

Deflating the Rubber Duck

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Editor's note.

In the editorial of the last issue of this Journal (Vol. 9, No. 4, 1998) I commented on an article that was an unsubstantiated attack on vision therapy. It appeared in the March, 1998 issue of the Review of Ophthalmology, and was written by ophthalmologist H. Koller. The title, "Is Vision Therapy Quackery?" says it all. The article quickly made its way through optometric circles, and angered many of us. However, Dr. Jeffrey Cooper saw fit to write a scholarly response. He sent it as a Letter to the Editor of the Review of Ophthalmology, but that periodical did not see fit to publish Dr. Cooper's response in its entirety. The officers and staff of the Optometric Extension Program Foundation are pleased that Dr. Cooper gave his permission to present his thoughtful, scholarly and instructive original letter in its entirety. However, I must claim credit for the title.

Mr. Stan Herrin, Editor
Review of Ophthalmology
Chilton Way
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Dear Mr. Herrin:

I have just read, "Is Vision Therapy Quackery? How to Separate Fact from Fiction and Get Pediatric Patients the Care they Need," by Harold Koller, M.D. I am shocked that *Review of Ophthalmology* printed such a poorly documented, politically biased, intellectually dishonest paper with an equally inflammatory editorial and picture on the cover. The article is an affront to the optometric profession and deserves a response. I will begin with a review of the inaccurate statements reported in this paper by using peer reviewed, scientific evidence to the contrary. I will also correct misconceptions about what vision therapy is and what it purports to do. Finally I will ask this pediatric ophthalmologist to evaluate his specialty at the same level that he does optometry (no more or less).

Vision therapy, like any area in a health profession, is practiced differently by various clinicians. I will restrict this discussion to the most commonly practiced and largest portion of the area of vision therapy: treatment of accommodative and vergence anomalies, including strabismus. These categories include the majority of patients treated by optometrists providing vision therapy services. In addition, all schools of



optometry include diagnosis and treatment of anomalies of accommodation and vergence in their curriculum.

Dr. Koller states that the "literature in (which) exists support of the (vision) therapy is ambiguous and vague; published accounts fail to reveal the rationale for various therapies. There are numerous claims of anecdotal success, but not one well-controlled multi-subject study on vision therapy." *These statements suggest that Dr. Koller did not perform a comprehensive literature search which should be required by any journal before publication.*

Negative feedback control theory analysis of the accommodative and vergence systems provides the basis of today's optometric vision therapy. These models have a strong physiological and anatomical basis, and have been described in numerous articles¹⁻⁴ and textbooks.⁵⁻⁷ Computer simulations using control theory demonstrates the predictability of both the accommodative and vergence systems.^{1,2,5} Defects in any component of the system may result in asthenopia, diplopia, and/or strabismus.⁸ The most common cause of asthenopia is related to inadequate slow vergence.^{4,9} Vision therapy differs from orthoptic models in that control theory analysis acknowledges the dynamic interaction of accommodation and vergence, and its respective feedback mechanisms.

Numerous studies have evaluated the effectiveness of vision therapy in eliminating symptoms and abnormal objective

findings associated with binocular anomalies. One study used random dot stereograms (RDSs) in a carefully controlled double blind, cross over experimental design to determine if vergence training improved vergence ability.¹⁰ The results of the experiment definitively demonstrate that those subjects who received vergence treatment improved their vergence amplitudes while the control group did not. In addition, improvement on one vergence task generalized to other related vergence tasks such as vectographs, Risley prism, and stereoscopes. These findings have been replicated by other studies using different instrumentation.¹¹⁻¹⁵ These studies, also, clearly demonstrate that vergence therapy improves vergence ability and that the effects persist over time.

The largest group of patients treated with vision therapy are patients manifesting symptomatic convergence insufficiency. These patients account for up to 15% of the population depending upon the definition and criteria used.¹⁶ Numerous optometric and ophthalmological studies have shown that vision therapy is the treatment of choice for CI.¹⁷⁻²⁸ Orthoptics or vision therapy is cost effective and has a high success rate. Even ophthalmological textbooks including the standards such as von Noorden's *Binocular Vision and Ocular Motility: Theory and Management of Strabismus*²⁹ and Leigh and Zee's *The Neurology of Eye Movements*,³⁰ dogmatically state the most clinically accepted treatment for convergence insufficiency is orthoptics/vision therapy. Pooled data from 18 studies accounting for 2149 patients is impressive, with 73% reported as cured, 15% reported as significantly improved, and only 5% reported as failed.^{16,31} Pantano³² demonstrated that orthoptic treatment lasts for at least two years following the termination of treatment, when a complete cure is achieved. Similar findings were reported by Grisham, et al.,¹¹ in a group of patients. Age is not a deterrent to the successful treatment of binocular anomalies.³³ Wick³³ treated 191 patients who ranged from 45-89 years of age. Immediately after therapy, 93% were reported as cured. Cohen and Soden³⁴ confirmed Wick's results. They treated 28 CI patients over 60 years of age. They reported an immediate cure rate of 96%. The cure rate was 83% 9-12 months later.

All of the above are large sample, retrospective studies. Their sheer numbers provide compelling evidence of the effectiveness of vision therapy. Case studies, when properly documented, can provide important clinical information as to the nature of the treatment. An excellent example of such a case was published in *Neuro-Ophthalmology* describing the findings and treatment of a patient with Guilaian-Baire syndrome. This single subject study documents the effectiveness of vision therapy in treating a patient with organic disease.³⁵

Cooper, et al.,³⁶ published in a peer reviewed journal a controlled, prospective, double blind, A-B reversal study that evaluated experimental vergence treatment vs. placebo treatment for a group of patients diagnosed with a pure convergence insufficiency. Prior to treatment, all the patients had clinical vergence amplitudes measured and completed a numerically scaled asthenopia questionnaire to quantify their degree of asthenopia. The experimental group had specific, automated vergence therapy using RDSs to improve convergence amplitudes. The automated design eliminated the possibility of experimental bias. Correct responses to the position of a RDS resulted in an increase in the vergence demand and a concurrent delivery of a reinforcement while incorrect responses resulted in a decrease in vergence demand and no reinforcement. Thus, the vergence demand and therapy was controlled by the patient's responses using an operant conditioning paradigm. The experimental group showed a dramatic improvement in vergence amplitude, a change in a forced fixation disparity curve and a decrease in asthenopic symptoms on the scaled questionnaire. The control group was treated with the same stimuli in an identical therapy paradigm except that there was no alteration vergence demand during trials. The control group did not show an improvement in either vergence amplitudes nor a decrease in symptoms. When the control group, crossed over to become the experimental group, similar findings were found (i.e., an increase in vergence amplitudes with a concurrent reduction in symptoms). *This study also clearly meets the definition of well-controlled, multi subject study.*

Atzmon, et al.,³⁷ addressed the effectiveness of orthoptics/vision therapy in the area of reading disabilities in an article, which appeared in *Binocular Vision and Eye Muscle Surgery Quarterly*, an ophthalmological journal. This double blind prospective study compared the effectiveness of orthoptics to other treatment modalities in the remediation of reading disorders. These investigators matched three groups of children with reading disabilities. One group received orthoptic treatment to improve fusional amplitudes to at least 60Δ. Group two received conventional reading tutoring. Group three received no treatment and served as the control. Each child had 40 20-minute sessions of therapy. Prior to therapy 100% had poor fusional convergence by the authors' criteria, 60% had a receded nearpoint of convergence, and many had asthenopic symptoms. After treatment asthenopic symptoms were eliminated in the orthoptic group. Reading had improved significantly in both the orthoptic/vision therapy group and reading group, but not in the control group. Atzmon, et al.,³⁷ concluded that orthoptics/vision therapy was as effective as reading tutoring but had an additional benefit of eliminating asthenopia. This study also meets the criteria of multi-subject, controlled study.

Pooled success rates of different treatment regimens for the divergence excess type of intermittent exotropia have been reported as follows: 59% for orthoptics/vision therapy, 43% for surgery, and 30% for passive therapy (minus lenses, patching, and/or prisms).³⁸ These data suggest that *vision therapy/orthoptics is more effective than surgery in patients with smaller angle intermittent exotropia and should be considered part of the treatment regimen for patients who receive surgery.*³⁹ Sanfilippo and Clahane⁴⁰ reported on the success of orthoptic treatment with 31 intermittent exotropia patients. They reported that 64.5% were cured, 9.7% were classified as improved, and 9% were classified as fair. In a subsequent study, they reported after five years that 52% remained cured while 32% were in the improved group.⁴¹ Similar findings have been reported by other studies.^{42,47} Another study reported that the highest success rate occurred when office therapy was supplemented with home vision therapy.⁴⁸

Several studies have reported that accommodation can be modified with therapy.⁴⁹⁻⁵³ Studies have also shown that voluntary accommodation can be taught⁵² and that accommodation developed by bio-feedback could transfer from one task to another.⁵³ Accommodative therapy has been shown to be effective in eliminating subnormal accommodation.^{54,55} One study reported that 87% of their patients with accommodative anomalies eliminated their asthenopia and normalized their accommodative findings with approximately 26 sessions of therapy.⁵⁵ Therapy to improve accommodative amplitudes resulted in a concurrent improvement of positive and negative fusional amplitudes, as well as stereopsis.⁵⁶ It was concluded that orthoptics/vision therapy is the method of choice in eliminating asthenopic symptoms associated with accommodative anomalies.⁵⁷ In those patients who could not participate in orthoptics/vision therapy, plus lenses were successful in decreasing symptomatology. This study was published in a peer reviewed ophthalmological journal (*Doc. Ophthalmol.*)⁵⁷

Another double-blind prospective study to determine the effects of monocular accommodative amplitude therapy on asthenopia showed that the patients in the experimental group had a dramatic improvement in their amplitude of accommodation, a decrease in their dynamic accommodative response time, and a significant reduction in symptoms on a rated, scaled asthenopia questionnaire. There was no change in the control group. When the control group crossed over and underwent identical therapy as the initial experimental group, a similar reduction in symptoms and normalization of accommodative function was found.⁵⁸

The above studies demonstrate that accommodation may be altered via accommodative therapy with a resultant change in accommodative amplitude, accommodative facility, and a reduction in symptoms. They demonstrate changes in symptomatology and clinically measured amplitudes. Therapy may also result in changes in the magnitude, velocity, and the gain of the accommodative response.⁵⁹ Accommodative therapy not only eliminates symptoms but shows objective changes in the velocity of the accommodative response and a concurrent decrease in recorded time constants.⁶⁰ Therapy pro-

vides improvement in time characteristics of the accommodative response including the latency and velocity.^{60,61}

Koller indirectly challenges the integrity of vision therapists by describing one therapist who may have advocated the use of vision therapy for a variety of questionable diagnostic categories. To condemn a discipline for one boisterous claim is outlandish. People in glass houses should not throw stones! Optometrists often have to respond to questionable claims made by ophthalmologists. For example, how many times have optometrists listened to patients state that a pediatric ophthalmologist told them their child would go blind if he or she didn't have surgery for an esotropia or intermittent exotropia? How often do pediatric ophthalmologists tell patients that most strabismus surgery is cosmetic? How often have you or your colleagues told an insurance company that most strabismus surgery is for cosmetic purposes? Neither you nor I can be responsible for the actions of a few of our colleagues.

Now let me ask a few questions. *Show me one prospective, randomized, double blind study that demonstrates that strabismus surgery improves quality of life.* The literature describes a few poorly performed studies by ophthalmologists which attempt to show that patients after strabismus surgery improve their subjective responses on a Worth 4 Dot Test or with a Bagolini Striated Lens Test. Please provide some scientific evidence that improvement on these tests relates to an individual's performance. Even if I accepted the scientific merit of these studies, tell me how experimental biases or ordering effects were controlled? Let's go one step further, presuming that surgery can improve stereopsis in a small number of patients, show me one study that demonstrates that there is an improvement in quality of life or functioning when one aligns the eyes and improves stereopsis.

The criteria of success in many ophthalmological retrospective studies on strabismus surgery are in serious scientific question. For example, most of the studies on esotropia and exotropia define a cure as cosmetic alignment (within 5 prism diopters) without any mention of performance or functioning! Let's define a cure, as optometry previously has, so we may "talk" the same language. Optometry has defined

a cure as an outcome whereby the patient is perfectly straight 95% of the time with diplopia upon rare deviation, has normal fusional amplitudes, is asymptomatic, and demonstrates normal stereopsis (40 sec or better on line stimuli and the appreciation of a large disparity random dot stereogram.) How many surgical procedures achieve this simple goal? In summary, studies evaluating the effectiveness of strabismus surgery are not nearly as well controlled or designed as the studies evaluating the effectiveness of vision therapy which have been presented in this paper.

When one uses a gold standard to judge a treatment protocol of another profession, one should maintain that standard for himself. I challenge Dr. Koller to show me one double blind, prospective study that demonstrates that lowering intra-ocular pressure stops visual field progression. Now find me one ophthalmologist who is willing to take all of his patients off ocular hypotensive medications since the appropriate well-controlled double blind studies have never been performed. There are numerous conditions where double blind, prospective studies have not been performed. It behooves the clinician to interpret the literature and provide the best treatment for the patient on the basis of our current clinical knowledge.

Dr. Koller's article goes on to describe a host of medical conditions to check for in the pediatric learning-disabled population which he infers are related to a learning disability. Please provide evidence that there is some relationship between developmental cataracts, juvenile glaucoma, congenital corneal dystrophies, mesodermal dysgeneses, etc. and learning disabilities. Dr. Koller then states that pediatric migraines are the most common systemic disorder presented by children recommended for vision therapy and references one of his own articles (not a research article) to support this statement. I have never seen any optometric or ophthalmological article or textbook that suggests that pediatric migraines are a reason to perform vision therapy. If Dr. Koller is correct in that optometrists do not know how to differentiate between headaches related to accommodative vergence abnormalities vs. migraines, then the study performed by Cooper, et al.,³⁶ demonstrates that vision therapy eliminates migraines. The study

found that the experimental group reported that their headaches disappeared with vergence treatment while the control group did not report a decrease in symptoms related to a headache. (I do not believe that to be the case since the patients in that study had ocular headaches which are not vascular, surrounded by an aura, eliminated by aspirin, associated with increased near work, etc.)

The cover of the journal sends a message that vision therapy is quackery. The editorial about quackery and how to attack the quacks is both unnecessarily inflammatory and unprofessional. Actually, Stan Herrin's treatment of the subject is more distasteful than Dr. Koller's article. All professional journals have a moral obligation to make sure their content is accurate and they should be careful not to publish articles just to create sensationalism. The publication of this article with the accompanying editorial was unprofessional and has caused unnecessary hostility between the professions. Mr. Herrin, having been the editor of both *Review of Optometry* and *Review of Ophthalmology*, has a responsibility to have been the bastion for eliminating the smoldering war between the two professions. It is time for optometry and ophthalmology to work together for the welfare of all patients.

Lastly, it is time for some ophthalmologists to eliminate their own biases, use an intellectual approach and try to help people rather than stroke their own egos. The editorial by Mr. Herrin and the article by Dr. Koller represent the opinion of two individuals, but are represented as if they represent the majority viewpoint. Most of the pediatric ophthalmologists I know would never put their names on a paper of this quality.

In conclusion, Mr. Herrin and Dr. Koller owe an apology to the profession of optometry and should strive to be more careful in their journalistic pursuit of the truth.

Sincerely yours,
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Part of this letter was adapted from the Optometric Clinical Practice Guideline Care of the Patient with Accommodative and Convergence Anomalies copyright American Optometric Association 1998 and has been reproduced with their permission.

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