Therapeutic Riding & the Visually Impaired

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PART I

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Understanding Blindness & Low Vision
Many NARHA operating centers serve riders with blindness or low vision. Each person, however, is different, their ability to function in our very vision-dependent world is different. This is article is part one of a two part discussion of blindness, low vision, orientation and mobility factors, and the role of vision in development and in brain injury.

"**Blindness**" is the lack or loss of ability to see; it is the lack of perception of visual stimuli, due to the disorder of sight or to lesions in certain areas of the brain. There is a wide variety of the types of blindess, such as color blindess--an inability to correctly perceive colors--and functional blindness, the inability to see although there is no disorder of the organs of sight (the eyes and related nerve connections to the brain).

What is legal blindness?
Legal blindness is a term which describes the point at which vision functionally limits a person's safety. People who are legally blind are not permitted by law to have a driver's license. There are two parts to the definition of legal blindness. The first concerns visual acuity, the second concerns visual field. Visual acuity refers to the actual clearness and sharpness of vision; visual field refers to the size of the area which we can see with eyes in a straight-ahead position, including our peripheral vision. **A person who is legally blind can have a loss in acuity, field of vision, or both**.

A person who is legally blind has a **visual acuity** of 20/200 or less in the better eye with the best possible correction. This means that a person who is legally blind cannot see clearer than 20/200 even with eye glasses or contact lenses. The numbers "20/200" mean that what a person with normal vision can see 200 feet away, a person with legal blindness can see at 20 feet. The greater the second number, such as "20/300", the greater the loss of acuity. Normal vision is "20/20".

A person with legal blindness has a **visual field** of 20 degrees or less in the better eye with the best possible correction. You can think of the visual field as the "window" of sight; we can see more of the world through a large window than through a "porthole". When describing visual field, the smaller the number of degrees, the worse the visual field. A person with a 20 degree visual field has a smaller field of vision than a person with five degrees. Normally, when a person looks straight ahead, he should be able to see nearly all of the objects in a half-circle (180 degrees, almost ear to ear) around the front of the face and head, equally on both sides of the nose. The central one-third of this arc of vision is seen by both eyes. A loss in the visual field can affect central or peripheral (side) vision, so the "porthole" in a person with a visual field loss is not necessarily in the central visual field. A person with a visual field loss may have to change their head position, but not their eye position, to access their available "window".

Here are a few examples:
Mr. S, who is legally blind, has a visual acuity of 20/20 and a visual field of 3 degrees. This is like looking through a pinhole, although what is seen is seen clearly. Thus, while riding, he must remember to turn his head to be aware of more of his field of vision, and he can be easily startled when unexpected objects move into that field suddenly, with no auditory cue to warn him.

Mr. C is also legally blind and has a visual acuity of 20/600, with normal visual field. For Mr. C, the world is extremely blurry in spite of attempts to correct his vision with glasses or contacts. With practice and initial assistance, he has mapped out the operating center's layout in his memory, and the staff there have learned to use orientation and mobility ("sighted guide") techniques to ensure his safety and comfort. His special cane allows him to travel in famiiar areas at the barn. At times, sunglasses help his vision by decreasing glare.

Low Vision
Most people diagnosed with legal blindness have some amount of vision, and can learn to use it. The American Foundation for the Blind suggests that the terms "blind" and "blindness" be used for persons with no usable sight at all, and the terms "visually impaired", "low vision", or "partially sighted" be applied to persons who have some usable vision. If a person finds that his his life is impaired in some way because he cannot see adequately for the task--whether the tasks are at home, at work, or in social situations--and his vision cannot be corrected, he may be said to have low vision. Common causes of low vision are as follows:

Macular Degeneration: this disease causes loss of vision in the central field, making it difficult to read or do close work. There is still side or peripheral vision, so that objects may still be seen. This is most common in older people.

Cataract: The lens of the eye becomes cloudy, so that details are hard to see, i.e., there is a loss of visual acuity. The person may see cloudy, distorted double images, and glaring light may exaggerate the problem.

Glaucoma: The tissues of the eye are damaged by increasing pressure inside the eye. It can lead to the loss of side vision, leaving central tunnel vision, if not treated quickly. Retinitis Pigmentosa: This disease is inherited and causes a breakdown of the tissues of the retina, resulting in loss of vision, particularly night vision. It can also result result in tunnel vision, and affect central vision.

Detched Retina: There a many reasons for the retina to tear and detach, including self injurious behavior i.e. hitting oneself repeatedly in the face and eyes. When the disease is active, the tear fills with liquid, lifting the retina from its normal position. The visual problem appears as a dark curtain-like shadow hanging above or below the central field.

Diabetic Retinopathy: In diabetics, the retinal blood vessels swell and leak, and the result is blurring in the central visual field. Abnormal new blood vessel growth can rupture and bleed, affecting light passage through the eye. Typically, at least some vision remains intact.

An **assessment for low vision** is different than a "regular" eye exam. The intent is to evaluate vision functioning and its effect on daily life. Initially an interview is conducted to determine the various ways the vision problem has affected the person, what helps him to function better and what is problematic, his lifestyle, work, goals, and general health. A clinical assessment by an optometrist or opthalmologist generally follows. This includes trial of various devices to attempt to improve vision, and training in their use. The devices range from a simple hand held magnifier, to a computer software program to enlarge text. Following the exam, the person may be referred to other professionals such as orientation and mobility specialists, or vocational couselors as needed.

Sighted guide technique is a method in which a sighted person assists a person with a visual impairment to move from place to place. Often, a person with low vision may be functional in familiar environments, but need a sighted guide for less familiar places. An **orientation and mobility specialist** is a rehabilitative health professional who evaluates and instructs the visually impaired in safe travel in any environment, as well as equipment designed to help the visually impaired be more independent at home, work, and leisure settings.

When a rider's medical history form notes a problem in the area of vision, the instructor or therapist should find out what the problem is. This may be accomplished through discussing the visual impairment with the rider, the relative /caretaker, special education teacher, vocational counselor, or optometrist. Did the problem occur suddenly, or over a long period of time, allowing the person to adjust? Does he see an orientation and mobility specialist, or is undergoing any type of visual rehabilitation? Does he use sighted guide technique (center staff will need to learn it also)? The typical mobility assistance devices for a person with low vision are a special cane, sighted guide, or a guide dog. What does this person use? Be aware that a loss or alteration in sight can also decrease balance, since vision is used to help balance ourselves.

The first visit to the operating center should include an orienting tour of the facility, preferably aquainting the rider to the safe and necessary areas of the center, such as where to wait for his lesson, the restroom, etc. Give him time to get a feel for the distances between these areas, and the terrain (even or uneven). Getting familiar with horse's shape and size through touch is helpful, so start with a horse that will calmly allow touch, even if this is not the horse the participant will ride. Brushes and tack- their location and use- may be part of the agenda in time as well. Conducting the lesson in an enclosed arena with minimal noise distraction will better allow the rider to focus on the instructor and the horse. If independence is a goal, and the amount of functional vision permits, the instructor and the rider can determine what specific visual cues to use in the ring, such as larger dressage letters. If the rider is blind, auditory cues from the instructor or other person may be necessary. In any case, if independent riding is a goal, it will take time for the rider to map in his mind the space he is riding in, so consider what cues, if any, will help. Spending the time to fine-tune the rider's balance and posture will help support that independence, enhancing the rider's safety and enjoyment.

Part two of this series will address functional vision problems in child development and also in people with traumatic brain injuries.

Reference: Low Vision Questions and Answers. The American Foundation for the Blind, New York, NY. 1-800-232-5463

PART II

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Therapeutic Riding and the Visually Impaired: Part Two In the last edition of STRIDES, blindness and low vision were discussed, and typical causes of vision problems were reviewed. However, many participants in therapeutic riding center have some form of brain dysfunction. The brain dysfunction may have occurred early in life, and thus affected normal development of the child, or it may have occurred later, such as a stroke or head trauma in an adult. These individuals often have some type of visual and/or visual perceptual disorder, and the disorder can significantly impair learning and function.

Normal visual perception requires numerous systems to be intact, and all have both structural and functional components. Essentially, the visual process has three subsystems: accommodation, oculomotor, and convergence. Accommodation is the process by which the lens actively changes shape to adjust the eyes' focus for objects at different distances. It therefore allows for accurate identification of objects by obtaining clear focus. By holding, mouthing, hearing and in other ways exploring the object that has been clearly seen, the child develops visual recognition of that object, and how it compares to other objects. The oculomotor system refers to accurately controlled and coordinated movements of the eye by the muscles of the eye in order to direct the eye toward a visual stimulus. Two types of eye movements are used: fixation and tracking. Fixation allows us to hold the eyes on a stationary object, such as the currycomb we

want to pick up. Repeated quick fixations allow us to scan a page of print. Tracking allows the eyes to follow a moving object, maintaining fixation on it, such as watching a horse go over a jump. Tracking will include head movement toward the object as needed or if there is not sufficient coordination of the eye movements, but a person should be able to track an object within his field of vision without head movement. The third subsystem of vision is convergence. This system allows us to maintain single vision on an object, rather than having double vision. This system, integrated with accommodation, ensures single binocular vision, so that objects are accurately and clearly seen with proper depth perception. Interestingly, according to Dr. William Padula in his book "Neuro-Optometric Rehabilitation", researchers have found that when the muscles of the eyes are paralyzed via a drug such as curare, the sensory function of vision ceases--that is, the subject is unable to "see" even though the eyes are open. Thus vision as a sense is dependent on eye movement.

Additionally, vision may be described as ambient or focal. Ambient vision is more peripheral, and is more involved with our perception of our body and head's orientation in space, less involved with discerning details, similar to the "soft eyes" concept of Sally Swift. The focal process of vision allows the eye to "focus" in on and orient to details. The ambient or peripheral process is significantly involved with normal balance. The two processes together allow the riding instructor, for example, to walk forward through the riding ring with normal balance, while keeping the head turned to the side to look at a rider who has halted for a stirrup adjustment; the instructor can focus yet be aware of the peripheral information, especially his or her orientation in space.

There are several visual diagnoses that may be seen in children or adults who frequent therapeutic riding programs. Strabismus is a visual defect in which one eye cannot focus with the other on an object due to an imbalance of control of the eye muscles. Esotropia causes one or both eyes to deviate toward the midline (crossed eyes); exotropia causes the eye to deviate laterally, to the outside. Hemianopsia is loss of vision in half of the visual field of one or both eyes; homonymous hemianopsia is loss of vision in the left or right halves of the visual field. Nystagmus is an involuntary movement of the eyeball from a resting position back to the midline, so that the eye(s) appear to move rapidly back and forth from right to midline, or left to midline. Cortical blindness is a loss of vision due to damage to the visual cortex of the brain, the area which receives the sensory images from the eyes, and it may be bilateral or one-sided damage; if one-sided, it will result in hemianopsia. Many children with severe developmental problems may be referred to as cortically blind, but have some amount of vision in some part of the visual field and can learn to use it. For the diagnoses noted above, treatment may include vision therapy, corrective lenses, or even surgery.

Blindness is a lack of perception of visual stimulation; perception is the ongoing process of receiving information through the senses about the environment, and translating this information into meaning. All our sensory systems--auditory, visual, tactile, olfactory, vestibular and kinesthetic-- contribute information to the brain, which integrates this information, relates it to previous knowledge, and determines an appropriate functional outcome--what action to take. During development, a child normally uses this sensory information to learn about the environment and his relationship to it; he takes in the information, and acts on it, and learns more. This perceptual learning is a process that allows the child to become better and better at discriminating specific and desired sensory inputs from the general background of multiple sensations. It allows him to attach functional meaning to those sensations, and he can then use this information to manipulate the environment around him. Thus, a child sitting in his high chair playing with a toy learns about that toy through how it feels, looks, smells, and sounds, and through what he has do to manipulate it; and he learns what happens when he drops the toy. It makes an interesting noise, and moves in a different way, and best of all, it causes someone--preferably mother--to come over to him, talk to him, and pick up the toy to return it to him. He also begins to learn that certain objects, or aspects of his environment, share similar characteristics, allowing him to generalize: this cup is somewhat round, like the ball was--if I drop it will it bounce?

Perceptual learning has three characteristics. It is first adaptive to the person's needs; the child at

the therapeutic riding center learns to distinguish the horse he rides from other objects. Second, it involves active search behavior; the child actively looks for and seeks the horse as it is brought to the ramp. Third, it allows the child to selectively extract helpful information about the environment/object which will decrease uncertainty; if the preferred horse is not apparent despite searching, but another horse (or the vaulting barrel) is, the child can observe that this different horse has similar characteristics to the usual horse, and he need not be afraid of it.

Visual perception includes several components. It requires the following: the person's eye must respond to stimulation on the retina, including adjusting focus; he must move his eyes and head to further observe the object; he must interpret the meaning of the information; he needs to quickly and accurately move a limb in response to the visual information; and he has to integrate all these steps.

Vision is the dominant developmental sense. A visually impaired child with normal movement and cognition will experience developmental lags or even advance quickly at some point, skipping a stage, just as sighted children do, because other factors such as intelligence and motor skills compensate for the visual problem. Blind children's developmental stages also closely parallel those of normal children, with delays occurring when the child must use a different sense than vision for the experiences and learning that would normally have occurred at that stage via vision. For example, a developmental lag that appears directly related to vision occurs at about forty weeks; while the child with sight is able to creep about on hands and knees, the blind child achieves the position but tends to rock in place. The absence of vision causes a temporary lack of stimulation to move forward to explore, or to pull to stand. Usually, by one year, the drive to move and explore is strong enough so that the blind child is creeping and exploring more normally.

Visual perceptual disorders in children encompass several general areas. One is visuospatial disorders. The perception of space includes such abilities as matching spatially similar or dissimilar objects; correct orientation of letters; size, length and shape concepts including sequencing; developing an internal "map" of the spatial relationships of objects close to and far from oneself and each other; also, time perception is closely related to spatial sequencing. Visuoconstructive disorders affect the ability to assemble parts to form a whole, such as toys that require assembly or building, or tasks such printing, copying, and drawing. Another area is visual analysis and synthesis. Visual analysis is the ability to perceive and analyze specific features such as position, shape, spatial relations, and configuration. Visual synthesis is the ability to perceive individual features as a unified whole, or to place them in a hierarchy or sequence. In all of the above, other problems such as a lack of integration of the senses and a lack of motor skills can contribute to difficulty in developing ability in visual perception, as well as difficulty diagnosing the problem. In mild developmental delay, or learning disabilities, problems with visual perception can be very subtle. Here the optometrist, who specializes in developmental disabilities, and the occupational therapist, are key figures in diagnosing problems and recommending interventions to anyone working with the child, including therapeutic riding center staff.

In adults, vision problems may have existed before damage to the brain from head injury or stroke occurred; recall the discussion of visual problems in Part I of this series in the last STRIDES. The brain damage then superimposes additional new problems in any component of the visual and visual perceptual processes. Damage to one side of the brain in a stroke may result in hemianopsia; damage to the visual cortex of the brain results in some degree of cortical "blindness"; there may be damage to the eye structures themselves, or to areas of the brain responsible for coordinating eye movements. Other problems can include double vision, vertigo, poor spatial judgement, apparent confusion and clumsiness, and motion sickness. A vision specialist treats the primary visual deficit, using corrective lenses, oculomotor exercise, or even surgery. Health professionals as a team can all assist as well. In the book Neuro-Optometric Rehabilitation, Dr. Padula et.al. describe Post-Trauma Vision Syndrome as a common problem in the person with traumatic brain injury. The symptoms include diplopia, poor concentration and attention, staring behavior, poor visual memory, and associated difficulties with balance,

coordination and posture; it appears to be due to disrupted ambient vision. The suddenness of the brain injury makes it very difficult if not impossible to compensate for, without vision therapy. Dr. Padula also describes Visual Midline Shift Syndrome, in which a disruption of the ambient process of vision due to the brain injury causes symptoms such as the person leaning away from the hemiplegic side, as well as perceiving incorrectly that the floor is tilted and the walls/floors appear to move.

Adult acquired visual perceptual dysfunction also include cortical blindness, visuospatial, visuoconstructive, visual analysis and synthesis problems as previously described. Also, the adult may demonstrate unilateral spatial inattention. That is, the person fails to recognize, orient to, or report stimulation on one side of the body. This condition is usually seen when there is also hemianopsia, as well as paralysis and decreased awareness of touch and movement on that side. This inability is involuntary, and may also be referred to as one-sided neglect. The individual appears completely unaware of one side of their body, even when another person draws attention to that side; they may be unaware of that side of space (in relation to their midline) at all. The individual is at risk for injury to that side, and does not necessarily learn with time to compensate by voluntarily turning the head to see the neglected side. The individual can also be inattentive to sounds on the affected side. Another visual perceptual problem can be visual agnosia, which is the inability to recognize what is seen, such as objects, faces, space, and colors, as though the visual perception is present but the perceptual meaning is lost.

Generally speaking, trying to isolate out visual perceptual problems from other deficits is difficult. An adult or child rarely comes to the therapeutic riding program with isolated visual perceptual deficits; usually, the deficits are seen in close combination with motor, language, and cognitive problems. It is helpful to consult with an occupational therapist or visual specialist, and to obtain a copy of the child's Individualized Education Plan, to determine what vision problems exist and how they are being treated or compensated for by other professionals and the family. The operating center should include questions about vision in their initial screening of a potential participant, since the riding environment is a visually challenging one, and since the overall sensorimotor experience of riding can at times, based on clinical observation, improve some visual skills. With increased knowledge of vision and visual perceptual skills, instructors and therapists may also suggest referral of a rider for a functional visual assessment. Clearly, vision and visual perception are areas that will significantly impact the riding experience, as well as rehabilitation and development of the participant.

References:

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