodation conflicts in stereo displays affect visual discomfort and fatigue:... examined the effect of viewing distance on discomfort and fatigue. We found that conflicts of a given dioptric value were slightly less comfortable at far than at near distance. In a second experiment, we examined the effect of the sign of the vergence-accommodation conflict ... negative conflicts (stereo content behind the screen) are less comfortable at far distances *(too far)* and that positive conflicts (contents in front of screen) are less comfortable at near distances *(too near)*. In a third experiment, we measured phoria and the zone of clear single binocular vision,... clinical measurements commonly associated with correcting refractive error. [these] predicted susceptibility to discomfort in the first two experiments. We [include] discuss the relevance of these findings for a wide variety of situations including the viewing of mobile devices, desktop displays, television, and cinema.*(martybanks@berkeley.edu)*

Motion Processing with Two Eyes in Three Dimensions. Rokers B, Czuba TB, Cormack LK, Huk AC. J Vision ARVO 2011. [Authors Conclusions]

These results imply the existence of eye-of-origin information in later stages of motion processing and therefore motivate the incorporation of such eye-specific pattern-motion signals in models of motion procession and binocular integration. *(b.rokers@uu.nl)*

Comparison of Automated Analysis of Cirrus HD OCT Spectral-Domain Optical Coherence Tomography with Stereo Photographs of the Optic Disc. Sharma A, Oakley JD, Schiffman JC, Budenz, DL, Anderson DR. Ophthalmology 2011; 118:1348-1357 [Authors Conclusions]

Designation of the cup and optic disc boundaries by an automated analysis of SD OCT was within the range of variable designations by different readers from color stereoscopic photographs, but use of different landmarks typically made the designation of the optic disc size somewhat smaller in the automated analysis. There was better repeatability among measurements from SD OCT than from among readers of photographs. The repeatability of automated measurement of SD OCT images is promising for use both in diagnosis and in monitoring of progression. *(Dr. Douglas R. Anderson, Clinical Research Building (LOC:C-209), 1120 NW 14th Street, Room 1560G, Miami, FL 33136-2107)*

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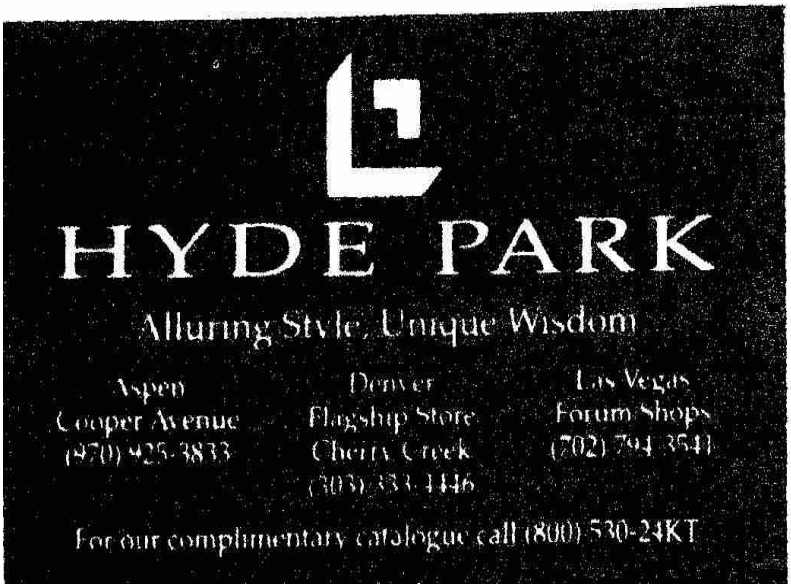
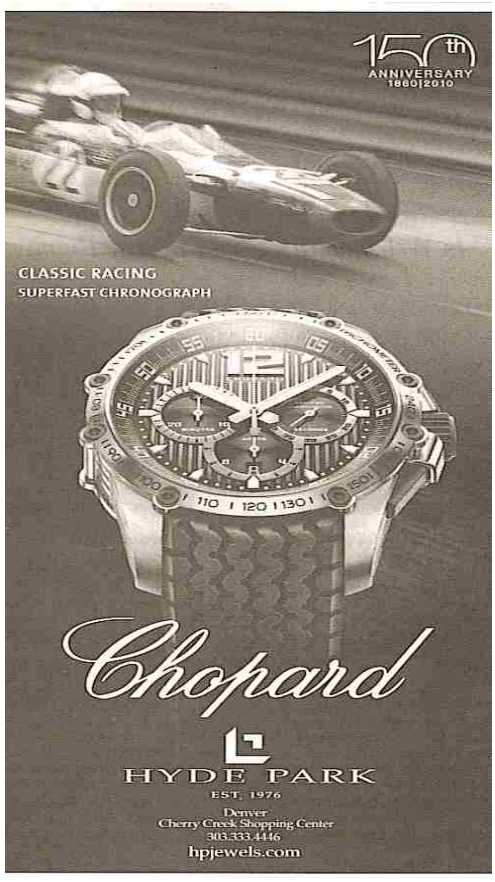
HYDE PARK EDITORIAL : The Editor's Soapbox, Sandbox & B'LOG

(Prehistoric) Since 1985

More AUTOSTEREOSCOPIC STILL and MOVIE Fuji CAMERAS; Lanzhou; RFID, and a bunch of CAVEATS

Stereoscopic 3 Dimensional depth perception vision remains the Acme, Epitome and GOAL of all of both (monocular) vision and Binocular Vision. It's the Very Foundation of Ego-Centric Localization, which is Your Very Own Cornerstone of SPACE and your respective unique world around you we each live in 3D.





Not much recent news on the binocular vision-stereoscopic 3D depth perception business. We did expand above our goal/mission after we heard that there is actually a "space center" in the base of the brain where you gather and register all the 3D bits and pieces and build the 3D world you actually live in. That's where ego-centric localization must actually reside.

So on the next page we retrieved news from late last year about the latest Fuji compact stereo camera. Now you can really play James Cameron (Director of the first 3D biggie movie " ".

On the third page of the blog you will find hard evidence of the very wide circulation we claim for *BV&SQ:* An Invitation to give one of our papers published in 2002, volume 5, in an ophthalmology meeting in the large western China city of Lanzhou. Howard Freedman copied his identical invitation for a paper of his we also published in that issue.

We *are* working on getting an "impact factor" for all the promotion requirements even though that has been shown to be so manipulable and distortable, it is quite...

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Depth Perfection

Oh, 3D TV—we *want* to love you, but there just isn't enough 3D content on the market. One solution: Create it yourself. The 10-megapixel ***Fujifilm FinePix Real 3D W3 Camera ($500)*** uses two lenses to shoot photos and 720p HD video in 3D. And the camera is just an HDMI cord away from displaying its fourth-wall-busting creations on a 3D monitor. Don't have a 3D TV handy? The FinePix has a 3.5-inch LCD that offers 3D viewing—without the goofy glasses. The camera's binocular vision even comes in handy in 2D mode: It can simultaneously photograph the same scene zoomed in close with one lens and from a wide angle with the other.

Remember a couple years back when, in this column, we reviewed Model 1 (yes, one, the first issue of this camera. Now we are up to 3! (Three).I think we missed Two. Number W1 lived up to all its advertised new 3D capabilities in both recording and viewing..

The W3 ups the resolution to 10 MP 3D pics and 720 p 3D video. Now it can do something even real binocular vision can't do! Simultaneously view a wide angle view with one eye while viewing the same target with a close up view from your second eye!

PHOTOGRAPHS BY STUDIO D

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From: EPS To: perxbvq@colorado.net
Subject: To: Romano PE, Conference 2011: 2011 Lanzhou International Forum ...

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If you no longer wish to receive email from us, you may unsubscribe

Dear Dr. Romano PE,

It is my great honor and pleasure to invite you to attend the **2011 Lanzhou International Forum on Clinical Medicine Development** and give an oral presentation at this meeting. This event will take place during October 28-30, 2011 in the charming city of Lanzhou in China, which includes sessions of Neurosurgery, Urology, General surgery, Orthopedics, Thoracic Surgery, Hematology, Ophthalmology, Cardiology, Neurology.

We are very interested in your article **Bilateral ametropic functional amblyopia in genetic ectopia lentis: its relation to the amount of subluxation, an indicator for early surgical management.** that is published on **Binocul Vis Strabismus Q.**. This article includes some novel conceptions, which may impress the global experts in your field. Please visit our website at www.epsglobal.ca and www.epswordlink.com for program details.

2011 Lanzhou International Forum on Clinical Medicine Development aims to promote international exchange and progress in the field of clinical medicine, and to enhance international collaborations across the world. This conference will be a great and exciting time for physicians and scientists. The scientific program will cover topics of almost all aspects of clinical medicine. World-renowned specialists from a wide range of disciplines will participate in this special event to present information on the latest developments in medicine research and deliver their powerful clinical experiences. Attendees will benefit by meeting and interacting with the world-renowned specialists for refreshing knowledge base and skills and by opportunities for establishing long-term international collaborations.

This conference will be organized by the **EPS Global Medical Development Inc.** of Canada, and hosted in collaboration with **The Second Hospital of Lanzhou University**. Following the success of the previous significant academic events, we will provide with high-quality organizing of the meeting, and sincere and hospitable services, and are confident that the **2011 Lanzhou International Forum on Clinical Medicine Development** will be a high-profile event.

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on OPTICS and OPTOTYPES:

On Good old typing and computer keyboards

(*Carry over from Summit Daily News September 26, 2010, "Summit Up" section.*)

"Ever wonder why Apple chose white keys [*with dark letters*] for the vast majority of its keyboards? [*Could it be that they know, like we do as optics students, that black optotypes on a white background are twice as visible as white on black, as repeatedly proven on various visual acuity charts?*]

Here we are, munching on chips, swilling coffee and scratching our noodle. By chance we look to see where those fingers dance feverishly every day - creating symphonies of words -and behold: It's one disgusting mess of dark discoloration and build-up. Is this Steve Job's roundabout way of telling us to keep [*clean and*] healthy? Cleaning a keyboard is tedious and boring. You don't just grab a rag and some spray. Often it involves Q-tips and alcohol. Most importantly, you have to shut off the system or unplug the keyboard. Hitting all sorts of random keys can lead to serious problems. The black MacBook Pro (professional) keyboards are much better for hiding accumulation of whatever substance that is. Maybe that's why they cost more."

More Jobs stuff.... and this is really important stuff:

The iPAD's biggest META MESSAGE was:

You can use me (this computer screen) either horizontally OR VERTICALLY
We have long been advocates of the VERTICAL Monitor screen
WHY NOT - that is how ALL our pages ARE, right?
That is how we scan magazine and books and even newspapers, by folding them vertically when there is not enough horizontal room to fully open them

Even the Wall Street Journal recently totally redid itself, severely narrowing its width from about 30 inches to just 24 inches so you could open the newspaper full width while seated on a public conveyance (where the shoulder to shoulder width of a person is supposed to be only22 inches max, folding the news paper center a little to keep it from collapsing vertically makes it only about 22 inches wide!)

another Jobs break out (after eliminating ordinary keyboards with the iPAD)
Now it looks as if touch screens will replace his mouse.....
no more "hunt and peck" keyboards???? for the disabled (name for unable no-touchers)
now it is hunt (still) and TAP ! Instead... Now everyone is back to 100% visual !!!
But Ladies now have NEW long fingernail problems but easier, (no longer any place for them to extend over into that old space above each keyboard key....
after they conquered the standard typewriter keyboard so many years ago...

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Ophthalmology (*AMA news*)

FDA grants orphan drug status for keratoconus treatment.

Medscape (9/15, Waknine) reports, "The US Food and Drug Administration (FDA) has granted orphan drug status to a 0.1% riboflavin ophthalmic solution (VibeX) combined with an ultraviolet A (UVA) irradiation system (KXL, Avedro, Inc) to perform corneal cross-linking in the treatment of keratoconus." Medscape explains, "The action was based on clinical data from three US multicenter phase 3 studies." How the treatment works is "by strengthening the cross-links between fibrils that serve as 'natural anchors' within the cornea, thereby reducing the abnormal curvature associated with keratoconus."

Elsewhere in Medicine

"MEDICAL **HOME**"

You will see this term used in one of the scientific articles published in this issue of *BV&SQ. We had not come across it before so inquired of the author as to its definition. The reply indicated that this was the same as "primary care physician". But in a recent AMA news bulletin the official definition is somewhat more: a "**team of people around their primary-care-doctor"** with several different administrative and medically supportive tasks... (? Statistically significantly ? Sounds to me like another Obama legislative creation to show he is fighting unemployment by creating new jobs for the unemployed - nice soft social worker type jobs - which will soon have more mandatory type paperwork required to get government payment of various medical entitlements at the expense and out of the pocket of all those RICH doctors who will have to pay their probably government mandated fat salaries and benefits... -PER)*

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

[*this section repeated from last issue because I think it should be a MANDATE for everyone in the health professions* who deal with patients... *when this editor sees any of his doctors, he drags the spouse along because by himself, he takes ho me only about 10% of what they said, and even get chunks of that only 10%, wrong. She takes notes too of both what the doc says and I said or asked. Being a doctor in NO way qualifies you to be competent as a patient - in fact I think it reduces and disturbs your potential in that regard!*]

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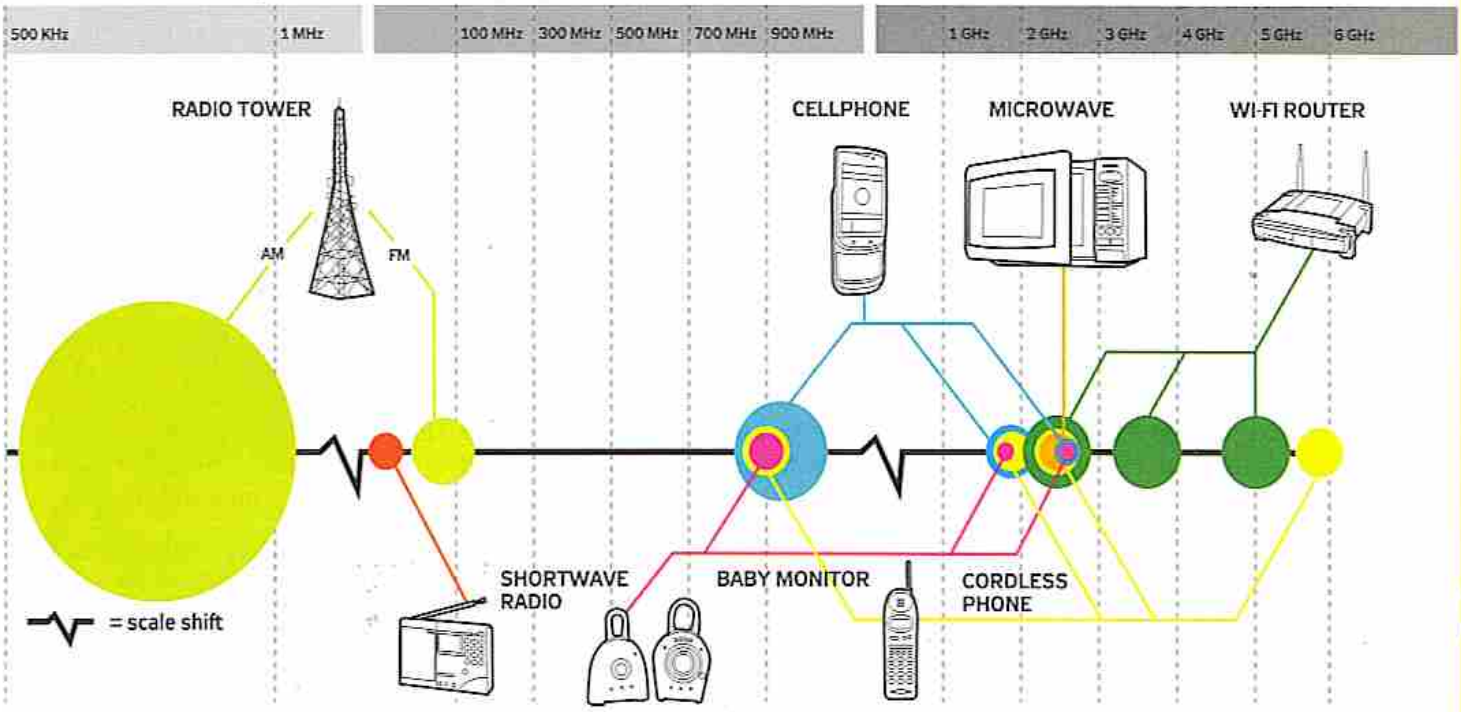
LIFE:
WHERE AM I ?
in each and all of my gadgets on the radio frequency spectrum ?

RADIO-FREQUENCY FINDER

WHAT'S MY GADGET'S WAVELENGTH?

Radio-frequency interference occurs when the signal emitted by one device gets unintentionally picked up by another—creating audible noise or a compromised connection. Some interference is due to badly shielded wires or components, but some is just the result of too many gadgets crowded into a limited spectrum.



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More bad news for you and your car on government subsidized (Ram it down your throat) secret hidden giant TAX on everyone, and terribly wrongheaded oil addiction cure and farm vote getter for no term limited chronic professional politicians, called ETHANOL

LOOKING AHEAD

E15 IN YOUR FUTURE?

The EPA has officially signed off on the legality of using E15 in 2007 and newer cars, based on testing that showed no problems in engine performance, durability or emissions. Why on earth do we need E15? It's the Blend Wall. By passing the Energy Independence and Security Act of 2007, Congress mandated that 15 billion gallons of corn ethanol be blended into the nation's gasoline supply by 2015. Last year's U.S. production of 11 billion gallons will ramp up to 22 billion by 2012. The amount of alcohol in gas must therefore be increased. Jeff Broin, CEO of Sioux Falls, S.D.–based POET, the nation's largest ethanol producer, says that the ethanol industry would like to increase that 15 percent to 20 percent—or more. All of which is okay in vehicles engineered to use it, but what about those that aren't? Broin suggests that in the future, "consumers will be able to dial up the concentration of ethanol they'd like to burn at the pump, from zero to 20 percent or more, just like they choose their octane rating today." That's exactly what those of us with older cars, tools or toys will need. Problem: Getting different blends to the consumer will require massive infrastructure changes. Gas-station owners will have to upgrade existing pumps to handle E15 and higher concentrations. The blending pumps Broin is suggesting will cost more than a typical $20,000 conventional unit. In addition, station owners will have to install more tanks. An energy policy that mandates more domestic production sounds like a great idea. But sneaking more ethanol into the supply stream at the expense of people who rely on their cars, boats and outdoor power equipment might better be left to the marketplace and not to bureaucrats.

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WHAT THE GOVERNMENT SHOULD BE DOING IS SPENDING OUR MONEY ON WHAT WE HAVE MORE OF THAN ANYBODY ELSE: **NATURAL GAS** AND THEY HAVE ALREADY GIVEN THE DRILLERS MUCH TOO MUCH OF EVERYTHING. THEY SHOULD BE SUBSIDIZING EVERYTHING NEEDED TO HELP THE **TRUCKING** INDUSTRY TO **CONVERT** 100% TO NATURAL GAS INSTEAD RIGHT NOW.... *–per*

THE LAW: More Bad News from your government(s) killing more of your RIGHTS

From: 'National Motorists Association <nma@motorists.org>
To: <perxbvq@colorado.net>
Re: The Fourth Amendment of the U.S. Constitution

In a disturbing decision issued in this new year, the California Supreme Court ruled 5 to 2 that the Fourth Amendment does no longer protect you and your cell phones and the information on those phones.

Here is the exact wording of the Fourth Amendment:

"**The right of the people to be secure, IN their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, and no Warrants shall issue, but upon probable cause, supported by Oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized...**"

Gregory Diaz was arrested ... on a drug charge. The police confiscated his cell phone during the arrest and used information from text messages saved on the phone as evidence to help obtain a conviction. The case reached the state's highest court when the Diaz defense team appealed to have the text message information excluded because the police did not have a search warrant for the phone. The majority opinion of the California Supreme Court allowed that **cell phones are essentially a part of a person's clothing.** The U.S. Supreme Court had previously ruled in favor of warrantless searches of **items immediately associated with an arrested person, such as clothing or cigarette packets**. [*or notes in your pockets, credit cards, or your wallet -ed*] As this article about the Diaz case notes, a cell phone can be an open portal to highly personal information about the phone's owner. That information may have nothing to do with a particular arrest, but no matter; based on the California ruling, the phone's contents can be seized and reviewed without a legal warrant authorized by a judge.

Even though the Fourth Amendment is precise in stating the protection of the people against unwarranted searches and seizures, today's courts are developing different legal interpretations. Last August, in Issue #86 of this newsletter series, we recounted the contrasting opinions by the U.S. Court of Appeals for the District of Columbia and the U.S. Ninth Circuit Court of Appeals on the Fourth Amendment issue of tracking a suspect's movements via a GPS device attached [*secretly by law enforcement persons*] to the vehicle of the unknowing suspect [*or anyone!*]. The Diaz decision is even more profound in the depth and breadth of information that can be gathered without a warrant.

Unless the California Supreme Court ruling on Diaz is successfully appealed, the state's drivers [*and by everyone, because it is a precedent*] should be aware that **the information on the cell phone [*and literally anything else at all -ed*] in their possession is available to law enforcement without the sanction of a judge's warrant. [*caveat everybody !*]**

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Caution: Some readers may be disturbed by the last page ahead. Sorry... -ed

9. Public Health and Safety (*first half reprinted from last issue)*

.

WARNING FOR ALL CYCLISTS !!!!

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

WHY MOTORISTS
DON'T AND CANNOT SEE CYCLISTS ?:

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

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

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

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

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

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

We ran the foregoing advice in the last issue of Hyde Park. We are running it again because
a. it is so terribly important being life rule 3 that it is worth repeating,
b. since last issue we had the most public, dramatic, most horrible most ugly PERFECT example of failure to follow this Marquis Q rule:

Did you watch a few weeks back the Saturday night boxing match on pay TV? The one for the Championship of the World in the top Division?...between Ortiz and Mayweather?, or at least see the replays of the end of the fight (shown a thousand times on every TV news channel or sports channel for the next 48 hours. If you didn't or if you needed a reminder, see the picture from the current issue of "Sports Illustrated". On the next page.

Notice Ortiz (on left) gloved hands are at his waist or below and that's where they were when Mayweather "cold cocked" him OUT ! Ortiz was trying to apologize for a head butt for the third time, thinking they would touch gloves yet again and then go back to boxing. He had dropped his hands from a defensive posture to a palm up supplicant query posture, since Mayweather wasn't responding as Ortiz expected...

Seems Mayweather thought or felt that the two prior apologetic gestures were more than enough and it was time for revenging the head butt. - and ending the fight which he was winning anyway.

There has never been a "more" perfect and pointed example of Marquis Q's advice. Don't think any other way. Think Marquis Q. So frame this and hang it on your wall in your private place. It applies to everything in life. So empty your pockets before you leave the house!
(Vide supra)-per

Enjoy your summer (or winter) . Note Change: Cancel that need to move to Italy!- per

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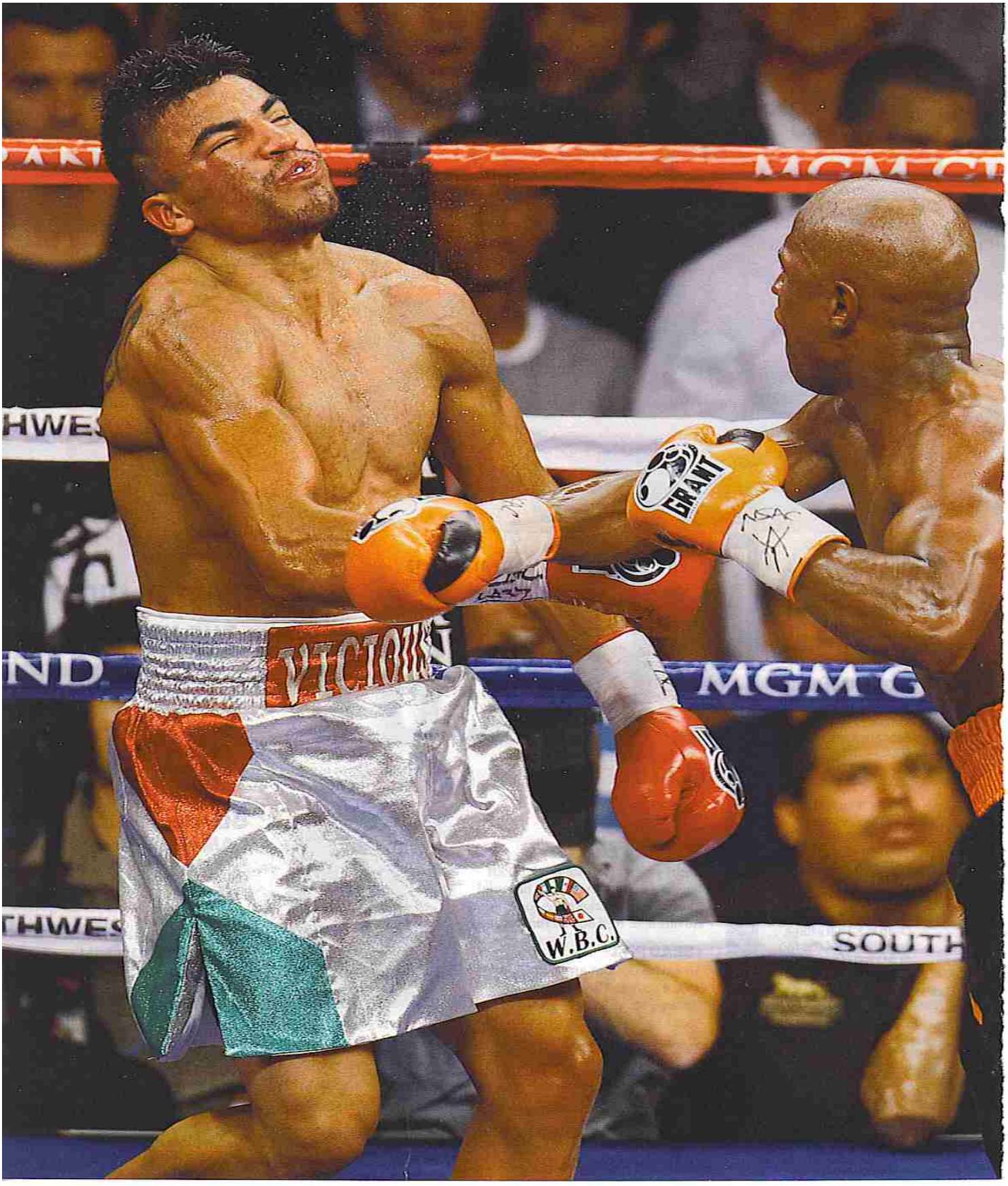

He never heard the Marquis of Queensbury And /or he didn't listen to the referee, either, or both..