

PERSPECTIVE

Visual Training: Current Status in Ophthalmology

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- **PURPOSE:** To inform ophthalmologists of the current status of visual training.
- **DESIGN:** Personal perspective.
- **METHOD:** A perspective and analysis of current practices that include a review of the literature and personal experiences of the author.
- **RESULTS:** Visual training of some sort has been used for centuries. In the first half of the twentieth century, in cooperation with ophthalmologists, orthoptists introduced a wide variety of training techniques that were designed primarily to improve binocular function. In the second half of the twentieth century, visual training activities were taken up by optometrists and paramedical personnel to treat conditions that ranged from uncomfortable vision to poor reading or academic performance. Other visual training has been aimed at the elimination of a wide variety of systemic symptoms and for the specific improvement of sight and even for the improvement of athletic performance. At present, ophthalmologists and orthoptists use visual training to a very limited degree. Most visual training is now done by optometrists and others who say it works. Based on an assessment of claims and a study of published data, the consensus of ophthalmologists regarding visual training is that, except for near point of convergence exercises, visual training lacks documented evidence of effectiveness.
- **CONCLUSION:** Although visual training has been used for several centuries, it plays a minor and actually decreasing role in eye therapy used by the ophthalmologist. At the beginning of the twenty-first century, most visual training is carried out by non-ophthalmologists and is neither practiced nor endorsed in its broadest sense by ophthalmology.

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EYE EXERCISES HAVE BEEN USED SINCE BEFORE THE Middle Ages. These included a wide variety of strabismus masks that were used to encourage eyes to point in the proper direction and presumably work together. Other visual training was used in children with “squint” by placing them strategically in a room lying in their crib, placed at a specific angle to a window or other source of light. Ribbons or strings were also placed around the crib to induce the infant to look in a “healthier” direction. A totally different scheme was used by those cultures who considered crossed eyes a mark of beauty. Exercises were devised for children by placing a spot on their forehead or in some other near area to induce the child to assume a state of spastic convergence and according to the plans of doting parents to develop “beautifully” crossed eyes.¹ For reasons that seem obvious today, none of these methods have prevailed.

Physical training makes up an important part of the lives of many. Exercise is clearly effective for the betterment of the human condition. Aerobic exercises rid the vascular system of debris that can clog arteries and cause premature death.² Weight training increases muscle volume, promotes strength, and even enhances musculotendinous union for improved proprioception and better balance. Exercise may be used by older individuals primarily for health reasons and by motivated youth for athletics or esthetics. Most healthy younger individuals can obtain sufficient exercise for good health by simply being young and exuberant. The lure of exercise as a lifestyle needs no further validation than the media blitz that extols the virtues of “wonder working” equipment and “guaranteed” techniques.

Most of us are realistic regarding our own physical capabilities. How close are we to perfection? The ultimate? As good as it gets? No! Perfection is attained by just a few. In most cases, we accept who we are and use exercises to build on that.

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Not so with the eyes. Each of us expects to see at least 20/20 (20/15 ideally) with each eye. This acuity is expected both at distance and near. Sometimes, to obtain this level of acuity, it is necessary to use optical correction in the form of glasses, contact lenses, intraocular lenses, or even with corneal surgery. The need for intervention notwithstanding, we all expect to have and to maintain good, or more likely, excellent vision.

This excellent vision is expected not only in youth but also as we grow older. We are perfectly willing to accept the fact that we cannot run as fast or jump as high or lift as much as we age, but we are not willing gracefully to accept the fact that we cannot see as well. When any eye function falls short of expectations, that is normalcy; when traditional optical or surgical remedies fail and/or when these traditional measures are rejected, a common recourse has been to turn to eye exercises or visual training.

Exercise is defined as "exertion made for the sake of training."³ The parts of the eyes that "work" or could be subject to exertion are limited. The lens changes shape, at least in youth and in early middle age, to enable more accurate focus at near, but this is a distortion that results from the work of the ciliary muscles that are working on a reflex basis. The retina carries out complex electrochemical responses that convert light into electrical energy on its way to the brain, with probably the only thing "moving" being ions. The six extraocular muscles that guide each of the eyes work with exquisite precision to ensure that the image of the object of regard falls precisely on the part of the eye that sees best, the fovea. Except in obvious pathologic states, these extraocular muscles are more than strong enough to "get the job done" by exerting only a relatively small part of their potential, except briefly during saccades or in extremes of versions. Even the individual with strabismus has muscles that are strong enough, albeit not properly coordinated. Conversely, patients with muscular paralysis or mechanical restriction are in a state in which muscle strength cannot be restored in the former or muscles can never be strong enough to prevail in the latter. Moreover, Hering's law joins the eyes in innervation so that, in both instances, exertion only makes the strabismus larger. In these cases, exercises are not effective.

ORTHOPTICS

ORTHOPTICS IS THAT DISCIPLINE THAT MOST CLOSELY associates the ophthalmologist with eye exercises. Arguably the forerunner of the profession of orthoptics was Javal, whose mid 19th century work was furthered by the invention of the stereoscope in 1883 by Wheatstone.⁴ This event was followed by the development of a variety of other devices to promote binocular function. But training with these and subsequent instruments took many hours of hard work by patients and also required careful supervision to ensure that the process was done properly. The need for

someone to supervise these vision training activities eventually resulted in the start of orthoptic practice in England in 1928. From there, the profession of orthoptics has spread literally around the world until by 2005 there are thousands of orthoptists working in all developed and many emerging economies.

The following commentary, which offers a succinct history of orthoptics over the past 75 years, is from the book by Roper-Hall⁴:

"Emphasis in the early days of orthoptics was on rigorous eye exercises to restore or enhance fusion and to teach control of a deviation . . . Antisuppression treatment was still in vogue (in the sixties) but its indications (are) now . . . limited to patients with intermittent deviations, proven normal retinal correspondence, or fusional ability . . . In the seventies, orthoptic therapy fell somewhat by the wayside (with emphasis now on) diagnosis, . . . retinoscopy, perimetry, ophthalmic photography, and electrophysiology."⁴

Historically, the orthoptist worked very closely with the ophthalmologist; although the first orthoptist, Mary Maddox, daughter of Ernest E. Maddox, the inventor of the Maddox rod and Maddox double prism, opened a private practice in London in 1928. The goal of early orthoptists was to help patients, mostly children, gain better binocular vision. Orthoptists used a wide range of instruments, which led patients through a variety of exercises. These orthoptic exercises were used in part (1) to compensate latent strabismus, (2) to improve control of intermittent strabismus, and (3) as a pre- or postoperative measure in constant strabismus.⁵ A prevailing belief among orthoptists has been, "Exercises are only given to patients who have or who have had normal binocular vision."⁵ The patient with a manifest strabismus, to qualify for orthoptics under these criteria, must be confirmed to have acquired this deviation. The ideal patient for orthoptic therapy has the potential for normal sensory and motor fusion, for equal or nearly equal visual acuity, for good health, the ability to undergo surgery, willingness for sufficient cooperation, and symptoms that are attributable to the deviation.⁵

The goal of orthoptic exercises in the traditional sense are (1) antisuppression, (2) control of manifest deviation, (3) improvement of fusional amplitudes, and (4) improvement of fusional vergence.⁵ Most eye exercises that are carried out by orthoptists have to do with helping the patient become aware of the image that is seen by each eye, which are followed up by the cortical blending of the images that are seen by anatomically corresponding parts of each retina. The ultimate aim, then, is to promote comfortable, sustainable, binocular (stereoscopic) vision. This version of orthoptics may have reached its zenith shortly after World War II and continued at least through the 1960s.

Orthoptists continue to work closely with ophthalmologists, but mainly in a new role in which they are engaged principally in strabismus diagnosis and management. Vi-

sual training or traditional orthoptics currently occupies only a small part, if any, of the orthoptist's professional activity. There is the impression among leading orthoptists that those students who are studying currently are not taught traditional orthoptics. Recently, some orthoptists have completed studies that were formulated by the Joint Commission on Allied Health Care Personnel in Ophthalmology, which leads to qualification as certified ophthalmic medical technologists. This extended activity has led some orthoptists to become qualified to assist at surgery. The variety of new activities that have been taken on by orthoptists notwithstanding, a common denominator of the profession is a thorough understanding of strabismus, ocular motility, and amblyopia plus, in most cases, at least a basic understanding of orthoptic therapy.

A survey with 310 optometrists and 198 ophthalmologists revealed the most common visual training exercise for convergence insufficiency to be pencil pushup therapy.⁶ Performing this exercise, the patient looks at a pencil that is held at arms length and then brings the pencil toward the nose, keeping it in clear focus, until the pencil appears to be doubled. This exercise is then repeated several times, making up a set. Several sets are then done each day and are continued for several weeks. The aim of this visual training is to improve the patient's ability to sustain comfortable convergence while maintaining single binocular vision of near objects.

A randomized multicenter clinical trial that was supported by the National Eye Institutes of the National Institutes of Health and conducted by the Convergence Insufficiency Treatment Trial Group studied 47 children, aged 9 to 18 years, to measure results of vision therapy for convergence insufficiency.⁷ Subjects were assigned randomly to receive (1) 12 weeks of office-based vision therapy/orthoptics, (2) office-based placebo vision therapy/orthoptics, or (3) home-based pencil push-up therapy. After this trial of treatment, the mean symptom score (higher numbers equal more symptoms) decreased from (1) 32.1 to 9.5 in the vision therapy/orthoptics group, (2) from 29.3 to 25.9 in the pencil push-up group, and (3) from 30.7 to 24.2 in the placebo vision therapy/orthoptics group. These subjects were selected according to the following criteria: exophoria of ≥ 4 prism diopters at near rather than at distance and a receded near point of convergence with a break at ≥ 6 cm. The office-based vision therapy in this study included a variety of supervised exercises that included loose lens accommodative facility, letter chart accommodative facility, binocular accommodative facility, "barrel card" convergence, "string" convergence, plus a variety of fusional vergence procedures.

A concern with the office-based treatment method is the cost. On the basis of the need for 12 to 15 office visits at an average cost of \$75.00, this treatment would cost between \$900 and \$1125. Cost notwithstanding, this study responds to the suggestion of von Noorden who said, "... most published studies attempting to evaluate the

results of orthoptic therapy are largely based on clinical impressions rather than solid evidence and do not stand up to scrutiny."⁸ Kusher,⁹ who commented on this study, observed that the selection of ophthalmologists, which was done randomly, theoretically would include only 5% of the pediatric ophthalmologist members of the American Academy of Ophthalmology. He pointed out that, by doing so, this study excluded most of those ophthalmologists who would actually be treating convergence insufficiency. He also pointed out that the "minimalist" routine for the home pencil push-up therapy that was described in the study was considerably less than actually practiced by most pediatric ophthalmologists and orthoptists who he surveyed. He suggests that a more useful study would compare similar treatment routines, with one routine done at home with only monthly office check ups and the other routine done entirely in the office. The program that was carried out primarily at home could result in savings not only of \$1000+ for office visits but also from the savings from eliminating the need for transportation to the office, time off work, and so on.

OPTOMETRIC VISUAL EXERCISES

A WIDE ARRAY OF EYE EXERCISES ARE USED BY THE OPTOMETRISTS. Ciuffreda¹⁰ states that "Optometric vision therapy for nonstrabismic accommodative and vergence disorders involves highly specific, sequential, sensory-motor stimulation paradigms and regimens. . . . Inclusion of related behavioral modification paradigms, such as general relaxation, visual imagery, (for example, "think far or near") and attention shaping *which may* [italics are mine] help one learn to initiate . . . and/or enhance the appropriate motor response." He goes on to say that "Nonstrabismic accommodative and vergence disorders of a nonorganic, nonophthalmological nature (that is, functional in origin) are the most-common ophthalmic vision conditions (other than refractive errors) that present in the general optometric clinical practice." He states that accommodative insufficiency is as high as 9.2% in symptomatic nonpresbyopic clinic patients and that, when counting all accommodative difficulties, 16.8% of these individuals who are seen by the optometrist are affected. In addition, this same author states that approximately 25% of patients in this population, which includes both children and adults, have vergence dysfunction with nearly one third of these patients affected by a clinically significant vertical phoria.

Optometrists who conduct visual training use a combination of exercises that are centered around three basic activities: (1) fixation through a changing series of plus or minus lenses, often called "flippers," (2) fixation through an array of prisms with specific orientation that depend on the condition that is being treated, and (3) shift of fixation to different distances from the eye. Cure rates are said to

range from 80% to 100% for accommodative disorders and from 70% to 100% for vergence disorders.¹⁰

SEVERAL POINTS THAT DESERVE COMMENT REGARDING THESE OPTOMETRIC CLAIMS AND PRACTICES

FIRST, THE INCIDENCE OF "DISORDERS" THAT ARE AMENABLE to vision training in patients who are seen by the optometrist is said to be >40%. These "numbers" are far in excess of what is experienced by ophthalmologists. I suspect that there could be no counterpart in the ophthalmologist's experience because the ophthalmologist is not likely to "hear" these complaints, many of which may be heard only after "provocative" testing or after the patient is asked a leading question. The claim that 9% of patients with nonstrabismic symptoms have a significant vertical phoria is actually a startling statement. A vertical phoria is usually slowly progressive, which in turn results in the development of increased vertical fusional amplitudes that can become huge over time. However, a sudden occurrence of a vertical tropia of only a few prism diopters can result in diplopia. I examined one patient who had 40 prism diopters of vertical fusional amplitudes in a few months (or probably less) after trochlear injury from an orbital rim incision for sinus surgery.¹¹ This patient's main symptoms were from the need to assume a head tilt to help maintain fusion, which was measured as normal.

Second, the cure rate of from 70% to 100% is so high that it raises the question of what, if anything, is being treated or cured.

Third, the cost that is associated with optometric vision therapy is significant, as shown by the average \$1000 cost for the treatment of a relatively simple vergence disorder, convergence insufficiency with in-office sessions.

Addressing the issue of vision therapy, optometrists point out that vision therapy is an outgrowth of orthoptics that actually had its origins in ophthalmology. However, although optometrists refer to the history of eye exercises that began with ophthalmologists, they carry eye exercises much farther. For example, some of the conditions that optometrists treat include blurred vision at distance and/or near work, headaches, poor concentration, difficulty with reading, diplopia, ocular discomfort during or immediately after near work, frontal headaches, nausea, sleepiness, loss of concentration, heavy lid sensation, general fatigue, and "pulling" sensation of the eyes.¹⁰ One optometrist praises the optometric scientific approach to treating this wide array of symptoms with visual training while citing >200 references to reports by colleagues.¹²

There are several reasons for this profound disagreement between ophthalmology and optometry about the validity of the many of the practices that are used in optometric visual training: First, although acknowledged as initiating visual training, ophthalmologists, and later orthoptists,

have limited activity in this area for the most part to the near point of convergence exercises. Did ophthalmology and orthoptics abandon a practice that is successful for as many conditions as the optometrists claim? The answer is probably no.

Second, the improvement of techniques in the diagnosis and treatment of strabismus, along with better optical aids, may have reduced the need for eye exercises, compared with the peak of visual (orthoptic) exercises as carried out in the first one half of the 20th century.

Third, the proliferation of "marginal" eye exercise schemes (some of which have been highly advertised) that are offered by optometrists and paramedical practitioners has led to a "backlash" that has caused ophthalmologists and consumers to take a closer look at optometric eye exercise practices, while rejecting those with only marginal claims.

Fourth, the vague symptoms that are related to many of the conditions that are considered by optometrists for vision therapy leads to suspicion that these, often expensive, eye exercises could be offered far in excess of need.

AMBLYOPIA TREATMENT

ALTHOUGH NOT AN EYE EXERCISE IN THE USUAL SENSE, amblyopia treatment does use noninvasive (except for the use of eye drops in some cases) treatment to the eyes for the purpose of improving performance. Traditionally, amblyopia has been treated by patching. This patching often is augmented by the prescribed use of the amblyopic eye. For example, this can mean that the patient is instructed to pick out specific letters or words on a printed page or to view targets such as the rotating grids in a stimulator with the use of the amblyopic eye with the sound eye patched. A more extensive amblyopia treatment was the regimen that used pleoptics. This treatment was designed specifically to re-establish the fovea as the point of fixation in cases of amblyopia with eccentric fixation. Pleoptics was in vogue for more than a decade. These treatments were designed to stimulate, either actively or passively, the anatomic fovea of the amblyopic eye by creating after images and by other selective stimulation. Pleoptic therapy was used widely in Europe where it was developed for the treatment of amblyopia and less extensively in the United States before being abandoned in the 1970s.

Interest in the study of the treatment of amblyopia peaked recently through the efforts of the Pediatric Eye Disease Investigator Group (PEDIG).¹³ They completed a series of studies that were aimed at determining the effectiveness of amblyopia treatment regimes that were less stringent than the traditional full-time or nearly full-time patching programs that were used by most ophthalmologists. According to the authors, "The primary focus of PEDIG involves studies that can be conducted through simple protocols with limited data collection and imple-

mented by both university based and community based pediatric eye practitioners as part of their routine practice.”

THE RESULTS OF RECENT PEDIG STUDIES

- 1. STUDY: Moderate amblyopia, 20/40 to 20/100, was treated with atropine 1% daily in the sound eye or with patching from 6 hours to full-time for the sound eye. RESULT: At 6 months, 75% of the patching group and 74% of the atropine-treated group had 20/30 vision or better and/or had improved from the baseline visual acuity greater than three lines.
- 2. STUDY: For moderate amblyopia, 20/40 to 20/80, 2 hours a day patching was compared with 6 hours a day patching. RESULT: The investigators concluded that “prescribing a greater number of hours does not seem to have a significant beneficial effect during the first four months of treatment.”
- 3. STUDY: For severe amblyopia, 20/100 to 20/400, 6 hours of patching was compared with full-time patching (minus 1 hour). RESULT: At 4 months, there was no difference in the vision recovery in the two groups. Moreover, 62% of the patients in each group had visual acuity of 20/30 or better.
- 4. STUDY: In patients with moderate amblyopia, 20/40 to 20/80, weekend atropine was compared with daily atropine. RESULT: Weekend patching was equally effective as daily atropine treatment.¹⁴
- 5. STUDY: In a study that assessed the risk of amblyopia recurrence rate, it was found that 24% of patients who were treated for amblyopia had recurrence. RESULT: The highest rate of recurrence (42%) occurred in patients with a patching regimen of 6 to 8 hours a day when patching was not reduced before the cessation of treatment compared with patients for whom patching was reduced to 2 hours a day before cessation. This suggests that patching should be stepped down rather than stopped abruptly to avoid amblyopia recurrence.¹⁵

These studies have been groundbreaking in that they use a strict protocol and at the same time enlist the cooperation of a large number of diverse investigators.

Two major conclusions that have been drawn from these studies are (1) that full-time patching for the treatment of amblyopia may not be necessary and that part-time patching with the time of patching adjusted to the depth of amblyopia may be sufficient and (2) that blur from atropine in the sound eye may be as effective as patching for moderate amblyopia.

Criticism of the PEDIG studies pointed out that “psychophysical studies have . . . shown that the amblyopic eye is at its best when the dominant eye is completely excluded from visual activities.” This puts the concept of part-time occlusion being on a par with full-time occlusion, which is

at variance with previous evidence. In addition, it pointed out that the question “which of the two treatments is more effective?” cannot be answered while the treatment is still in progress. von Noorden and Campos¹⁶ go on to say that “These views may be proven to be correct or will have to be changed as new evidence emerges from strictly controlled randomized clinical trials.” The authors responded that they designed the studies to test effectiveness (benefit in the real world) and not necessarily efficacy (benefit under a highly controlled conditions).¹⁷

LEARNING DISABILITIES

EYE EXERCISES ALONG THE LINES DESCRIBED EARLIER UNDER the heading of orthoptics and optometric visual training are prescribed commonly by optometrists for the treatment of learning disabilities. However, the American Optometric Association has offered this disclaimer regarding visual training for dyslexia, it (*visual training*) “does not directly treat learning disabilities *but* improves visual efficiency *to make the student* more responsive to educational instruction” (italics are mine).¹⁸ Many optometrists seem to invoke the “visual efficiency” comment to justify the treatment of children with learning disabilities with visual training. Practitioners, mostly nonoptometrists, add so-called “neurodevelopmental” training for the treatment of learning disabilities or dyslexia. These “neurodevelopmental” exercises include a wide variety of body motion activities, such as crawling on the floor, hopping on one foot, and other body manipulations that are repeated in a pattern. These “neurodevelopmental” exercises are sometimes used in combination with a variety of eye exercises plus, in some cases, eye tracking exercises and training to improve saccades.¹⁹ As with other reasons for and results from doing eye exercises, there is profound disagreement between proponents of this type of activity and ophthalmologists and many educators who are skeptical or even disdainful.²⁰

The conclusion of the authors of the American Academy of Ophthalmology Focal Points of March 2005 is that “Claims that vision therapy can improve all aspects of life (including emotional, physical, educational, social, and psychologic problems) for children with learning disabilities are without merit and have not been proven by well-controlled prospective clinical trials.” The authors go on to say that “. . . neurodevelopmental training has not been shown to be independently responsible for improved learning in children affected by learning disabilities.”¹⁸

What does the ophthalmologist do when encountering a child with dyslexia? The American Academy of Ophthalmology, the American Academy of Pediatrics, and the American Association for Pediatric Ophthalmology and Strabismus issues the following joint statement²¹:

- 1. All children should have vision screening according to national standards

- 2. Any child who cannot pass the recommended vision screening test should be referred to an ophthalmologist who has experience in the care of children
- 3. Children with educational problems and normal visual screening should be referred for educational diagnostic evaluation and appropriate special education evaluation and service
- 4. Diagnostic and treatment approaches that lack objective scientifically based efficacy should not be used.

In response to evidence that 15% of all children in Australia experience problems with learning, a longitudinal study of the efficacy of visual training programs for visual information processing skills was undertaken. The authors who were from Optometry and Vision Sciences, University of Melbourne, divided 96 suboptimally achieving children into an experimental group and a study group. The experimental group had typical visual training; a control group had similar amounts of time and attention spent with them, but no specific training. Their conclusions were that, "Results for the entire group did not provide evidence supporting efficacy of the VT program under investigation. Findings suggested that a placebo effect was responsible for much of the demonstrated improvement in educational and VIP (visual information processing) parameters following intervention. Further analysis of results will be useful to determine whether select subgroups demonstrate similar outcomes." (Sampson G, Fricke T, Metha A and associates ARVO Meeting, 2005, Abstract).²²

For the ophthalmologist, the policy to adhere to when treating a child with learning disability seems to be clear. Take care of the eyes and their function in a comprehensive manner. Then support educators as they attempt to help these children with dyslexia and learning disability.

TINTED LENSES

A NEW FORM OF EYE EXERCISE WAS INTRODUCED IN 1983 BY Irlen²³ at the Annual Meeting of the American Psychologic Association. Eye exercise in the form of looking through tinted lenses was suggested for the treatment of a condition that Irlen called scotopic sensitivity syndrome. The now so-called Irlen syndrome is characterized by (1) photophobia, (2) eye strain, (3) poor visual resolution, (4) a reduced span of focus, (5) impaired depth perception, and (6) poor sustained focus. Irlen suggests that all of these can be treated by wearing tinted lenses. The diagnosis of the condition and therefore the need for tint is determined by a scotopic sensitivity screener. At the screening, the session clients are given an extensive battery of visual tasks of increasing difficulty. The tests usually continue until the client experiences failure. This failure confirms the diagnosis of scotopic sensitivity syndrome. Clients are then asked to read material through a succession of different

tinted transparent overlays until they find one that makes the reading task easier. Patients are then prescribed glasses with tinted lenses. However, this tint is not necessarily the same tint that was chosen at the time of screening. These tinted lens spectacles are to be worn at all times. At subsequent follow-up examinations, the process is repeated, and the tint could be changed. Testing and treatment for scotopic sensitivity syndrome have a fairly wide following among educators in the United States who use them more than optometrists; in the United Kingdom, testing and treatment for scotopic sensitivity syndrome are popular among optometrists.¹⁸

In addition to being prescribed for young children with dyslexia and learning difficulties, according to Irlen, tinted lenses can be used in the treatment of other symptoms such as head injuries, concussion, whiplash, perceptual problems, neurologic impairment, memory loss, language deficits, headaches (including migraine), autoimmune disease, fibromyalgia, macular degeneration, cataracts, retinitis pigmentosa, complications from LASIK and radial keratotomy, depression, and chronic anxiety.²⁴

In a study of the effect of tinted lenses on reading, Menacker and associates²⁵ determined that (1) "neither improvement nor deterioration was attributable to lens color or density" and (2) "the lens condition that was subjectively preferred by each child did not correlate with reading performance." The authors undertook this study because of the lack of scientifically validated research to support either the theory or effectiveness of tinted lenses in the treatment of dyslexia.

THE SEE CLEARLY METHOD

IN A WIDELY CIRCULATED SERIES OF RADIO ADVERTISEMENTS, some of which had celebrity endorsement, the "See Clearly Method" promises ". . . in just a few minutes a day you can begin to (1) see more clearly; (2) eliminate or reduce nearsightedness, farsightedness, astigmatism, poor vision because of aging, and eyestrain; (3) strengthen your eye muscles; and (4) prevent further deterioration of your vision and eliminate or reduce your need for glasses and contacts. The program further promises that the "See Clearly Method Eyestrain Relief Program" can reduce or eliminate (1) dry eyes, (2) red or irritated eyes, (3) tired eyes, (4) sore eyes, (5) headaches, (6) double vision, and (7) blurred vision. The See Clearly Method, according to its website, requires "hard work." The core of the See Clearly Method "is the four half-hour exercise sessions . . . which should be done on a regular basis, preferably every day."²⁶

The See Clearly Method is based loosely on the works of William Horatio Bates, an ophthalmologist who in 1920 published, *Perfect Sight Without Glasses*. In this book, he proposed a series of exercises that were aimed at accomplishing a variety of things for the patient, most important

of which was to normalize vision. The Bates exercises included (1) palming (the patient cups the hands over the eyes to block out light to get rid of nervous energy), (2) shifting (the patient looks back and forth between two targets, being careful not to stare), and (3) sunning (the patient is advised to look at the sun to normalize vision [To the best of my knowledge, this activity is NOT included in the See Clearly Method]).^{27,28}

CONCLUSION

THE SUBJECT OF EYE EXERCISES IS NOT ONE THAT THE ophthalmologist undertakes to critique with any pleasure. After all, it is much more uplifting to be positive than negative. But in the case of eye exercises, it is simply not possible to be positive about the various schemes that are proposed. Conversely, it is a useful thing to inform colleagues so that they might be better informed when called on to answer the questions of their patient—and questions there are!

A report from New Zealand examined current scientific evidence, or lack thereof, regarding the efficacy of eye exercises as used in optometric therapy.²⁹ Forty-three refereed studies were obtained and the authors concluded that “Eye exercises have been purported to improve a wide range of conditions including vergence problems, ocular motility disorders, accommodative dysfunction, amblyopia, learning disabilities, dyslexia, asthenopia, myopia, motion sickness, sports performance, stereopsis, visual field defects, visual acuity, and general well-being. Small controlled trials and a large number of cases support the treatment of convergence insufficiency. Less robust, but believable, evidence indicates visual training may be useful in developing fine stereoscopic skills and improving visual field remnants after brain damage. As yet there is not clear scientific evidence published in the mainstream literature supporting the use of eye exercises in the remainder of the areas reviewed, and their use therefore remains controversial.”

It remains a fact that the practice of eye exercises started with the ophthalmologist. They were perpetuated by orthoptists who worked closely with the ophthalmologist. From there, the optometrist embraced visual training and expanded it greatly; orthoptists steadily limited eye exercises over the past 50 years to the point at which now eye exercises are limited for the most part to the treatment of convergence. Orthoptists remain experts at the diagnosis and measurement of strabismus, the assessment of binocular vision, and the supervision of amblyopia treatment, while retaining at least an understanding of the issues that are related to visual training. Optometrists have become the main proponents of eye exercises. There is clear evidence that near point of convergence exercises are effective, but whether these exercises need be done in the office with the attendant high cost is not clearly shown. Other visual training, especially for vague complaints with

claimed success approaching 100%, is more difficult to justify. In a lengthy treatise, Ciuffreda¹⁰ touts optometric visual training for accommodation and fusional vergence and discusses motor learning and motor planning saying that “dry dissection . . . incorporating a variety of mathematical techniques can enable one to understand when specific system aspects are abnormal before vision therapy, and which aspects normalize subsequent to vision therapy.” In other words, a complex model that purports to represent the visual system is used to “prove” that a given intervention both is needed and will provide a given result. The number of disorders that are considered amenable to visual therapy by optometrists in those symptomatic non-strabismic clinic patients appears to be unreasonably high, in that they are said to be the most common ophthalmic disorders that are seen. These differences in practice between the optometrist who promotes eye exercises and the ophthalmologist and orthoptist who use eye exercises sparingly are not likely to go away soon, if ever. In the meantime, ophthalmologists are advised to continue to use those therapeutic measures that they believe are valid, while advising their patients to avoid those eye exercises that have not proved effective and that may be unnecessarily costly (activities that include most visual training).

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