

Coordination Activities for Hand Therapy Patients

Cynthia Cooper, MFA, MA, OTR/L, CHT, Phoenix, AZ
Colleen G. West, MS, OTR/L, Phoenix, AZ
ASHT 31st Annual Meeting, Boston, MA, 2008

The hand is a perceptual entity that has been described as an information-seeking organ. The hand allows our patients to interpret and analyze the tactile properties of size, shape, and texture and to use in-hand manipulation in order to identify objects and handle them effectively. Through manual exploration by way of coordinated hand use, our patients recognize the relationship of objects to their bodies and to gravity.

Translating available motion into function requires complex sensorimotor capacities of hand use. This is especially true for fine motor hand functions and may be apparent in the rehabilitation of either the dominant or the non-dominant extremity. Coordination activities that look easy may in fact be quite challenging for some hand therapy patients, even those with excellent range of motion. Facilitating coordination provides a bridge to recovery of meaningful hand function.

“Although refined tool use and fine manipulative activities depend on excellent finger control, ...it is in the elaboration of the central nervous system and not in the specialization of the hand that we find the basics of human skill. This elaboration of the central nervous system ...includes both the more motoric aspects of development found in the precision of spatially directed movement and timing and in the more cognitive aspects of attention, memory, object perception, planning, and problem solving. Movement timing and object manipulation both draw on the motor and cognitive systems, but the latter is especially interactive with higher levels of cognition.”
(Henderson & Pehoski, p. 103)

Concepts

- Radial digits are the skill side of the hand. Ulnar digits are the stability side of the hand.
- Prehension precedes manipulation
- Increasing dissociation, strength, and perception allow for tool use and manipulation of objects

Definitions

Bilateral: Symmetrical hand use (e.g., steering bicycle, throwing or catching large ball).

Bimanual: Each hand doing different things (e.g., cutting with scissors, tying shoelaces).

Passive Touch: Excitation of receptors in the skin and underlying tissue.

Active Touch: Also called haptic perception, is the concomitant excitation of receptors in joints and tendons along with changing patterns in the skin. It involves the retrieval, analysis, and interpretation of the tactile properties (such as size, shape, and texture) and identity of objects through manual and in-hand manipulation.

Purposeful Grasp: adjusting hand to the object. Opening and shaping the hand prior to grasp according to the object's size and shape.

Primitive Squeeze: squeezing object against another surface.

Squeeze Grasp: tightly squeezing the object with total finger flexion, against the palm. Thumb does not participate.

Palmar Grasp: Pronated hand and flexion of all fingers around the object. Thumb may passively slide around the object but does not actively hold the object. Pressure moves from ulnar to radial side.

Scratching: alternating finger flexion and extension of the digits together.
Finger movements become differentiated with one or two digits moving independent of the others.

Pianoing: automatic movement, rather than purposeful isolated motion of each digit.

Radial Palmar Grasp: radial fingers and thumb press the object against the palm. When held in supinated position, object can be brought to the mouth.

Radial Digital Grasp (inferior forefinger grasp): grasping object in the fingers rather than the palm.

Scissors Grasp: prehension of a small object between the thumb and lateral border of the index finger following a raking movement of the fingers. The hand is stabilized on a surface, ulnar fingers are flexed to provide stability.

Forefinger Grasp (inferior pincer grasp): stabilize forearm on the table while grasping with thumb and forefinger tips.

Superior Pincer Grasp: the forearm is not stabilized. Can use index finger to turn or move the object before prehension.

Purposeful Release: transfer object from one hand to the other.

Deft and Precise Grasp: Use of a variety of grasps.

Grading

Gross motor to fine motor
Textured objects to smooth or slippery objects
Proximity of activity to body
Eliminate proximal support
Change effect of gravity on the action
Add weights to FA

References

Case-Smith J, Occupational Therapy for Children, 4th ed., 2001, Mosby, St. Louis

Henderson A & Pehoski C, Hand Function in the Child, 1995, Mosby, St. Louis

Henry Occupational Therapy Services, Inc., Tool Chest: For Teachers, Parents & Students, course presented in Mesa, AZ, 2002.