FACULTY PROFILE: Elli Kollbaum

FEATURED REVIEW: Homonymous Hemianopsia and Driving: Is It Safe?

RESEARCH: Comparison of Methods of Prescribing Lateral Prism in Non-Strabismic Subjects

REVIEW: Recent Studies Comparing Autorefraction and Retinoscopy

REVIEW: Effects of Computer Training for Visual Attention and Visual Processing on Reading

BOOK REVIEW: Manual of Emergencies: Diagnosis and Management

ARTICLE OF INTEREST: Importance of Stereopsis in Ball Catching

SHORT PHOTOESSAYS: Descemet's Membrane Rupture and Terson's Syndrome
In This Issue

The contributions in this issue represent quite a varied range of topics. In this, the fifteenth, issue of the Indiana Journal of Optometry, we present a profile of Elli Kollbaum, a clinical faculty member at IU since 2000. In the featured review, she tackles the question of whether patients with homonymous hemianopsia can drive safely.

A clinical research paper compares five different methods of deriving lateral prism for vergence disorders in non-strabismics. Some of the considerations involved in such prism prescriptions are also discussed.

Two mini-reviews of recent papers in the literature look at comparison of autorefraction and retinoscopy and at the effect on reading of computer procedures which train visual attention and visual processing.

Subhash N. Jani, who received his M.S. degree in physiological optics from IU in 1967, reviews a manual on eye emergencies.

An article showing the importance of stereopsis for ball catching is reviewed. Lastly, the photographs which grace our cover for this issue are part of two photoessays, which discuss cases of Descemet's membrane rupture and Terson's syndrome.

David A. Goss
Editor

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CONTENTS

FACULTY PROFILE: Elli Kollbaum
By David A. Goss ................................................................. 24

FEATURED REVIEW:
Homonymous Hemianopsia and Driving: Is It Safe?
By Elli J. Kollbaum ................................................................. 25

CLINICAL RESEARCH:
Comparison of Methods of Prescribing Lateral Prism in Non-Strabismic Subjects
by David A. Goss ................................................................. 27

MINI-REVIEW:
Recent Studies Comparing Autorefraction and Retinoscopy
by David A. Goss ................................................................. 32

MINI-REVIEW:
Effects of Computer Training for Visual Attention and Visual Processing on Reading
by David A. Goss ................................................................. 34

BOOK REVIEW:
Manual of Eye Emergencies: Diagnosis and Management
Reviewed by Subhash N. Jani ..................................................... 36

ARTICLE OF INTEREST:
Importance of Stereopsis in Ball Catching
by David A. Goss ................................................................. 38

SHORT PHOTOESSAYS:
Descemet's Membrane Rupture
by Ali A. Bodla, Syed A. Ali, and M.Y. Shaikh ...................................... 39

Terson's Syndrome
by Ali A. Bodla and Arvind K. Singh ................................................ 39

On the cover: Photographs which accompany the photoessays on page 39.

Statement of Purpose: The Indiana Journal of Optometry is published by the Indiana University School of Optometry to provide members of the Indiana Optometric Association, Alumni of the Indiana University School of Optometry, and other interested persons with information on the research and clinical expertise at the Indiana University School of Optometry, and on new developments in optometry/vision care.

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Elli Kollbaum, a valuable member of the Indiana University School of Optometry clinical faculty, says that it may have been childhood experiences that led to her becoming an optometrist. Her mother was a nurse and the interesting stories she would tell about patients piqued her interest in healthcare. Elli recalls that when she was child, her parents thought it was important for her to have regular optometric check-ups. She didn't need glasses or other treatment, but the experience of the regular examinations led her to consider optometry as a career.

Elli completed her undergraduate degree at the University of Notre Dame in 1993. She found Notre Dame's incorporation of service learning into the educational program to be a beneficial experience. She volunteered in a homeless shelter, a soup kitchen, and spent a week in Appalachia. She continues to volunteer with community screenings and lectures, VOSH, and Habitat for Humanity. While in undergraduate school, Elli worked for a busy optometric practice which incorporated low vision care. Her observations there of the impact of low vision rehabilitation led her to practicing low vision herself and eventually teaching the subject at IU.

A 1997 Doctor of Optometry graduate of IU, Elli completed a residency in 1997-98 at Chicago Veterans Administration Healthcare Systems. That residency emphasized hospital-based primary care optometry and low vision rehabilitation. Elli then practiced from 1998 to 2000 in the McFarland Clinic in Ames and Story City, Iowa. It is a multi-disciplinary clinic which includes optometry, ophthalmology, neurology, rheumatology, and other specialties. While there, she practiced full scope optometry, including contact lens fitting, pediatric and geriatric care, ocular disease management, and ocular surgery co-management. She also created a low vision consultation service and helped start a low vision support group.

In July of 2000, Elli returned to Indiana University as a faculty member. Some of her first teaching duties were working with third year students in the Primary Care Clinic, with fourth year students in the Low Vision Rehabilitation Clinic, and doing some lecturing in the course entitled The Clinical Interview and Health History Taking. In the last two years, she has taken on additional classroom teaching duties, taking responsibility for the courses in low vision rehabilitation and geriatric optometry. Asked about what surprised her most about teaching, Elli noted that she didn't know she would learn so much as a teacher.

Elli has given a number of invited lectures for various organizations. She has given posters at seven of the last eight American Academy of Optometry meetings. Among her various other professional activities, she has participated in VOSH trips to Mexico and she has taught two week intensive courses at Ramkhamhaeng University in Bangkok, Thailand. Elli's husband is Pete Kollbaum, also an IU optometry graduate. Pete is pursuing a Ph.D. degree in vision science from IU. Elli says that they enjoy traveling and being new parents. Their daughter, Greta, will be one year old in January 2006.
Homonymous Hemianopsia and Driving: Is It Safe? by Elli J. Kollbaum, O.D.

When examining patients with homonymous hemianopsia (HH), many optometrists are faced with the individual's questions about driving. "Is it safe?" "Can I keep my driver's license?" "My family doesn't want me to drive. What do you think?" Clinicians can make their recommendation based on their state's driving requirements, but this method appears inadequate. The driving laws in the U.S. give minimum standards. But, what is the true minimum needed? There is no uniformity among states. Visual field requirements vary widely and only 33 states actually require testing of minimum binocular visual field extent. The minimum binocular visual field ranges from as low as 60 degrees up to 140 degrees. Consequently, patients with HH can legally obtain licensure to drive in many states without any extra testing or review process.

A logical question to ask might be, "Is visual field loss associated with poor driving performance?" Johnson and Keltner screened 20,000 eyes to assess the incidence of visual field loss and its relationship to driving performance. They, indeed, found accident rates and conviction rates to be higher for those with bilateral visual field loss, but the driving performance for hemianopes specifically was not discussed in the article. When research specific to hemianopsia and driving is reviewed, evidence in the literature suggests that no swift decision can be made on whether a HH patient should drive or not.

Racette and Casson reviewed a group of 131 individuals with visual field loss who underwent an on-road driving assessment while enrolled at a driving rehabilitation program in Toronto. Of these, 13 had HH and seven had quadrantanopsia. (Patients with neglect or substantial motor or cognitive deficits were not included this study.) Driving instructors performed the on-road evaluations after an interview and visual assessment with an occupational therapist specialized in driving rehabilitation. Performances were rated as safe, unknown, or unsafe based on a number of tasks common to driving and a set variety of driving situations. The unknown rating was given to those who needed re-evaluation, had potential with training or were deemed too early after a cerebrovascular accident (CVA). The unknowns were removed from the analysis. For the HH individuals, four were safe and three were unsafe. For quadrantanopsia, four were safe and none were unsafe. The safe rating here on a small group of persons with hemianopsia creates a positive argument for licensure after on-road testing; however, no follow-up or long-term safety data were collected. Other drawbacks of this study include small sample size and non-standardized evaluations. The authors surmised that vision standards in driving are warranted, but from this study's results "...that their strict application to all drivers may prevent some competent individuals from driving."

In Belgium, Tant et al. studied a group of 17 hemianopic patients before and after compensational training. All failed the practical driving test prior to the training, and two (17%) passed the driving test after 18 total hours of training (six hours on-road training). The two that passed were split - one with a right-sided defect and one with a left. In all cases, the visual performance while driving improved which may indicate some patients could have passed after further training.

Szlyk et al. investigated the effects of age and hemianopic visual field loss on driving. The subjects included six older individuals (53 to 80 years of age) with hemianopsia resulting from cerebrovascular accident, three with hemifield neglect. (Neglect was measured with the Line Bisection test and a signature-writing task.) These subjects were compared to seven age matched normally sighted controls and 31 younger normally sighted controls. All subjects were tested on an interactive driving simulator. The hemianopic group was found to have significantly more crossings of traffic lane boundaries and more variability in lane position than the age matched normals. Right-sided versus left-sided field loss had no relationship to performance. The two subjects with hemispatial neglect had marked performance deficits. However, most of the CVA patients were able to compensate and perform at levels close to the level of the normally sighted older group. Interestingly, subjects with HH without neglect had greater head movements in the simulator than the older control group to compensate for their loss. Generally, the study found that older subjects, normally sighted or with HH, performed more poorly than younger subjects.
on the driving simulator indexes.

Thus far, the assessment and training studies discussed have been for subjects without prism options introduced. Prism designs to extend the visual field have also been considered in relation to hemianopsia and driving. Szlyk et al.7 analyzed the performance of the Gottlieb Visual Awareness System compared with sector Fresnel prism in ten HH individuals. Training in use of the prisms for navigation and driving was included in the study. Overall, no differences in performance were found with either system; however, at the two-year follow-up interview, patients were still using the Gottlieb VAS system. Additionally, during the follow-up interview, two individuals reported obtaining licensure to drive legally with the Gottlieb system. The article’s authors specifically point out that they “…do not have any data on the long-term safety of device use while driving for any of the patients.”

An innovative form of visual field enhancement for HH was introduced by Peli in 2000.8 He proposed optically inducing peripheral exotropia in a spectacle form. With two elliptical segments of high power base-out prism positioned above and below the line of sight for one eye, the system provides field expansion of about 20° across the midline in segments above and below the line of sight. This method of management for HH differs from sector prism use in that there is a measurable amount of field expansion in primary gaze. The other methods rely on some scanning from the individual. Peli’s opinion on whether his field expansion with prism should be tested for driving is stated as, “such testing is futile before a clear difference in performance can be shown (between driving performance of normals and hemianopes) without the prisms.”

The best management strategy for patients with hemianopsia who desire to drive is not clear at this time. On road performance evaluations reveal that some hemianopes can achieve a safe rating during that form of testing. However, long-term safety data are not available and may be difficult to collect. In clinical practice, hemianopic patients can be referred for on road driving evaluations with occupational therapists and/or driving rehabilitation specialists (www.driver-ed.org or http://www.aota.org/driver_search/index.aspx ) when deemed appropriate. The hemianopic patients with hemispatial neglect appear to have unsafe behaviors in on road simulation and are unsuitable candidates for driving. Training driving skills and management with prism are strategies that may prove helpful for some hemianopes intent on driving, but further research is needed.

References
Comparison of Methods of Prescribing Lateral Prism Power in Non-Strabismic Subjects

by David A. Goss, O.D., Ph.D.

Abstract
One of the treatment options for non-strabismic vergence disorders is the prescription of prism to relieve strain on fusional vergence. The results of five methods of deriving nearpoint prism prescription power were compared in 38 exophoric and 41 esophoric young adult subjects. The five testing procedures were associated phorias with Bernell lantern nearpoint slide, associated phorias with Borish card, Sheard’s criterion, Percival’s criterion, and the minimum prism at the flattest segment of the fixation disparity curve (Shedy’s criterion). Various considerations in prescribing prism are also discussed.

Key words: associated phoria, dissociated phoria, esophoria, exophoria, prism, vergence disorders.

The prescription of prism can help to relieve symptoms and improve visual efficiency in patients with vergence disorders. Various methods have been described to determine the prism power to prescribe.1,2 Some methods involve analysis of dissociated phoria and fusional vergence range data. Other methods use associated phorias or fixation disparity curve parameters.

Methods involving dissociated phoria and fusional vergence range findings include Sheard’s criterion and Percival’s criterion. Prism is recommended by Sheard’s criterion when the compensating vergence range blur (or break, if no blur occurs) is not at least two times the amount of the dissociated phoria. Prism is suggested by Percival’s criterion if the lesser of the vergence range blurs (or break, if no blur) is not at least half of the greater of the two vergence ranges.

Perhaps the most common method today of prescribing prism is the use of associated phorias. The associated phoria is the amount of prism required to make fixation disparity equal to zero.3,4 Examples of devices which can be used to determine near associated phorias are the Mallett unit, the Bernell lantern nearpoint slide, and the Borish card. The nearpoint slide for the Bernell lantern3,4 is shown in Figure 1. The lateral associated phoria target is toward the center of the slide. The numbers 2,1,0,1,2 are seen binocularly. The vertical lines above and below the numbers are seen monocularly, one with each eye when using Polaroid testing goggles. If the patient sees them as exactly aligned, the associated phoria is zero. If not, the associated phoria is the amount of prism that does align them. The associated phoria target on the Borish card5 is in the lower right of Figure 2. The x and o marks are seen binocularly. Associated phorias with the Borish card are determined in the same manner as with the Bernell lantern.

Figure 1. The nearpoint slide for the Bernell lantern. The lateral associated phoria target is near the center of the slide. When polaroid goggles are worn during testing one of the arrows is seen by the right eye and the other is seen by the left eye.

Figure 2. One side of the Borish card. The associated phoria target is in the lower right.
Sheedy has recommended using the fixation disparity curve and prescribing an amount of prism equal to the lowest prism value on the flattest segment of the fixation disparity curve. Griffin and Grisham have coined the term Sheedy's criterion to describe that fixation disparity curve parameter.

In the fixation disparity curve in Figure 3, the flattest segment of the curve goes from 3 to 6 base-in (BI), so Sheedy's criterion would be 3 BI. Devices for the determination of fixation disparity curves include the Disparometer, the Wesson fixation disparity card, and the Saladin card.

The purpose of this paper is to compare the prism power prescriptions that would be obtained with various methods in non-strabismic subjects. All testing considered in this paper was conducted at near. The testing procedures were: 1) associated phoria with Bernell lantern, 2) associated phoria with Borish nearpoint card, 3) Sheard's criterion, 4) Percival's criterion, and 5) Sheedy's criterion with a Disparometer.

### Methods

All testing was conducted with the subjective refractions of the subjects in a phoropter. The phoropter rotary prisms were used for all prism settings and measurements. With the exception of the Bernell test lantern, all test targets were mounted on the phoropter reading rod 40 cm from the spectacle plane. Due to its weight, the Bernell test lantern was held by the examiner 40 cm from the spectacle plane during testing.

Associated phoria testing with the Bernell and Borish targets was done first. The one of those two that was performed first was alternated on consecutive subjects. Subjects were asked if the target marks were vertically aligned. If not, lateral prism was introduced using the phoropter rotary prisms until the subjects judged the marks to be vertically aligned. The prism to first alignment was recorded as the associated phoria.

Associated phoria testing was followed by determination of the fixation disparity curve (FDC) with the Disparometer. Fixation disparity was measured with zero prism followed by prism settings in multiples of 3 base-in (BI) to diplopia. Base-in prism settings were done before base-out, as recommended by Sheedy.

Accommodation was controlled by asking the subject to view the letters on either side of the alignment marks, and then to look at the marks to judge their alignment.

After a pause in testing, dissociated phorias were measured with the von Graefe prism dissociation method, and fusional vergence ranges were determined using the rotary prism in the phoropter. Base-in vergence ranges were tested before base-out. Sheard's criterion prism was
calculated using the following formula:
\[ P = \frac{2D - R}{3} \]

where \( D \) = the magnitude of the dissociated phoria, \( R \) = the base-in blur (break if no blur occurred) in esophoria or the base-out blur (break if no blur) in exophoria, and \( P \) = Sheard's criterion prism amount. A negative \( P \) value, indicating that Sheard's criterion was met, was included in the data analysis as a zero value because no prism would be recommended.

Percival's criterion was calculated using the following formula:
\[ P = \frac{G - 2L}{3} \]

where \( G \) = the greater of the two lateral fusional vergence limits (base-in or base-out), \( L \) = the lesser of the fusional vergence limits, and \( P \) = Percival's criterion prism amount. A negative \( P \) value, indicating that Percival's criterion was met, was considered to be a zero value for analysis because no prism would be recommended.

Comparisons of the prism amounts from the different tests were done by finding the mean difference between pairs of tests and the standard deviations of the differences between pairs of tests and by noting the percentages of subjects which agreed within particular limits. Comparison of the results of two tests are often presented graphically in scatterplots or in plots of test difference versus means of the two tests, as recommended by Bland and Altman.9 However, because there are so many comparisons in this study and because the majority of test findings were zero, the results will be presented in tabular form.

Subjects
Subjects ranged in age from 20 to 38 years. Persons with strabismus or amblyopia were excluded from the study. Subjects were optometry students, faculty, and staff. There were 38 subjects with exophoria at 40 cm on the von Graefe dissociated phoria test and 41 subjects with esophoria. Bernell and Borish associated phorias were not determined on one of the subjects with exophoria because diplopia occurred before alignment of the test marks was achieved. Sheedy's criterion was not recorded for one of the subjects with exophoria and for three of the subjects with exophoria because irregularity of the FDC made the determination of Sheedy's criterion ambiguous.

The subjects with exophoria at near on the von Graefe test had exophorias which ranged from 1 to 10 U. The subjects with esophoria had phorias which ranged from 1 to 20 U. The majority of subjects were asymptomatic as judged by a survey.10 Morgan's normal range for near dissociated phorias is ortho to 6 U exo. Only seven of the 38 subjects with exophoria had dissociated phorias which were outside that normal range.

Results
Summary statistics for the findings on each of the tests are given in Tables 1 and 2. The mean values were all around one prism diopter or less. Because the majority of findings were zero, the medians for all methods were zero for both exophoric and esophoric subjects.

Differences between outcomes on the various tests are summarized in Table 3 for subjects with exophoria and in Table 4 for subjects with esophoria. Taking the difference between Bernell
and Borish tests in exophoric subjects as an example, the mean difference was 0.1△. The standard deviation of the differences, indicating the variability in the amount of difference on the two tests for different subjects, was 1.5△. More than half of the exophoric subjects (65% as shown in Table 3) had associated phorias which were zero on both Bernell and Borish. In 27% of the exophoric subjects, the Bernell and Borish results were within 1△ of each other, when at least one of the two had a non-zero value. Five percent of exophoric subjects had a prism finding more than 1△ greater on Bernell than on Borish, and 3% had the Borish finding more than one prism diopter greater than Bernell.

The data in Tables 3 and 4 indicate that mean differences between tests were all 1△ or less. The variability of differences between tests (SD of differences) was least for the Sheard-Percival comparison in exophoric subjects and least for the Bernell-Borish comparison in esophoric subjects. The variability in differences was greatest for both exophoric and esophoric subjects on the comparison of Sheedy's criterion to the other methods of prism determination.

Discussion and Comments

The mean differences were quite low for all of the test comparisons in this study. There was more variability in the differences in some comparisons than in others. The test which tended to show the largest variability in differences with other tests was Sheedy's criterion. Bernell and Borish results, both associated phorias, were closely related. Both of these targets have a central fusion lock. The Disparometer, used for Sheedy's criterion, does not have a central fusion lock. Differences between the associated phoria results with Bernell and Borish procedures and the Sheedy's criterion results with the Disparometer may have been due not only to the differences in the nature of the tests, but also the presence or absence of the central fusion lock.

Sheard's criterion and Percival's criterion results were also quite closely related in this study. Sheard's criterion, based on the dissociated phoria and the compensating vergence, often yields more prism in symptomatic individuals with exophoria than Percival's criterion, which is based on the balance between the vergences. Percival's criterion often suggests more prism in symptomatic individuals with esophoria than Sheard's criterion. The close agreement of the tests in general may be due in part to the fact that the subjects were mostly asymptomatic and most of the test results were zero. The results of a large study with more symptomatic subjects would be interesting.

Many optometrists feel most comfortable with using associated phorias for prescribing prism. Griffin and Grisham’s ratings of how valuable various prism prescription methods are according to their experience are summarized in Table 5. They rate associated phorias and Sheard's criterion the highest. One useful approach is to use associated phorias when possible. Then if associated phoria equipment is not available or the associated phoria findings seem questionable, use Sheard's criterion. Saladin has suggested that another formulation, the 1:1 rule, may be more helpful than Sheard's criterion in esophoria. The 1:1 rule states that the base-in recovery should be at least the amount of the esophoria. The amount of base-out prism (P) recommended in esophoria by the 1:1 rule is:

\[ P = (\text{esophoria} - \text{BI recovery}) / 2 \]

Confirmation of a prism prescription with loose prisms in a trial frame or lens holder is a useful procedure. Patients who will benefit from a prism prescription will usually notice print to be clearer or vision to be more comfortable with the prism being considered. To rule out a placebo effect, the prism can be reversed to the opposite base direction, in which case comfort should be reduced. A beneficial prism will also sometimes result in an improvement in measured stereopsis. Another consideration is the relative acceptance of prism in exophoria and esophoria. Saladin has observed that inadvertently prescribing more prism power than necessary is more likely to lead to an unhappy patient in exophoria than in esophoria.

It should be noted that this paper has been mainly concerned with examining whether different prescription methods give similar results rather than with when prism should be prescribed. Prism is typically a second option to vision therapy in exophoria, especially in convergence insufficiency. Nearpoint plus is preferable over prism in convergence excess esophoria, where there is a high AC/A ratio. Prism is frequently a very useful option in basic esophoria.
Acknowledgment

The data analyzed in this study were collected by Greg A. Brownlee (1959-2002), who graduated from the Northeastern (Oklahoma) State University College of Optometry in 1984 and practiced optometry in Tulsa, Oklahoma.

References

Autorefractors have shown increased popularity in recent years. Like retinoscopy, they provide estimations of refractive error without requiring judgments from the patient. They can be operated by a technician, and patients may perceive their use as an indication that an office has the latest technology. However, some practitioners worry that patients will get the idea that high-tech equipment is more important than the doctor's skills and knowledge. Further, instrument accommodation is often a problem with autorefractors. Therefore, it is not surprising that practitioners vary in their opinions of the merits of autorefractors in comparison to retinoscopy. Two well-done studies recently conducted in Portugal have addressed that issue.

In one of these studies, Jorge et al. compared cycloplegic to non-cycloplegic refraction findings with an autorefractor and also with retinoscopy. The autorefractor that they used was a Nidek ARK 700A. The authors chose this autorefractor because it had been used in various clinical studies. They also cited a study which found that the measurements obtained with the Nidek ARK 700A compared closely to other autorefractors.

Used in the analysis were the right eyes of 199 healthy young adults. The mean age of the subjects was 21.6 years (range, 18 to 34 years). The only exclusion criteria were systemic disease or history of eye injury or disease. Spherical equivalent refractive errors of the subjects by retinoscopy with cycloplegia ranged from -9.00 to +3.75 D and averaged +0.28 D. Myopia was present in 22% of the subjects, emmetropia in 24%, and hyperopia in 54%.

Measurements were taken first without cycloplegia and again 30 minutes after the instillation of two drops of 1% cyclopentolate five minutes apart. The first author of the paper performed retinoscopy. As retinoscopy was being done, the phoropter displays of sphere, cylinder power, and cylinder axis were covered. After retinoscopy was completed, another one of the authors noted and recorded the results. Only the spherical equivalent results will be considered here because the differences between the non-cycloplegic and cycloplegic results for cylinder components were very small.

The autorefractor without cycloplegia averaged 0.86 D more minus or less plus than the autorefractor with cycloplegia, with the standard deviation of the differences being equal to 0.79 D. Retinoscopy without cycloplegia averaged 0.37 D more minus or less plus than retinoscopy with cycloplegia, with the standard deviation of the differences being 0.45 D. The means show that the difference between non-cycloplegic and cycloplegic findings was less with retinoscopy than with the autorefractor. The standard deviations show that the variability of the differences between non-cycloplegic and cycloplegic findings was also less with retinoscopy.

Examining the graphs of the data in their paper, it appears that on retinoscopy non-cycloplegic and cycloplegic findings were usually pretty close for myopes, but often up to 1 D more plus on cycloplegic retinoscopy for hyperopes. Non-cycloplegic autorefraction was almost always more minus for myopes and less plus for hyperopes than the cycloplegic autorefraction. Differences on hyperopes were generally between 0.25 and 2.00 D. The authors suggested that their results "demonstrate that when performed under standard procedures to minimize accommodation, non-cycloplegic retinoscopy should give a valuable objective start point to perform subjective refraction in young adults. Despite the proliferation of autorefractors in optometric and ophthalmology clinics, the use of retinoscopy should not be underestimated, mainly by the new generations of optometrists and ophthalmologists."

In another study by Jorge et al., manifest retinoscopy and manifest autorefraction were compared to manifest subjective refraction. Again the investigators used the Nidek ARK 700A autorefractor. Subjects in this study ranged in age from 18 to 34 years, averaging 21.6 years. Spherical equivalent refractive errors of the subjects ranged from -9.00 to +2.25 D. Myopia was present in 22% of the subjects, emmetropia in 24%, and hyperopia in 54%.

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equivalent results will be discussed here.

On average, the retinoscopy spherical equivalent was only 0.02 D more minus than the subjective refraction. The standard deviation of the differences was 0.33 D. Autorefractor findings averaged 0.44 D more minus than the subjective refraction, with the standard deviation of the differences being 0.54 D. Thus retinoscopy not only averaged closer to subjective refraction than the autorefractor, but also showed less variability in the differences from subjective refraction.

The authors also reported how often the objective refraction sphere findings were within +0.25 D of the subjective refraction sphere. That level of agreement was found in 75% of subjects with retinoscopy and 44% of subjects with autorefractor. The authors interpreted their results as confirming that "when carried out by an experienced clinician, retinoscopy is more accurate than autorefractive refraction, giving a better starting point to non-cycloplegic refraction."

Comments
The "gold standard" for refraction is the subjective refraction. The numerical results of the Jorge et al. studies seem to show clearly that retinoscopy is a better starting point for non-cycloplegic subjective refraction than is autorefraction. Besides that numerical advantage, retinoscopy may also give the practitioner a glimpse of media opacities.\(^1\) Changes in the appearance of the reflex can also alert the practitioner to changes in accommodation.

However, some optometrists may consider autorefractive refraction to be an acceptable substitute for retinoscopy. By delegating autorefractic refraction, the practitioner may save the minutes ordinarily spent on retinoscopy. Borish\(^4\) has reminded us that it is essential for the optometric profession to maintain its strength and expertise in its traditional core competencies. Maintaining skill in retinoscopy would help achieve that end. But there is pressure today to do more exams in less time than in years past. Some of the parts of the examination that are often dropped as a result are tests which are in the areas of the traditional strengths of optometry. Borish\(^4\) recommended that one can avoid that by delegating tests that are objective and give quantitative information. On that basis, Borish and Catania\(^5\) suggested that autorefractor provides a reasonable alternative to retinoscopy.

But what about the qualitative information that can be gained from retinoscopy? Werner and Press\(^6\) suggested that some hints of the same information can be gained by interpretation of autorefractor print-outs. The autorefractor that they use primarily is the Nidek ARK 700A, the same as that used in the Jorge et al. studies. That autorefractor gives a confidence value for each reading. Werner and Press note that a common cause of a reduced confidence value is media opacity. They also look at the multiple readings which are printed out. For children and young adults the most common cause of variability in the readings is accommodative fluctuation. By using autorefractor in that way, Werner and Press feel that it is possible to use autorefractor as the primary objective refractive procedure before subjective refraction and that retinoscopy can be used for confirmation of the autorefractor results when necessary. They noted that retinoscopy is more useful in patients with small pupils and that autorefractor measurements are susceptible to instrument accommodation.

Ultimately practitioners need individually to assess the potential value of an autorefractor based on their preferences, philosophies, modes of practice, and interpretation of the literature. Because of some of the advantages of retinoscopy, it will remain an important optometric skill for estimation of refractive error.

This mini-review has considered only static refraction. Skill in retinoscopy can also become very valuable in dynamic retinoscopy. The measurement of accommodative response provided by dynamic retinoscopy is a useful part of the assessment of nearpoint function. Observation of some of the qualitative aspects of the retinoscopic reflex is held to be particularly important in dynamic retinoscopy by many practitioners.\(^7,8\)

References
A common reason parents schedule a child for an optometric examination is difficulty with reading. The process of reading involves a number of visual skills. It begins with proper focus of and alignment with the print and eye movements across a line of print. Reading also requires interpretation of the letter symbols on the page.

Optometric interventions may include not only the traditional treatments for refractive, accommodative, or binocular vision disorders, but also therapy to improve other skills such as visual attention and visual information processing. Among the procedures available for training the latter skills are computer programs. This short review will give a brief discussion of papers published in the last few years which have looked at how effective computer programs which largely target those skills have been in improving reading skills.

In a study published in 2001, Solan et al.1 trained 31 sixth grade students who scored 0.5 to 1.0 standard deviations below national means on the Gates-MacGinitie Reading Test. Sixteen subjects underwent twelve sessions of specific reading comprehension therapy followed by twelve sessions of eye movement and visual processing speed therapy. Fifteen subjects had eye movement and visual processing speed therapy first followed by specific reading comprehension therapy. Eye movement and visual processing speed training was done with the Perceptual Accuracy/Visual Efficiency (PAVE) and Guided Reading Program. The eye movement training showed improved eye movements as assessed by the Visagraph II and improved reading comprehension as assessed by an alternate form of the Gates-MacGinitie Comprehension Test. The authors suggested that their results "support the notion of a cognitive link among visual attention, oculomotor readiness, and reading comprehension."

In 2003, Solan et al.2 reported a study in which 15 sixth grade students diagnosed with reading disability underwent computer training got visual attention with the Perceptual Accuracy/Visual Efficiency (PAVE) program and the Computerized Perceptual Therapy Program. A control group of 15 sixth grade students with similar mean initial reading scores did not undergo any training. Grade equivalent reading scores from the Gates-MacGinitie Reading Test were used as the outcome variable for the study. The experimental group had a statistically significant improvement in reading comprehension test results, but the control group did not. Solan et al. suggested that "visual attention is the catalyst that links perception with cognition." They did not put forward a mechanism for synchronization of those elements, but they did interpret their study findings as showing a connection between visual attention and reading comprehension.

Tran et al.3 did a pilot study of eye movement training with the Taylor Reading Plus software, which incorporates Perceptual Accuracy/Visual Efficiency (PAVE) and Guided Reading programs. Five young adult subjects completed ten weeks of training. Most of the subjects were optometry students, and no subjects reported ever being diagnosed as reading disabled or dyslexic. Reading eye movements as assessed by the Visagraph II improved in the experimental subjects but not the control subjects. Improvement in the Visagraph II comprehension test was seen in two of the five treatment subjects and none of the control subjects, but overall was not statistically significant in either group.

The Solan et al. studies and the Tran et al. study used computer programs which are commercially available. A study in Italy used a computer program which the investigators designed themselves to train visual attention. Facoetti et al.4 did visual attention training on 12 children with specific reading disorder. Twelve additional children with specific reading disorder and matched for age, IQ, and reading ability underwent traditional speech therapy. Participants in each group had two training sessions per week for four months. Training session lasted 45 minutes. For visual attention training subjects watched a dot move up and down the computer screen. A word was presented for a time interval between 100 and 250 msec on one side of the computer screen and thus in the subject's peripheral visual field. The length of the words was increased as training proceeded. The visual
attention training group had greater increases in reading speed and reading accuracy than the speech therapy group.

Reading requires various visual and cognitive abilities. A recent review of eleven studies of the effect of oculomotor vision therapy on reading skills such as reading rate and comprehension found a weak but positive relationship. The studies they reviewed suggest that oculomotor vision therapy results in about the same improvement in reading as conventional reading training but that a greater response occurs with the two types of training programs in combination. The four studies reviewed here were small studies but they suggest that training visual attention and visual processing improves reading skills. Continuing research on training regimens for reading and on the nature of the reading process will help to identify the combination of therapy programs which may optimize reading skills.

References
Interested in a quick refresher on eye emergencies? Try the 212 pages of text in this book. It has an easy read layout of headings and subtitles with lots of well illustrated photos, sketches, charts and resources needed in ocular emergencies. The text is written for primary care optometrists, ophthalmologists, general practitioners, and emergency room staffs. Given the broad range of reading audience, optometrists will find it a breezy read but with valuable emergency information from a medical perspective in one pocket compendium. The author is Consultant Ophthalmologist at Tennent Institute of Ophthalmology in Glasgow, United Kingdom.

There are 11 chapters with Red Eye and Visual Symptoms comprising the bulk of text with 90 pages. Chapters on Trauma, Lids, Tumors, Surgery and Complications, Drugs and Basic Examination are ten to twenty pages long. The remaining chapters, Contact Lens Problems, Watering Eye, Painful Eye are short with four to nine pages each. Caveats in these chapters are recurring headings: Pitfalls. These alert readers to document relevant standard-of-care tests and observations and thereby avert potentially medico-legal situations.

Chapter 1 is Basic Examination. An opening diagrammatic trains the reader for a quick overview lookout on Face, Lids & Orbit-for eczema, trauma, cellulitis, carcinoma, papilloma, dacryocystitis, etc. Additional examination and analysis features include eye movements, pupil, fundus, confrontation visual fields and slit lamp usage.

Chapter 2, Red Eye, is under two broad headings: Sudden Onset Painful and Sudden Onset Painless. Further subdivisions are Unilateral vs. Bilateral. Additional factors considered are: chronic or trauma. As appropriate, the author advocates immediately washing the chemically injured red eye. Subsequently, in all chapters where appropriate, the S.O.A.P. format is essentially followed. Emphasis is on detailing accurate History (HPI), Examination-detailed and problem-focused, Management, Referral and follow up and the Pitfalls. While common to rare conditions, e.g., conjunctivitis, foreign bodies, abrasions to orbital cellulitis are presented with diagnostic photos and bulleted management steps, the Pitfalls sections come to be reassuringly helpful. For example, a condition with acute, painful, bilateral red eyes may be simple allergic or bacterial conjunctivitis. However, differences in saturation/brightness between the two eyes, on red spot test especially in the presence of afferent papillary defect may be indicative of optic nerve compression - particularly thyroid dysfunction or orbital cellulitis.

Chapter 3, Painful Eye, looks at conditions commonly related to trauma or inflammation. Intense pain with nausea may be glaucoma. Also to consider, optic neuritis, especially with periorbital pain and reduced color vision, temporal arteritis in the elderly, neuralgia associated with shingles, ocular ischemia secondary to carotid disease, diabetes associated with 3,4,6th nerve palsies, neuralgia following shingles and of course, sinusitis, migraine and the obvious one----old incorrect prescription glasses.

Chapter 4, Visual Symptoms, is the second longest with 39 pages. However, it reads fast because optometrists deal with these routinely. Common complaints are floaters/cobwebs, focusing difficulty, double vision, and loss of or reduced vision. Patients tend to describe severe reduction as total loss. Hence, key questions of whether loss is total, partial, chronic, transient, central or peripheral are raised and possible scenarios to explore are included. Among the pathologies covered are optic nerve infarction, temporal arteritis, vascular occlusions, cerebrovascular accident, glaucoma, cataracts, age-related macular degeneration, post surgical complications, etc. And of course, don't forget old glasses. Among the Pitfalls were: temporal arteritis treatment delay, which may lead to irreversible loss in fellow eye; failure to examine fellow eye; bilateral temporal field loss ("bumping into") may indicate chiasmal tumor; failure to treat a 3rd nerve palsy, irrespective of afferent papillary defect is a neurological emergency.

Chapter 5, Trauma, is rich with Do's and Don'ts. Do Not force open an eye. Do put an ice pack over orbit, unless globe is ruptured or penetrated. Do Not get an MRI if metallic foreign
bodies. Do Not rule out an intraocular foreign body even when X-ray and CT-scan findings are negative. Do Not evert upper lid with penetrating injury, lest intraocular contents get expelled. Many more interesting hints are included.

Chapter 6, Watering Eye, unless resulting from trauma or red eye etiologies, is treated as a chronic entity. The common adult causes are alluded to ectropion, punctual stenosis, nasolacrimal system blockage or dry eye. For children it may be the nasolacrimal duct canalization or congenital glaucoma-mistaken as "beautiful big eyes".

In chapter 7, Contact Lens Problems, it is noted that problems with contact lenses can either be acute or chronic. Topics included are: overwear, hygiene, lost lens, lens intolerance, cleaning solutions in eye and corneal ulcers and infections secondary to lens wear.

Chapter 8, Lids, addresses irritations, infections, cysts/lumps, ptosis ectro/entropions, and shingles. There is good coverage of these conditions, with a special alert that diffuse erythema and infection may follow localized infection rapidly leading to preseptal or life threatening orbital cellulitis.

Chapter 9, Tumors of the Eye and Surrounding Tissues, covers tumors of eyelids, eye-surface, internal ocular-iris, retina/choroid, and periorbital/orbital. Excellent photos illustrate the incision and curettage of chalazion. The text recommends referral when malignancy is suspected by observed tissue changes in size, color or presence of bleed.

Chapter 10, Eye Surgery and Complications, covers cataract, refractive surgery, squint, glaucoma, retinal detachment, laser for diabetes, glaucoma, cataract and oculoplastic and trauma. Two noteworthy features of this chapter are (a) well illustrated photos and sketches of cataract surgery, LASIK, PRK, RD, PRP, squint, trabeculotomy, and (b) discussion of complications at early and late stages and the appropriate management protocol. The illustrations are particularly useful for patient education.

Chapter 11, Eye Drops and Drugs, provides pictorial information on some opthalmic diagnostic and therapeutic as well as over the counter regimens as primarily used in the United Kingdom. Readers in the United States may not find this section particularly useful. For example, the antibiotic Chloramphenicol is often used in UK, whereas Tobradex is mentioned nowhere.

In summary, this is a great resource for colleagues interested in dealing with ocular emergencies just with that little bit more confidence!

Reviewed by Subhash N. Jani, OD, PhD, Professor Emeritus, Western Illinois University, Macomb, IL 61455
Many optometrists have observed that patients with poor binocularity often have difficulty in ball sports. An article based on research done in Belgium demonstrates this in clear fashion. Two groups of 19 to 23 year old physical education students served as subjects. There were three males and six females in each group. A stereo normal group consisted of subjects who had stereoacuity of 40 arc seconds or better on the graded circles on the Random Dot Stereo Butterfly test from Stereo Optical. A stereo weak group consisted of subjects whose stereoacuity on that test was 400 arc seconds or worse.

A ball launching machine was used to project tennis balls, at three different speeds, 8.4, 11.6, and 14.6 meters per second. Subjects stood 8.4 meters from the machine, resulting in the balls being in flight approximately 1.00, 0.72, and 0.57 seconds. The balls were aimed at a point about 10 cm above the subject's shoulder on the side of the preferred catching hand. Each subject attempted to make one-handed catches of 30 balls at each velocity under binocular conditions and also under monocular conditions with the non-preferred eye covered with an eye patch.

The percentages of balls caught under the various conditions are summarized in Table 1. The stereo normal group did significantly better binocularly than monocularly, with overall 23% more catches binocularly. In the stereo weak group, the overall 6% increase in catches from monocular to binocular conditions was not statistically significant.

The advantage of binocular vision over monocular vision in stereo normal subjects increased as ball speed increased, going from a 8% difference at the lowest speed to a 39% difference at the highest speed. The stereo normal group made significantly more catches under binocular conditions that did the stereo weak group (overall 92% vs. 75%). The difference increased as the ball speed increased, so that at the highest speed the stereo normal group caught 83% under binocular conditions compared to 54% for the stereo weak group.

The authors of the article hypothesized that various different monocular and binocular information sources guide the timing and execution of catching behavior. They suggested that because the stereo weak group did not do significantly better binocularly than monocularly, stereopsis and/or retinal disparity information must be the most important advantage of binocularity. Because the stereo weak group didn't do better than the stereo normal group under monocular conditions, they also suggested that "people with a lifelong experience with virtually no binocular depth vision are not able to compensate for this deficiency by depending more on other information sources." The authors also noted that poor stereopsis may not be as much of a disadvantage in many aspects of daily life as in "highly temporal constrained situations, such as in fast ball games."

Reference

<table>
<thead>
<tr>
<th>Ball speed; monocular or binocular conditions</th>
<th>Balls caught by stereo weak group</th>
<th>Balls caught by stereo normal group</th>
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</thead>
<tbody>
<tr>
<td>8.4 m/sec; Monocular</td>
<td>86%</td>
<td>90%</td>
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<tr>
<td>8.4 m/sec; Binocular</td>
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</tr>
<tr>
<td>14.6 m/sec; Binocular</td>
<td>54%</td>
<td>83%</td>
</tr>
</tbody>
</table>

Table 1. Percentages of balls caught by subjects in the two groups under various conditions.
Descement’s Membrane Rupture


A 57-year-old gentleman was referred to the eye clinic by his optician for assessment of left eye corneal linear scars, unexplained due to the negative history of ocular trauma. On examination there were two vertical striae suggestive of healed Descemet’s membrane rupture. The patient also reported weaker eyesight from amblyopia of the left eye since early childhood. The patient was also aware of left amblyopia being secondary to traumatic forceps birth delivery. The top photograph on the cover of the Journal shows the left eye cornea with striae from healed Descemet's membrane rupture.

Forceps injuries are known to cause rupture of Descemet's membrane and the ruptures are usually oriented vertically.1 This is in contrast to Haab's striae observed in congenital glaucoma which are disposed as horizontal curvilinear lines.2 The vertical orientation of rupture of Descemet's membrane from forceps injury can be explained by a squeezing effect of the forceps pressure in the vertical meridian. Once torn the edges of Descemet's membrane retract and the striae represent the healed area of ruptures. Resulting refractive error, mainly astigmatism, leads to amblyopia in the vast majority of patients.1 The astigmatic errors are corneal in origin and are related to the axis of break.

The diagnosis is obvious in the immediate postnatal period due to associated corneal haze. Late presentations in adult life as in our case demand an accurate history dating back to birth in addition to careful examination. In eliciting previous history of trauma while evaluating corneal scars in the adult patients, the possibility of a remote birth trauma should not be forgotten.

References

Terson’s Syndrome


A 44 year old lady with hemiplegia after an episode of subarachnoid hemorrhage was referred to the eye clinic by a community optometrist. Findings included left vitreous hemorrhage. Detailed history revealed that drop in vision had occurred 3 months previously and had coincided with subarachnoid hemorrhage (SAH), which caused the hemiplegia. Fundoscopy in the left eye revealed a partially absorbed vitreous hemorrhage.

This is called Terson's Syndrome, where a SAH is associated with unilateral or bilateral vitreous hemorrhage. The exact mechanism is not known but studies have shown that patients with this have higher mortality and morbidity than those with SAH alone. Therefore, as a prognostic marker, all patients with a SAH could have fundoscopy with dilated pupils.

The lower left photograph on the cover of the journal is a picture of the right normal fundus. The lower right photograph on the cover shows the left fundus with partially absorbed vitreous hemorrhage.