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Another joint statement regarding learning disabilities, dyslexia, and vision—A rebuttal

Daniel Lack, O.D.

Lake Katrine, New York.

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Abstract Several medical organizations have published yet another joint statement trivializing vision therapy and vision disorders in the learning-disabled population. A review of the references in the joint statement as well as other references find that the joint statement is misleading because of inappropriate citations and selected references, as was the case with previous joint statements. The most current joint statement ignores the results of evidence-based research and makes recommendations regarding the treatment of convergence insufficiency that have no scientific validity. Ophthalmology should not allow professional rivalry to cloud its judgment regarding optometry's involvement in the diagnosis and treatment of learning-related vision problems.
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A joint statement titled "Learning Disabilities, Dyslexia and Vision" was published in 2009 in the journal *Pediatrics*[1] and was promptly criticized by a prominent neurologist as well as by another physician, who served as a consultant to the President's Council on Bioethics, because of the statement's propensity to "misinform than inform."[2] The organizations that participated in the joint statement included the American Academy of Pediatrics, the American Academy of Ophthalmology, the American Association for Pediatric Ophthalmology and Strabismus, and the American Association of Certified Orthoptists. This report reviews the cited references regarding vision and learning and vision therapy that led to the flawed conclusions and points out the misleading and contradictory statements that permeate the article.

History

Similar position statements have been published approximately every decade starting in 1972 when "The Eye and Learning Disabilities" was issued by the American Academy of Pediatrics, the American Academy of Ophthalmology and Otolaryngology, and the American Association of Ophthalmology.[3] It concluded that vision training and glasses were ineffective for the treatment of learning problems. Among the 15 references that were supposed to support this position was one by Nathan Flax, O.D., an optometrist with a vision therapy practice who knew that his cited article was misused. Dr. Flax's investigation resulted in a rebuttal that reviewed all of the references and found that each one had either nothing to do with the topic or actually supported the link between vision and learning disabilities.[4]

This misrepresentation was repeated in a 1981 position statement, "Learning Disabilities, Dyslexia and Vision," by the American Association for Pediatric Ophthalmology and Strabismus and the American Academy of Ophthalmology when again the references were inappropriate for the claims made or in fact supported the vision-learning link. Unsubstantiated attacks on vision therapy included the statement, ". . . such training yields deleterious results."[5]

In 1998 the American Academy of Pediatrics rejoined the 2 organizations involved in the 1981 statement for another article titled "Learning Disabilities, Dyslexia, and

Corresponding author: Daniel Lack, O.D., 117 Penstock Lane, Lake Katrine, New York 12449
E-mail: dlack@hvc.rr.com

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Vision: A Subject Review."[6] Bowan's review of this report concluded, "Through highly selective reference choices, it misrepresents the great body of evidence from the literature that supports a relationship between visual and perceptual problems as they contribute to classroom difficulties."[7] Bowan included more than 300 references to substantiate that great body of evidence.

A joint policy statement was issued by the American Optometric Association (AOA), the American Academy of Optometry (AAO), and the College of Optometrists in Vision Development in 1997, and another statement was issued by the AOA and AAO in 1999 to clarify the optometric position regarding vision, learning, and dyslexia,[8] and vision therapy,[9] respectively. The first policy statement made it quite clear that "Vision therapy does not directly treat learning disabilities or dyslexia" but its goal is to treat deficits in visual efficiency and visual information processing that interfere with learning. Visual efficiency includes visual acuity, accommodation, vergence, and ocular motilities. Visual information processing includes visual perception and the integration of vision with motor, auditory, language, and attention.[10]

The latest joint statement

The latest joint statement (LJS) lists 2 ophthalmologists as the contributors: Sheryl Handler and Walter Fierson. They defined dyslexia as, ". . . a primary reading disorder that results from a written word processing abnormality in the brain. It is characterized by difficulties with accurate and/or fluent sight word recognition and by poor spelling and decoding abilities." This was the definition that was developed by the International Dyslexia Association in 2002.[11] The LJS cited Shaywitz[11] with the misleading statement that 80% of people with learning disabilities have dyslexia. Shaywitz actually stated, ". . . reading disability is estimated to comprise at least 80% of all learning disabilities . . ."[12] Therefore, the LJS asserted that all reading disability was dyslexia without any proof that the entire reading-disabled population had difficulty with decoding. The LJS then stated, "The terms 'reading disability' and 'dyslexia' are often used interchangeably. . ." The cited reference actually stated, ". . . 'dyslexia' and . . . '*specific* reading disability' . . . are often used interchangeably,"[13] meaning that dyslexia represents only a part of the general reading-disabled population.

The LJS was inconsistent in denying a vision component to the reading disability of dyslexics who have the symptom of poor *sight* word recognition. Even Shaywitz,[14] who was so opposed to the vision–learning link that she questioned whether poor convergence affected reading, stated that it was important to nurture the ability to visualize[15]; visualization being a component of optometric vision therapy programs. Additionally, the LJS recommended that primary care physicians should perform vision screenings, but admitted that these screenings did not detect accommodative/convergence issues or hyperopia.

Vision and learning

The LJS stated, "Although vision is fundamental for reading, the brain must interpret the incoming visual images." This implies that the brain plays an isolated role in vision and that visual perception (the interpretation of the incoming visual images) is distinct from visual processing.

The LJS omitted research showing a statistical relationship between academic skills and most aspects of vision, including hyperopia, vergence control, visual memory, eye movements, fixation stability, convergence insufficiency, accommodation, binocularity, amblyopia, and visual motor skills.[16-32]

Seventeen references were cited to the following statement:

> Currently, there is inadequate scientific evidence to support the view that subtle eye or visual problems, including abnormal focusing, jerky eye movements, misaligned or crossed eyes, binocular dysfunction, visual-motor dysfunction, visual perceptual difficulties, or hypothetical difficulties with laterality or "trouble crossing the midline" of the visual field, cause learning disabilities. Statistically, children with dyslexia or related learning disabilities have the same visual function and ocular health as children without such conditions.

There has never been any dispute regarding the relationship between ocular health and learning disabilities. This statement was apparently included to impress laypeople who may read the LJS and accept it as more evidence of the supposed absence of vision problems in the learning-disabled population. This author was able to access 16 of the references via his personal library; the Internet; and the International Library, Archives, and Museum of Optometry. None of the references mentioned eye health (except for pupillary testing), laterality, or trouble crossing the midline, despite the latter phrase being enclosed by quotation marks. Few of the references were of a scientifically acceptable nature, reflecting poor experimental design, bias, incorrect assumptions, or omission of crucial information. They are briefly reviewed below.

Brown et al.[33] compared 34 dyslexic children with 35 matched controls and found no significant differences in smooth pursuit or saccadic eye movements. However, the reading level of the controls could be as much as 1 year below their grade level, and therefore some of the controls could not truly be classified as normal readers. The authors admonished at the end of the article, ". . . to . . . take extreme care in generalizing from particular populations of 'dyslexics' to any other group with reading problems."

Black et al.[34] recorded the eye movements of good readers and poor readers who were identified by their scores on the reading section of the Wide Range Achievement Test. Black et al. may have detected no significant difference in eye movements between the 2 groups because they selected a group of poor readers whose average Wechsler Intelligence Scale for Children performance score (105.6) was higher

than their average verbal score (99.8). Black et al.[34] acknowledged the controversy about eye movements and dyslexia in the last sentence of their article: "It is noted that a recent study by Black et al. (1984b) of slow pursuit of slowly moving targets showed that 25% of a group of 35 dyslexic subjects had abnormal smooth tracking ability with an excess of saccadic component superimposed on smooth pursuit."

Hall and Wick[35] compared 11 ocular factors with reading ability on the Stanford Achievement Test. There was no mention of dyslexia, and it is unknown if any of the subjects were classified as learning disabled. All subjects with significant heterophorias were excluded from the study. Because most of the ocular factors were related to binocularity and accommodation, it was not surprising that no relationships between the data were found.

Helveston et al.[36] evaluated 1,910 students from first through third grades and found no positive relationships between visual function and academic performance. His research had already been criticized by Stolzberg[37] for flaws in its design and the analysis of the data. The students were divided into below average, average, and above average reading groups without defining those terms and apparently based solely on the teachers' opinions. Stolzberg noted, "It is possible that the difference in ability between the above-average and average readers is 4 times as great as the difference between the average and below-average readers (or vice versa)." The criteria for failure for most of the visual tests were so lax as to produce extremely low failure rates. For example only 4 out of 9 Titmus Wirt Circles had to be correctly identified to pass that subtest. Mysteriously, there was a prevalence of 45.6% for color vision problems, which elicited questions regarding improper administration of the testing. Summaries of the data were not printed. Helveston et al.[36] did find a positive relationship between the reading levels and the performance on a visual perceptual/visual motor test (Draw a Bicycle Test). The diagnostic ability of this nonlinguistic test was not explained.

Blika[38] compared 200 good readers with 41 apparently poor readers in a Norwegian elementary school. Blika[38] compared stereopsis, phorias, and acuities of the 2 groups, and he found no significant differences. However, there were no definitions of good readers or poor readers. Blika[38] explained the reason for this study: ". . . an increasing amount of parents pay large sums of money to non-medical persons who claim to be able to cure learning disabilities by eye muscle exercise and glasses. In our country this sort of 'therapy' is carried out by opticians assisted by some teachers and psychologists. The increasing amount of useless glasses being given was why this investigation was undertaken." Glasses were deemed unnecessary for myopia or astigmatism less than 1.00 diopter or hyperopia less than 3.00 diopters, a level that is 140% higher than the amount of hyperopia that adversely affects academic achievement.[16] Blika[38] found that 44% of good readers and 71% of poor readers wore unnecessary spectacles based on these standards, and most of them had been prescribed by opticians.

Hutzler et al.[39] recorded the eye movements of 11 dyslexic and normal readers while searching for 2 identical adjacent letters in 3- or 4-letter strings of consonants or pseudowords. They theorized that if dyslexics had poor oculomotor control, then they would perform significantly worse than normal patients when decoding pseudowords and when searching consonant strings. Language difficulty would cause dyslexics to perform the same as normal patients during searches of consonant strings and worse during searches of pseudowords. Hutzler et al.[39] found that dyslexics had more fixations and longer fixation durations compared with normal readers, particularly when reading pseudowords but also when searching consonant strings. The experiment was repeated with a group of 13 dyslexic and normal readers searching for 3 identical adjacent letters in 5- or 6-letter consonant strings or pseudowords. The small sample sizes make the significance questionable. (The fact that the small samples were culled from an original group of 500 boys indicates that the authors were extremely selective in their choices of subjects.) All subjects with nonverbal IQ scores of less than 85 had been excluded from the study. Therefore, it was less likely that visual factors played a significant role in the subjects' reading disability because relatively low performance scores are indicators of vision deficits.[40]

Rayner[41] compared the perceptual span of beginning readers (second- and fourth- and sixth-grade children) and proficient readers (adults). This study was not salient to the referenced statement because dyslexic subjects were not included.

Hoyt[42] implied that ophthalmologists should reject claims of tracking difficulty while reading because tracking refers to pursuits, a type of eye movement that plays no role in reading. However, tracking is not limited to pursuits. When a baseball pitch or a tennis serve is tracked at speeds faster than the maximum pursuit velocity of 60°/s, we revert to saccades.[43] Hoyt acknowledged, "Normal reading at near requires saccadic and vergence eye movements," and reviewed a Toronto study in which "Saccadic pursuit and optokinetic movements were measured . . ." He did not, however, define a saccadic pursuit. Hoyt[42] confusingly stated, "in the Toronto study no abnormality of pursuit eye movements were characteristics for the learning-disabled child rather than the normal one," and did coherently state, "There is no disagreement that clinically significant convergence insufficiency should be treated in any child, and vergence exercises are a fundamental part of this treatment protocol."

One referenced article titled "Complementary Therapy Assessment: Vision Therapy for Learning Disabilities" was a guideline by the American Academy of Ophthalmology that repeated many of the assertions made in the position statement and used many of the same references.[44] The American Academy of Ophthalmology, one of the participating organizations of the LJS, used itself as a reference for its own controversial statement!

The Olitsky and Nelson reference[45] reiterated the point of view that dyslexia was solely caused by linguistic deficits and that vision therapy was useless. The references were similar to those found in the LJS, including the faulty Helveston research.

Beauchamp[46] admitted that the number of physicians who performed vision therapy was close to zero. He explained that the 1981 joint statement that was criticized by Flax, Mozlin, and Solan was "a preliminary document and not . . . the final approved position statement,"[46] an argument that is difficult to reconcile with the fact that the statement had been approved by the American Association for Pediatric Ophthalmology and Strabismus Board of Directors on May 7, 1981, and by the American Academy of Ophthalmology Board of Directors on June 27, 1981, and was most certainly published and widely disseminated.[47] Beauchamp[46] did not have any excuse for the 1972 joint statement, which was similar in its text, references, and conclusions. Then he cited the faulty Helveston and Blika research to support his contention that vision disorders were not more common in the learning-disabled population compared with normal readers.

Beauchamp and Kosmorsky[48] reported on research by others regarding neuroanatomy (dyslexia is a left brain, language disorder), eye movements (rejecting research that suggested deficits in that area), and genetics (more boys have dyslexia). They did not mention or consider that deficits in accommodation or binocularity may accompany dyslexia and may make reading more arduous even though they do not cause dyslexia. For example, the Convergence Insufficiency Treatment Trial (CITT) study, which the LJS acknowledges to be valid, was based on a 15-item symptom survey (CISS), with each item involving reading. The extent to which binocular problems can make reading more arduous is evidenced by the CISS items that include fatigue, discomfort, instability of print, loss of place, loss of concentration, slow reading, and difficulty remembering what is read.[49]

Metzger and Werner[50] disputed that hyperopia was associated with learning disabilities, disregarding the Rosner study that showed significantly lower academic achievement in those with hyperopia greater than 1.25 diopters.[16] They assumed that children less than 10 years of age had amplitudes of accommodation of 14 diopters, whereas clinically this often is not the case.[51,52] Most children generally read with 2 eyes, and therefore the more important measurement would be a binocular measure of accommodation (positive relative amplitude) rather than monocular amplitudes. They questioned the usefulness of a prescription of +0.50 without analyzing the accommodative demand of 2.50 diopters at 40 cm and neglecting the dark focus resting level of approximately 1.50 D.[53] Therefore, +0.50 results in a 50% reduction in extra accommodation from the baseline. They dismissed small phorias and strabismus in learning disabilities, but they did not mention moderate or large phorias. Phorias are associated with academic difficulty.[25] Metzger and Werner's study[50] was the basis for Levine's assertion that vision deficits are not associated with reading disability.[54]

That left 2 acceptable referenced articles that revealed the debate regarding the role of eye movements in dyslexia. Polatajko[55] found no differences in eye movements between his samples of learning-disabled and normal readers, and Vellutino et al.[13] reviewed his research and others' that rejected eye movement and visual perceptual disorders as causes of dyslexia. There was no mention of accommodation, binocularity, or visual motor skills.

Optometric vision therapy

Optometric vision therapy has been proven to be effective for a wide range of skills requisite to reading. These include accommodation, saccades, perceptual-motor skills, binocular skills, and visual attention.[56-66] This research was not listed among the 21 references in the LJS that were cited to support the following statements:

> Other than convergence insufficiency treatment, scientific evidence does not support the assumption that vision therapy is capable of correcting subtle visual defects, nor does it prove eye exercises or behavioral vision therapy to be effective direct or indirect treatments for learning disabilities. Detailed review of the literature supporting vision therapy reveals that most of the information is poorly validated, because it relies on anecdotes, poorly designed studies, and poorly controlled or uncontrolled studies. Their reported benefits can often be explained by the placebo effect or by the traditional educational remedial techniques with which they are usually combined. There is currently no evidence that children who participate in vision therapy are more responsive to educational instruction than are children who do not participate. Thus, current evidence is of poor scientific quality and does not provide adequate scientific evidence that vision training is a necessary primary or adjunctive therapy.

This author was able to access 19 of the references via his personal library; the Internet; and the International Library, Archives and Museum of Optometry.

The article by Vellutino et al.[13] made no mention of vision therapy. Shaywitz's article[67] cited Silver (see below) to reject vision therapy. Shaywitz's book[68] and the articles by Beachamp and Kosmorsky[48] and Hoyt[42] rejected vision therapy because of the belief that vision deficits play no role in reading disability. Hoyt nevertheless supported convergence training, which is a form of vision therapy.

Levine[54] cited Metzger and Werner[50] to support his rejection of vision therapy. Levine suggested that all vision therapy research that was done by optometrists should be rejected because of their "vested interest (often pecuniary) in a positive outcome."[54] He did not explain who should perform the research.

Silver[69] cited Metzger and Werner[50] and a previous Joint Statement to label vision therapy as a controversial therapy. He also included applied kinesiology, auditory processing

therapy, tinted lenses, allergy treatment, and the correction of nutritional deficits in his list of controversial therapies. Silver contradicted the LJS when he stated, "Optometrists and ophthalmologists agree that if a child or adolescent has a learning disability, it is critical to rule out or treat . . . eye muscle tracking . . . difficulties."[69]

Beauchamp[46] cited Keogh and Levine in his rejection of vision therapy, which was also based on his belief that reading problems were not caused by vision inefficiency. Beauchamp questioned how vision therapy could be beneficial for both those with learning disabilities and juvenile delinquency, demonstrating a lack of awareness that a high prevalence of vision deficits in juvenile delinquents has been reported.[70]

Helveston was cited twice. He referred to the faulty 1981 Joint Statement to advise against therapy to cure perceptual deficits despite his use of the Draw a Bicycle Test, which he apparently did not consider to be a visual function test.[71] (Helveston's footnoted reference to the 1981 statement also belies Beauchamp's implication that it was an unpublished document.) Helveston questioned the 70% to 100% success rate for vision therapy, depending on the diagnosis being treated and the high incidence of vision problems that ophthalmologists did not detect. He acknowledged that the American Optometric Association had explained that vision therapy did not directly cure learning disabilities, but it did improve visual efficiency so that the student could learn more easily. He described vision therapy programs as "schemes," and he went on to state without any justification, "Many optometrists seem to invoke the 'visual efficiency' comment to justify the treatment of children with learning disabilities with visual training."[72]

Granet et al.[73] and Olitsky and Nelson[45] cited the discredited Joint Statement from 1998 in their dismissal of vision therapy.

A report from a group of physicians from the Institute for Clinical Systems Improvement Technology[74] cited Olitsky and Nelson[45] and Metzger and Werner[50] to criticize vision therapy. The only complaint about a supportive vision therapy study by Seiderman[62] was the lack of follow-up.

The LJS cited American Academy of Ophthalmology Complementary Therapy Assessment: Vision Therapy for Learning Disabilities as proof of the inefficacy of vision therapy, ignoring again the conflict of interest of the Academy quoting itself.[44]

Metzger and Werner[50] agreed that a study by Farr and Leibowitz[60] showed the efficacy of vision therapy for the improvement of visual perception. They complimented well-controlled research by Heath et al.[75] in which he divided his subjects among 4 groups: group 1 received visual motor training with proprioceptive feedback, group 2 received training without feedback, group 3 received perceptual training, and group 4 was the control group. Metzger and Werner concluded, ". . . all groups improved both on reading and visual-motor performance." In fact, the study by Heath et al.[75] found that group 1 had significantly higher ocular control gains than all other groups, significantly higher convergence gains than groups 2 and 4, and significantly higher reading scores than group 4.

Rawstron et al.[76] reviewed vision therapy research. They agreed that 2 studies by Hoffman[64] and Weisz[56] did show that accommodative therapy was effective in improving accommodative levels, but they would have preferred more than the 48 subjects in Hoffman's study and the 28 subjects in Weisz's study. This criticism was not consistent with the Hutzler et al.[39] study cited previously by the LJS, which had fewer subjects. They acknowledged that the Seiderman study[62] did find significant improvements in the visual skills and academic skills of the vision therapy patients compared with those of the control group but criticized Seiderman for treating several different diagnoses that contributed to the learning difficulties, which was how vision therapy was performed in a private practice such as Dr. Seiderman's.

Keogh and Pelland[77] were ". . .sympathetic with the need for treatment programs which are designed to meet the particular problems of individual children." They complained that this made it difficult to assess the success of individual procedures. However, it should not make it difficult to assess the success of the entire vision therapy program. They reviewed a study by Haddad et al.[78] who, " . . . examined 73 school children (ages 6–13) referred for reading problems. . . 37 had problems with fusional amplitudes (sometimes associated with dyslexia). The 37 received orthoptic treatment . . . resulting in improved attention span in reading and improved reading skill as observed clinically by an LD specialist. . . The training had positive effects on children with fusional problems whether they were dyslexic or not."

Barrett[79] agreed that the accommodative therapy research of Hoffman[64] and Weisz[56] as well as 3 more articles by Cooper et al.,[65] Sterner et al.,[57] and Brautaset et al.[66] supported its efficacy, although he would have preferred more than the 24 subjects who participated in the study by Brautaset et al.[66] Again, this was not a valid criticism in the LJS because of the Hutzler study cited previously. (The LJS should not set higher standards for acceptance of vision therapy than it sets for itself in rejecting vision therapy.) When referring specifically to dyslexia, Barrett cited the 1998 Joint Statement as well as Sampson et al.[80] (see below), Helveston,[72] and Rawstron et al.[76]

One reference was a brief abstract of an Australian study by Sampson et al.[80] that did not find any improvement with a vision therapy program. There were no data or details about the optometric procedures that were done.

Convergence insufficiency

The LJS stated, "Convergence insufficiency and poor accommodation . . . are uncommon in children . . ." The referenced article by Granet et al.[73] did not confirm this statement. In fact, Granet et al.[81] performed another study in which they showed that there was a 15.9% incidence of convergence insufficiency in the attention deficit

hyperactivity disorder population. Other ophthalmologic research found that 12.7% of dyslexics had convergence insufficiency.[21] Another ophthalmologic study found that 61.7% of asthenopic children between the ages of 6 and 16 years had abnormal accommodation.[82]

The LJS was the first Joint Statement to acknowledge vision therapy for convergence insufficiency because of the 2008 Convergence Insufficiency Treatment Trial that conclusively proved that in-office vision therapy, combined with home procedures, was the most effective treatment for that condition.[83] Seventy-three percent of the subjects enrolled in the office-based vision therapy program with home procedures achieved a normal or significantly improved near point of convergence. Nevertheless, the LJS stated, " . . . in-office vision therapy is usually not required," directly contradicting the results of the CITT whose experimental design was so rigorous as to meet the high standards of the National Institutes of Health, which supported the study. It appears that the LJS authors would not be satisfied with any positive research regarding vision therapy because the LJS advised reading glasses with base-in prism or minus lenses as substitutes for the treatment of convergence insufficiency. This contradictory advice was "supported" by 3 footnoted references.

The first was a comment by Kushner[84] to the 2005 pilot study by Scheiman et al.[85] that showed that in-office vision therapy, combined with home procedures, was significantly more effective than pencil pushups. Kushner[84] decided that it was not sufficient for Scheiman et al.[85] to have surveyed more than 1,700 ophthalmologists and optometrists (almost 200 ophthalmologists responded) about their treatment methods of convergence insufficiency, so Kushner talked to 20 of his colleagues and decided that their methods were more representative of the ophthalmologic profession. He cited no research to support his anecdotal claims.

The second article by Wallace[86] did not mention any research other than Scheiman's study.

The third article by Petrunak[87] listed various orthoptic techniques and cautioned *against* using base-in prisms: "This is not desirable as a primary treatment because of the tendency of exo deviations to gradually increase with the wear of base-in prisms, leading to a dependency on prisms of increasing magnitude." In fact, research has found base-in prism to be no better than placebo.[88]

Minus lenses as a treatment for convergence insufficiency were not mentioned in any of these references. Minus lenses have the potential to produce asthenopia, particularly in people with accommodative insufficiency.

Therefore, the LJS contradicted its own dictum that "Treatments that have inadequate proof of efficacy should be discouraged."

Evidence-based research

The LJS addressed the need for a multidisciplinary approach with formal evidence-based procedures in the diagnosis and treatment of learning disabilities. The disciplines included were neurology, pediatrics, psychology, psychiatry, ophthalmology, audiology, speech therapy, and occupational therapy, among others. Notably omitted was optometry.

The paucity of evidence-based research in the other fields of the multidisciplinary group was never mentioned in the LJS, and the public was not cautioned to steer clear from them. This is a criticism of the LJS and not of these professions. For example, occupational therapists play an important role in treating the learning-disabled population and comanaging these patients with optometrists, but occupational therapists themselves acknowledge that their research lags behind their clinical skills.[89]

Interestingly, when looking at the evidenced-based data in medicine in general, David Eddy, M.D., Ph.D., a professor at Duke University, estimated that only 15% of medical procedures were supported by solid scientific evidence.[90] Also, it is estimated that only 24% of all surgical procedures have undergone randomized, controlled trials.[91] David Hunter, M.D., an ophthalmologist, commented, "As physicians, we pride ourselves in our use of the scientific method to give the best care to our patients. Yet, many of our daily treatment decisions reveal us more as apprentices than scientists. We choose a particular treatment not because a clinical trial determined that it worked better but because that is the way our mentors' mentors did it."[92]

A literature search found not one randomized, double-masked, controlled study, performed by a researcher without a vested interest in the outcome (paraphrasing Levine), that demonstrated a significant improvement in first-, second-, and third-degree fusion caused by strabismus surgery when compared with a control group. And this is a procedure that carries a low but measurable risk of blindness[93] or death.[94] Paul Romano, M.D., reported that 48% of North American ophthalmologists routinely used only surgery for exotropia, whereas only 5% of international ophthalmologists did. Dr. Romano explained the reasons: U.S. ophthalmologists were paid more for surgery compared with their international counterparts, nonsurgical options were time-consuming and not well reimbursed, there is a lack of training in nonsurgical methods, and there is a fear of losing patients to those professionals who were well trained in those methods. Dr. Romano went on to say, "Optometrists have developed and improved their own non-surgical treatment methods . . . non-surgical treatment is quite effective . . . and . . . surgery is *at best* only equally effective."[95,96]

Discussion

The following is a summary of the salient points of the LJS and the reasons these points are not valid or confusing:

- ***The entire reading-disabled population has dyslexia, representing 80% of the learning-disabled population.*** The LJS offers no proof that every reading-disabled person has dyslexia. The LJS misquoted 2 references in an attempt to justify this falsehood.

- ***Dyslexia is currently defined as a language disorder.*** This is an oversimplification that neglects the differentiation of dyslexia between dysphonetic and dyseidetic groups.[97] The LJS cites functional magnetic resonance imaging research in which dyslexics showed increased activity in the speech areas of the brain and underactivity in the posterior area of the brain, which is predominantly visual. It would, therefore, be just as reasonable to conclude that visual dysfunction, and impaired efficient recognition of sight words, results in overreliance or compensatory overactivation of speech areas of the brain.

Dyslexics more commonly have deficits in the function of their white matter and cerebellum and in the communication between the hemispheres of the brain than nondyslexic individuals.[2] These areas are intimately involved in eye movements and visual motor skills.[2]

Heim et al.[98] found that some dyslexics had only phonologic deficits, whereas others also had deficits in visual attention or in their magnocellular systems. Physicians, who are experts in learning issues, assert that 20% to 30% of dyslexic children have faulty visual memory and 50% to 70% of dyslexic children have a combination of visual and phonologic deficits.[99]

As reviewed by Vidyasagar and Pammer,[100] " . . . there is emerging evidence that phonologic problems and the reading impairment both arise from poor visual (i.e., orthographic) coding." Their review makes it evident, ". . . that attentional mechanisms controlled by the dorsal visual stream [magnocellular] help in serial scanning of letters, and any deficits in this process will cause a cascade of effects, including impairments in visual processing of graphemes, their translation into phonemes, and the development of phonemic awareness. This view of dyslexia localizes the core deficit within the visual system and paves the way for new strategies for early diagnosis and treatment."

- Despite this limited definition, ***the treatment of learning disabilities, (presumably including dyslexia), must include a multidisciplinary approach provided by professionals, such as audiologists, physical therapists, occupational therapists, psychologists, and physicians.*** These professionals should be involved, but confusion arises after the LJS devoted almost an entire page to the premise that dyslexic patients only have a pure language disorder. The LJS does not recommend the inclusion of optometry, the profession that has been treating vision problems in the reading-disabled population for more than half a century. The Joint Organizational Policy Statement of the 2 major national optometric organizations cites evidence for the role of vision and optometry in the multidisciplinary approach to dyslexia,[8] and the American Optometric Association approved a resolution endorsing such a multidisciplinary approach (*see* Appendix 1).
- ***Children with suspected learning disabilities should be examined by ophthalmologists.*** If one accepts the premise that learning problems are brain problems and not eye problems, and that optometrists play no role, what would be gained by having these children examined by an ophthalmologist? Ophthalmology's lack of expertise in this domain was candidly disclosed by Paul Romano, M.D., when he wrote in 2002:

"There is no doubt in my mind that the exams most orthoptists, ophthalmic technicians and ophthalmologists, including pediatric ophthalmologists, perform for the learning disabled or the dyslexic child are too often inadequate or incomplete and are unable to find these subtle abnormalities of monocular and binocular vision which may give rise to these problems."[101]

Learning disabled children should be examined by eye doctors who have an adequate understanding of learning-based visual processes, who perform the testing necessary to detect visual problems, and who understand that vision plays a significant role in learning disabilities.[10]

- ***The learning-disabled population does not have a greater prevalence of vision problems than normal readers, and the vision problems are uncommon.*** This is a false statement that is not supported by the literature that the LJS omitted.[16-32] Despite having minimized the relationship between vision deficits and learning disabilities, the LJS on page 842 recommends the treatment of convergence insufficiency, accommodative insufficiency, high hyperopia, strabismus, amblyopia, and refractive errors. Helveston et al.[36] unwittingly supports the link between dyslexia and visual motor/visual perceptual skills with his Draw a Bicycle Test. Other LJS references mention the importance of visualization,[15] tracking,[69] and good fusional amplitudes.[42,77] The role of eye movements in dyslexia is the subject of ongoing study. Depending on the population sample, research appears to indicate that erratic eye movements are an artifact of poor reading[13,55] and also that poor eye movements, measured with nonreading tests, are more prevalent among poor readers.[19,20,22-24] The LJS considers the matter settled. It is not.
- ***Vision therapy does not cure dyslexia.*** This is a straw man argument, as the cited Joint Optometric Policy Statements make it clear that there is no assertion that vision therapy cures dyslexia. Shaywitz[102] makes the point that it is a chronic condition and is not outgrown; there is no cure. Why then did the LJS not remind its readers that the medical profession does not cure dyslexia, nor do any of the other professionals listed in its multidisciplinary team?
- ***Vision therapy is unnecessary because there are equally effective ophthalmologic procedures that can be substituted.*** The LJS's own references express praise for tracking therapy,[69] binocular therapy,[42] and visual perceptual/visual motor therapy.[50] Hypocritically, ophthalmologists recommend focusing exercises for patients who had accommodative intraocular lens surgery, despite the support of only anecdotal evidence.[103] The bias against optometric

vision therapy is obvious when the LJS disregards the results of the Convergence Insufficiency Treatment Trial and then recommends procedures that have no scientific validity and which may worsen the condition, according to its own referenced articles.

Why the bias?

It is appropriate to ask why ophthalmologists have repeatedly minimized the effect of vision deficits on reading ability and discredited vision therapy. The optometric profession originated during the late 19th century to fill a need that was demanded by the public: the prescription and the fitting of eyeglasses. At that time, ophthalmology considered this practice to be quackery.[104] The opinion of ophthalmologists regarding optometric vision therapy was reflected in the cover story of an issue of the *Review of Ophthalmology* (with a photo of a rubber duck on the cover) that was titled "Is Vision Therapy Quackery?"[105] The bias in reluctance to accept a part of optometric practice that has transcended ophthalmologic practice is readily apparent.

Press[106] wrote a thorough review of the relationship between ophthalmology and optometric vision therapy. Vision therapy has its origins in ophthalmology with orthoptics in the early 20th century. Ophthalmology departed from the practice of orthoptics, preferring the medical/surgical approach over the frequent office visits and long treatment duration of orthoptics programs.[106] Optometry expanded orthoptics, as ophthalmology abandoned it, to include therapy for learning-related vision problems. This expansion was partially based on research from the pediatrician Arnold Gesell. His landmark work on vision development, conducted at Yale in the 1940s, influences optometric vision therapy to this day.[107]

By 1972 it was time for the ophthalmologic organizations to publish a position paper that justified the opinions of the rank and file rather than to write a paper that reflected good research. It is unfortunate that ophthalmologists apparently convinced their pediatrician colleagues to join them. The misleading Joint Statements continue to this day.

Leonard Apt, M.D., admitted in 1989 regarding asthenopia among students:

> My impression is that many ophthalmologists handle this disorder poorly. Too often they consider most cases of asthenopia in young persons as instances of uncomplicated convergence insufficiency and treat these patients with simple push-up exercises. This unsophisticated approach ofttimes is not helpful and the patient leaves dissatisfied. Many ophthalmologists do not fully appreciate the role and function of the process of accommodation and convergence, their interrelationship, and how to study their dysfunction. Thus proper treatment is not given. Many of these patients end up under the care of optometrists. The optometry profession seems more interested in the problem of convergence and accommodation than the ophthalmology profession. This impression is supported by the results of my recent Medline literature search on the subject covering the past 10 years, which elicited 81 articles in optometric journals and only 7 in the ophthalmic literature. I ask my fellow ophthalmologists: have we abdicated to optometry still another area of eye care that already includes dyslexia, school vision screening, so-called "fusion training" of strabismic patients, and sports vision? I certainly hope the trend does not continue.[108]

This concern regarding the loss of patients to optometry translating into professional bias is further supported by the ban on optometrists attending the educational courses of the American Academy of Ophthalmology annual conferences starting in 2004.[109]

Conclusion

The LJS contains false, confusing, and contradictory statements whose aim is to create doubt about vision deficits in learning disabilities and the efficacy of vision therapy. It cites numerous references to create the illusion of widespread support in the literature for its position. However, most of the references, on careful examination, are faulty. Some of the references actually support the opposite position. In essence, it is a flawed document that glosses over the collaboration of eyes and brain in the visual process.[110] The LJS does not meet the high standards that it sets for others.

These joint statements have serious consequences. Professionals, who are involved in the field of learning disabilities and who are convinced by the LJS specious arguments, may allow students to needlessly struggle academically because of undetected and untreated vision deficits. Insurance companies cite the joint statements to deny coverage for vision therapy.

Optometrists have invited ophthalmologists to join them in research, and ophthalmologists are free to attend national optometric meetings to learn about this field. One can only hope that the ophthalmologic profession will stop allowing its view of optometry as a competitor to cloud its judgment. Ample evidence exists that visual efficiency and visual processing disorders impact a significant percentage of the learning-disabled population, and ophthalmology should advocate for their proper remediation to help these members of our society reach their full potential.

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Appendix 1

	VISION AND LEARNING DISABILITY
1838 (Cod. Res. 1692, 1762) (Mod. 1995)	WHEREAS, a problem being demonstrated by many children and adults today, generally known as learning disability, is the end result of many complex processes of growth and development, with the ability to use vision being one of these processes; and WHEREAS, it is optometry's belief that success in learning can be better achieved through interdisciplinary communication and cooperation; now therefore be it RESOLVED, that the American Optometric Association pledges its continued cooperation with disciplines which have concern for children and adults with learning problems; and be it further RESOLVED, that the American Optometric Association affirms the responsibility of the optometrist in the management of vision conditions which relate to learning and the rehabilitation of such patients.