

# Motor Components of Vision: Assessment and Management in Children with Neurological Disorders

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## Abstract

The literature is filled with information and research related to visual acuity and pathology (**medical model**), and visual perception and cognitive processing (**educational model**). Relatively little can be found, however, concerning the motor components of the visual action system, particularly the developing process of eye-hand linkage, which influences the development of both eyes and hands. This poster session presents a **developmental model** that can be useful for children of all ages who have specific eye dysfunction related to cerebral palsy, multiple handicaps, and other developmental disabilities. Video clips will be available for viewing, showing how comparisons of typical and atypical visual function lead to strategies for therapists, teachers, and parents to manage visual problems.

## A Developmental Vision Assessment

The Erhardt Developmental Vision Assessment (EDVA), is a developmentally-referenced evaluation instrument that measures movement-related components of the optical and neural visual system. (Erhardt, 1990a). It was created from an extensive literature review of research from the fields of medicine, education, anthropology, developmental psychology, and child development (Erhardt, 1987a). The process of collecting, compiling, and organizing this developmental normative data was followed by wide clinical use, and revisions based on a videotaped study of normal infants from birth to 6 months and field study data (Erhardt, 1986). An interrater reliability study, describing subjects, procedures, methods, and results, showed highly significant interrater agreement with the test author (Erhardt, 1988).

## Organization of the EDVA

Protocol sheets measure the motor components of vision from the fetal and natal periods to 6 months, when primitive reflexes are integrated, and essential eye movements are nearly as functional as in the adult.

### Section 1: Primarily Involuntary Visual Patterns (Positional-Reflexive)

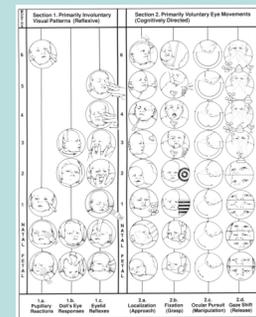
- Pupillary Reactions
- Doll's Eye Responses
- Eyelid Reflexes

### Section 2: Primarily Voluntary Eye Movements (Cognitively-Directed)

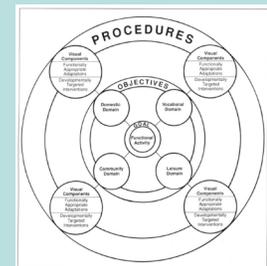
- Localization (Visual Approach)
- Fixation (Visual Grasp)
- Ocular Pursuit (Visual Manipulation)
- Gaze Shift (Visual Release)

The summary page shows a pictorial view, organized horizontally into clusters, and vertically into developmental ages.

## Summary Page of the EDVA Developmental Sequence Clusters



## Model for Management of Visual-Motor Dysfunction (Erhardt, 1990c)



## Case Example

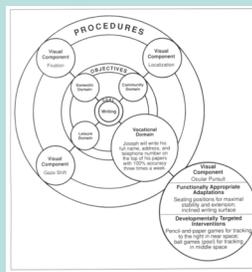
Joseph has moderate cerebral palsy with spasticity, and struggles with eye movement patterns strikingly similar to motor patterns throughout his entire body, such as muscle imbalance, slow difficult movements, and limited range.



Joseph's visual fixation for **reading or writing** can be accomplished only when he assumes this flexion synergy position, with rounded back and posterior pelvic tilt. His posture is dictated not only by his need for stability, but also by his right hemianopsia, myopia (nearsightedness), nystagmus, and the large cataract in his right eye.

## Scored EDVA Ocular Pursuit

## Joseph's Model for the Goal: Writing Domain: Vocational Visual Component: Ocular Pursuit



## Functionally Appropriate Adaptations

**Before**  
Compensatory postures for reading and writing in existing chairs

**After**  
Improved posture for writing and computer use in alternative seating solutions



→ Note points of stability at elbows, pelvis, and knees. →



## Developmentally Targeted Interventions

According to the EDVA, Joseph needs to improve ocular pursuit in near space, especially to the right, as he follows his moving pencil on the paper. He plays a connecting dot game with his brother assisting to locate the dots. This activity simulates the motor skill of writing, but at a lower cognitive level.



While playing pool, Joseph visually follows the path of the ball in middle space:

- Horizontally
- Approaching (convergence)
- Retreating (divergence)