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Development of a Hand Preference Assessment

Poster presentation at the American Occupational Therapy Association Conference
Philadelphia, Pennsylvania, April, 2001

Abstract

This poster describes the development of a new qualitative hand preference assessment designed to examine the effects of genetic, cultural, developmental, and environmental factors on choices of handedness for tasks that require:

- 1) unilateral movements (preferred hand only),
- 2) bilateral movements (both hands moving simultaneously and symmetrically, or one hand leading, the other assisting or stabilizing the object), and
- 3) bimanual movements (each hand performing different movements).

The process of collecting, comparing, and organizing the literature review data was followed by a videotaped study of typical elementary-age children, ages 5 to 11 years, filmed in home and community settings. Poster video captures illustrate examples of the children using one or both hands to perform

- 1) exploratory or sensory movements,
- 2) gestures, and
- 3) functional tasks: power (resistive), precision (fine manipulation), or power/precision (combination).

These tasks were also grouped into occupational performance areas: self-help or daily living, work or productive, and play or leisure activities. A sample of test items illustrated with video-captured still photographs demonstrates that skill levels vary developmentally, and choices depend not only on innate genetic factors, but also on task requirements and physical location of objects in relation to self.

The Study

Method: An intensive literature review from a variety of disciplines including medicine, education, psychology, and child development was conducted to define the content of the new instrument. Eighty test items were then organized into 3 sections: 1) Exploratory and Sensory Movements, 2) Gestures, and 3) Functional Tasks, which were grouped as power or resistive, precision or fine manipulation, and power and precision combination. Functional tasks were also grouped according to occupational performance areas: activities of daily living, work or productive activities, and play or leisure activities. Five elementary-age children with typical development were then videotaped performing as many of the test items as possible, in home and community environments. The videotaped data were analyzed during each task to determine unilateral hand preference, as well as bilateral and bimanual hand movements.

Subjects: The convenience sample included one apparent left-hander, and 4 apparent right-handers, cousins from the same family, in three sibling groups. The 3 females and two males ranged in age from 5 to 11 years,

when handedness is assumed to be established.

Results: This videotaped study demonstrated examples of the wide variety of arm and hand skills needed for function in home, school, and community environments, and the ability of children of different ages to adapt to changing situations. Their choices frequently depended on the interrelationships of themselves, the objects, and the task requirements, sometimes changing during the activity. Exploration of size, shape, texture, weight, and spatial relationships seemed to be integral to the process. Spontaneous unilateral gestures could also be used to determine handedness. The dominant hand, more accurate as well as stronger, was usually preferred for power tasks. Certain precision skills such as applying nail polish required equal skill in each hand. Which hand holds and which pulls in power/precision combination activity may depend on placement, such as a zipper pull. Some bimanual activities, such as playing string instruments, require the non-dominant hand to perform the more difficult manipulation.

Conclusions: The choice of hand preference is a complex issue. Although the skilled use of one hand is essential for many fundamental tasks, the importance of skill development in the non-dominant hand cannot be underestimated. Bilateralization, or being able to use both hands skillfully together, provides a more balanced repertoire of adaptive behaviors. Observations and analyses of these activities through the use of structured, comprehensive assessment forms can provide important information for understanding the issues surrounding hand preference and its practical relevance in children with and without disabilities. The research edition of the EHPA has been in the process of field testing by occupational therapists, who are providing feedback for future revisions.

Organization of The Erhardt Developmental Hand Preference Assessment (EHPA)©

Occupational Performance Areas

- Self-help/daily living activities
- Work/productive activities
- Play/leisure activities

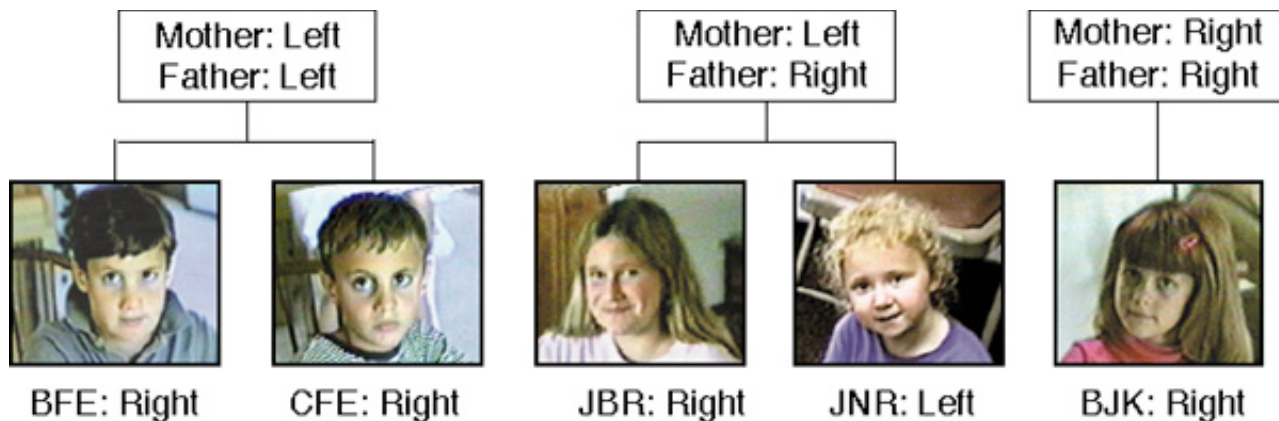
Task Requirements

- Unilateral movements (preferred hand only)
- Bilateral movements
 - * both hands moving simultaneously and symmetrically
 - * one hand leading, the other assisting
 - * one hand leading, the other stabilizing
- Bimanual movements (each hand performing differently)

Types of Movements

- Exploratory/sensory
- Gestures
 - * symbolic
 - * instrumental
 - * expressive
- Functional tasks
 - * power (resistive)
 - * precision (fine manipulation)
 - * power/precision (combination)

Genetic Components of Hand Preference of the Five Videotaped Study Subjects (in sibling groups)



Examples of EHPA Test Items Matched with Video-captured Still Photographs

**Section 1. Exploratory/Sensory Movements
(Tactile attributes: size, shape, texture, temperature, weight)**



Section 2. Gestures



Section 3. Functional Tasks

3.a. Power (Resistive)



**Section 3. Functional Tasks
3.b. Precision (Fine Manipulation)**



Unilateral use of cup



Both hands used symmetrically



Each hand performs differently



Unilateral use of chalk



Each hand performs differently

Section 3. Functional Tasks 3.c. Power/Precision (Combination)



Left hand use of comb for left side



Right hand use of comb for right side



Each hand performs differently



Right hand aims while left stabilizes



More manipulation skill in non-dominant hand

- [Normal Components of Hand Preference\(video\)](#)
- [The Erhardt Developmental Hand Preference Assessment \(EHPA\)©](#)

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