

***Vision Therapy as a Viable Management Option
for Various Learning Disabilities***

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ABSTRACT: Various studies have been conducted which have investigated the relationship between learning disability and ocular functions (such as phoric postures and oculomotor, accommodative and vergence abilities). There have been many conflicting viewpoints resulting from these studies. This is further complicated by the fact that there are several factors acting simultaneously, which lead to the development of the disability. In addition, there is disagreement upon whether vision training is aimed directly at treating the learning disability or indirectly by specifically concentrating on the individual components of the condition. By compiling information from these reports, we plan to describe the role of vision training and its effectiveness upon this population of patients.

REVIEW: A distinction must be made between the word sight and the word vision. Sight is the ability an individual has to see or as optometrists like to refer to it as a person's visual acuity. Vision is the ability to understand and interpret the information which comes through the eyes and is sent to the brain.¹ Vision is a process which is learned and is usually a process that can hinder a child who has a learning disability if there are flaws in this process.

Unless eye problems are severe, they usually do not interfere with the learning process. A child who has decreased visual acuities due to refractive problems may be affected by the blur, but this does not lead to the development of a learning disability. Also, certain degrees of hyperopia(farsightedness) have been linked to a decreased efficiency in reading; however, this does not cause a child to be learning disabled.² Glasses can be prescribed for refractive errors to give the child a clearer image so that they are not struggling when trying to read the board or their schoolwork. As stated earlier, refractive error is not a major contributor to the development of a learning disability; therefore, correction of the refractive error does not lead to a cure for a child's learning disorder.

Several other eye problems have a larger influence on a child's learning development than refractive error does.³ Oculomotor control, intersensory integration, eye/hand coordination, directionality, binocular vision, and accommodative dysfunction can cause problems to the learning disabled child. They hinder the child's performance in different ways and make it difficult in the remediation process for the learning disability.

The clearest vision a person has is located in their center of view at an area in the back of the eye(retina) called the fovea. Because this area is so small, accurate eye movements are essential to assure good vision. The oculomotor(eye movement) system plays a big role in early severe learning disabilities. Neonates have the innate ability to point their eyes toward bright objects, moving targets, or certain patterns.⁴ However, these eye movements are not appropriate for a school setting. In school, a child must have voluntary eye movements to attend to important areas such as the chalkboard or schoolwork at their desk. These areas are not of interest to an infant because they don't have enough physical stimulation. Therefore, a child who does not develop these voluntary eye movements will have a difficult time paying attention in class and will be distracted by extraneous stimuli.

An inability to control eye movements can lead to an inaccurate aiming of the eyes and will have an effect upon a child's reading ability.⁵ Inefficient eye movements can lead to reading errors such as omissions, substitutions, miscopying of written material, and loss of place while reading. A beginning reader needs more

precise eye aiming movements than does the more experienced reader. Reading errors which are persistent are usually caused by a problem in the oculomotor system and a symptom of this is when a child moves their head or body while they are reading.

Motor relationships exist between the eyes and other sensory systems of the body.⁶ Eye movements respond to vestibular, postural, and auditory stimuli which leads to the development of intersensory integration. During normal development, a dissociation of the senses occurs that allows a child to separate these different senses so that they can attend to only visual, tactile, or auditory stimuli depending upon the situation. Learning disabled children have an inability to efficiently develop intersensory integration or the dissociation of the senses. Those children who are unable to integrate the senses have a problem with matching visual, verbal, or tactile stimuli. Children who are not able to dissociate the senses are highly distractible and need continuous input through all sense systems in order to function well. These children cannot perform visually unless they also have auditory and tactile stimuli.

Children who are learning disabled fail to develop adequate eye/hand coordination.⁷ In younger children, tactile stimuli are important in developing accurate eye aiming abilities. However, a shift occurs around the time when a child gets into school in which the hand is led by the eye. Learning disabled children fail to make this shift; therefore, handwriting is difficult for those who depend upon tactile stimuli to aim their eyes. Finger-pointing while reading is the result of a child who has delayed development of eye/hand coordination.

Directional orientation problems that are associated with learning disorders are the result of an inadequate relationship between eye posture and movement information with body image and postural information.⁸ There is the need for an appropriate reference in order to establish directional orientation from incoming visual stimuli. The eyes are in a state of continual movement; therefore, visual input images are constantly shifting. A child has to learn to stabilize these visual images so there must be enough positional information that will coincide with the retinal image in order to achieve the proper directional orientation. An image cannot be assigned any directional orientation unless there is also an awareness of the location and orientation of the eye when it receives the visual signal. The difficulty with directional orientation in the learning disabled is associated with the failure to properly develop the appropriate proprioceptive and intersensory feedback.

Binocular vision problems are not a major contributor to the severe learning disabilities which are seen in younger children. They do tend to interfere with the comprehension level of reading. When children are younger, the primary function in learning to read is placed upon word recognition. They are given solitary words and the only thing they have to do know what the word is. As they get more competent in the area of recognizing words, the primary focus shifts to comprehending what they are attempting to read. Binocular

problems can interfere with reading comprehension because the material is no longer isolated like during the word recognition tasks and they need the eyes to function well together in order to read across a page of print.⁹

Another aspect of binocular vision and its' relationship to learning disorders which can somewhat confuse people is the concept that a person with one eye can read at a much more comfortable level than a person who has two working eyes which are binocularly inefficient.¹⁰ People who have a partial ability to use both eyes and are unable to easily achieve fusion tend to get more tired when they read as well as demonstrating more carelessness with a greater number of omissions, loss of place, and loss of comprehension.

Accommodative dysfunction(problems with the focusing system of the eye) can cause problems for the learning disabled especially if they are severe or are working in conjunction with high hyperopia(farsightedness).¹¹ Accommodative inefficiencies much like binocular problems tend to cause a greater amount of distress to older learning disabled children. As the reading level increases, the assignments get longer with smaller print while there is an increase in the comprehensive level. The ability to maintain clear focus on the page becomes an important factor for a comfortable level in reading.

Binocular vision and accommodation are closely linked functions; therefore, a problem in one system can cause difficulties in the other.¹² When a person looks out at a distance, their eyes are looking straight ahead in what should be a parallel position and their accommodation(focusing system) should be at rest. When they change their position of gaze to looking at something up close, the eyes must converge(turn in) and their focusing system(accommodation) must shift into working mode in order to focus on the object. Both systems may be working properly, but the link between the two may be faulty leading to problems in reading. This can lead to learning problems in children who did well in lower grades where reading was not as difficult, but their work declines in the higher grades in school. These problems can lead to reading discomfort, reduced comprehension, blurring of printed material, headache, fatigue, and even to an avoidance of reading tasks.

Behavioral optometrists have identified a number of visually-related learning skills most of which were discussed earlier in this paper. These skills have been broken down into vision efficiency skills(oculomotor control, accommodation, binocular vision, and fusion) and visual processing skills(laterality/directional orientation and intersensory integration). A very important point is that there are different visual skills required for learning to read as opposed to those visual skills needed for reading to learn.¹³ The skills for visual efficiency are important when a student is reading to learn and visual processing skills are important when a student is learning to read.

Optometrists do not treat dyslexia or other learning disorders. They treat reading or learning disabled children who have some type of visual dysfunction. They focus on treating the visual problem which may be

interfering with the treatment of the disability of a learning disabled patient. Vision therapy can be used to help treat the visual dysfunctions which are associated with dyslexia and learning disabilities.

A distinction must be made between vision therapy and vision training. Vision therapy is the process in which lenses, prisms, and specific eye activities are used to enhance the efficiency of the eyes. On the other hand, vision training is the process in which vision therapy techniques are used as well as gross and sensory motor activities in order to increase a person's learning achievement.¹⁴ Dyslexia and other learning disorders are not cured by vision therapy or training, but instead progress can be made to help the with learning and reading dysfunctions through the use of these two programs.

In the beginning, vision training, or orthoptics as it was called previously, focused on treating patients to give them "correct eyes" which were eyes that were aligned, had no refractive error and were fine binocularly.¹⁵ This process was dependent upon strengthening the extraocular muscles function to achieve alignment and to reduce the fatigue in the focusing muscles through the use of lenses. In later years, behavioral optometrists began focusing not on treating the muscles, but on expanding clinical procedures so that the patient is required to extend their interpretations of what is being viewed. Thus, vision training has become a carefully designed program which is cognizant of an individuals needs and influences a patient's interpretation of visually acquired information.

Vision training is usually begun with procedures that are selected to increase the efficiency of the oculomotor system.¹⁶ The basic "machinery" of the oculomotor system needs practice in order to achieve an automatic muscle response which will increase the performance of the system. Once this automation is achieved, the interpretive analysis of vision is practiced so that the person can make visual inspections followed by visual discriminations. This leads to visual decisions that are followed by actions and modifications. The result of this will be new visual discriminations upon which new visual decisions, actions and modifications can be made again.

Individual differences can lead to very different outcomes in vision therapy. Even though the basic machinery has been "fixed" by lenses, prisms, or eye activities and has become more efficient, it is the discrimination skills of a patient which will determine whether or not the patient has any improvement in their treatment. Vision training enhances the skills which a patient then uses in a visual task in which the ability to make visual discriminations and interpretations is necessary. Having efficient visual skills does not mean that a patient will have a better ability to read; however, it will remove a factor which negatively affected a person's reading ability.

DISCUSSION: Vision problems can have an effect upon reading and learning disabilities by delaying the development of efficient reading skills. A deficiency in visual processing skills can interfere when a child is learning to read. Also, any decreased development in visual skills such as accommodation and oculomotor control can have a negative effect upon the learning process. Inefficiencies in these skills can cause headaches and fatigue while reading. As a result of this, the child may dislike reading and learning throughout the rest of their life.

- Although these visual dysfunctions have an effect upon the learning process, they are not the only cause of the learning disability. Many factors contribute to the development of a learning disability. The child may have a problem with paying attention. Also, nutritional, psychological, and emotional problems can have an effect upon attention and learning. A hearing problem can also affect the learning process. Usually, learning disabilities develop as a result of a variety of combinations of these factors. Therefore, treating visual problems only will not necessarily lead to a “cure” for the learning disability. In order to deal with the learning problem most effectively, a multidisciplinary team should handle the management of the disability. This team can include the optometrist, parents, audiologist, psychologist, nutritionist, teachers, and anyone else who can help with the factors which have led to the development of the learning disability. By treating all of these factors, there is a greater chance that progress can be made to help a child with a learning disability.
- As stated earlier in this paper, optometrists do not “cure” learning disabilities through vision training. However, vision training can be used to improve visual skills. By treating the visual component of the problem, they are removing one of the factors which is interfering with the learning process. Therefore, vision training can be used indirectly to treat an individual component of the condition and hopefully will aid in the overall treatment process of the learning disability

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