advance
for Occupational Therapy Practitioners®

Visual Development

VISUAL DEVELOPMENT

Part One of Two

Answers to Some Common Questions

By Rhoda P. Erhardt

OT practitioners have been very concerned and sometimes confused about visual problems in children with physical handicaps.

Traditionally, we have focused on the hand and its importance for most functions of daily living. We have always planned intervention to improve eye-hand coordination without fully understanding the role that visual development plays in the equation.

It is true that the baby's hands need to distinguish sensory qualities of objects, e.g. shape, size, texture, weight and temperature, in preparation for and during manipulation. Actually, the eyes of the newborn provide information about the environment even earlier than the hands. At one time we thought the infant's visual world was a blur during the first few months. Now we have detailed data about what is seen and when it is seen. The truth is that by 6 months, the motor components of vision are functioning almost identically to that of an adult!

At some point in every OT's experience comes the realization that one cannot study only the hands and arms. Just as the hand influences the whole body and is also influenced by the whole body, so do the eyes interact with all areas of development. Many of us now realize the importance of evaluating and treating visual dysfunction in children with multiple disabilities, to help them fulfill their occupational roles and their ability to play, perform self-care and achieve in school.

Like most pediatric therapists, I was aware of how little I knew about the relationship between vision, posture, and movement. Rather than focusing (no pun intended) on visual acuity, I tried to learn as much as possible about the motor components of vision, that is, visual reflexes as well as voluntary movements. A few years after publication of the Erhardt Developmental Prehension Assessment (EDPA), I used a similar process to create the Erhardt Developmental Vision Assessment (EDVA). Through extensive literature review, I started my own developmental checklist, adding items and revising them over a period of years during videotaped research studies and clinical observation with my caseload of patients. The current version of the EDVA is a 16-page booklet measuring visual development from prenatal stages to 6 months.

When I teach workshops about developmental visual dysfunction throughout the United States and overseas, I hear the same questions over and over:

Why do some children avoid watching their hands or look at them only briefly?

Task analysis is necessary to discover the cause of poor visual monitoring of hands, since there are so many possible reasons. As

stated in my previous *ADVANCE* article (June 6, 1997) many children with multiple disabilities have poor grading of neck muscles for head control. They must maintain the head totally erect or it will flop into flexion. Thus, fixation on their hands or objects is usually fleeting. Long-term goals can include improving head control, but short-term intervention must provide environmental adaptations such as head support and appropriate positioning of objects so eyes can watch hands.

Some children's eyes, however, are influenced by the flexion/extension components of the "doll's eye responses," involuntary reflexes which should be integrated by 3 months. If not, when the neck flexes downward, the eyes remain up or are delayed in moving down with the head.

How can we decrease distractibility in the classroom?

Many children are easily distracted by any visual stimulus, especially moving objects, and are unable to maintain attention. To understand fixation, or visual grasp (the ability to keep the eyes on a target), we need to review its developmental process. The newborn's eyes are usually in constant motion, roving through the immediate environment, with only one eye able to align and immobilize briefly on an object presented in a specific spot. By one month, the infant's first true fixation is a vague stare at the surroundings, and fixation on Mother's face is still brief.

By 3 months, the baby can maintain fixation on a stationary target unless distracted by a more compelling moving target. Not until 5 months can a moving target be ignored for an interesting stationary one. I believe visual distractibility is a sign of delayed development. We can help these children by analyzing and inserting all the necessary motor components, and/or by conditioning them to focus on relevant stationary targets during attempts to distract the children with moving targets. For example, we can ask a child to build the tallest block tower possible, while we try to bother him with a squeezie toy frog hopping in all visual fields.

Should we try to help a child move eyes separately from head for faster reading?

It depends. Infants don't begin to move eyes separately from head until 5 or 6 months, when the rotational components of the Doll's Eye Responses are integrated and head control has been perfected. If those and other elements are in the process of development, it may be best to allow the child's visual development to proceed normally, although delayed, because visual motivation stimulates head control. If, however, we are reasonably sure that a child with severe disabilities may never gain sufficient head control, we would provide adaptive equipment and positioning to stabilize the head. The eyes could then move very precisely to operate an augmentative communication system.

What can we do about children with cortical visual impairment (CVI) who seek self-stimulating visual displays, including repetitive hand movements in front of their faces?

Normal infants go through developmental stages of attraction to specific stimuli, such as black-and-white patterns, bright colors, moving targets, targets with internal movement and/or sound properties, diffuse light, focal light, and of course, faces. These patterns are gradually linked to concrete objects that the children are able to handle and explore, categorize with cognitive awareness, and label through language. The more mobile the developing child, the more opportunity that child has to seek and receive a variety of visual and tactile input

People with cognitive, visual, and/or mobility impairments still have strong needs for that sensory input followed by motor output. Since their developmental process is interrupted, they get stuck using a few stereotypic patterns to satisfy those needs. Our intervention depends on determination of specific developmental levels and sensorimotor needs of each individual.

For example, children with very low vision may need manual assistance in exploring the tactile attributes of accessible objects concurrently with learning their names and functional uses. By offering more choices for gaining meaningful sensory information, we help these children expand their repertoire of socially acceptable behaviors.

An appropriate sensory diet could address ways of providing proprioceptive and vestibular input, as well as tactile, through selected activities that are age-appropriate and related to occupations of childhood.

The second article in this series, scheduled to appear in the May 25 edition of *ADVANCE*, will address the importance of early visual development for future adult performance.

Rhoda P. Erhardt, MS, OTR, FAOTA, is currently in private practice in the Minneapolis-St. Paul area, providing evaluation and consultative services to a variety of health agencies, educational systems and national corporations. She is internationally known for her publications and workshops on prehension, vision, eye-hand coordination and feeding in children with CP, as well as perceptual problems in children with LD. You can reach Ms. Erhardt at (612) 730-9004, or online at rperhardtdp@worldnet.att.net.