EVALUATION

- **History:**

History taking as part of the occupational profile offers an excellent opportunity to establish therapeutic rapport.

Assess deficits in the areas of occupation by asking what the patient cannot do that he or she wants to do, needs to do, or is expected to do. Also discuss the case with the physician.

For trauma, learn the date of injury, dates of any surgery, where and how injury occurred, mechanism of injury, posture of the hand when it was injured, and any previous intervention.

For nontraumatic problems, learn the date of onset, whether the symptoms are worsening, sequence of onset of symptoms, functional effects, and what worsens and/or lessens the symptoms

- **Pain**

Pain may be acute or chronic. Acute pain has a sudden and recent onset, usually has a limited course with an identifiable cause, and can last a few minutes to 6 months. Acute pain serves a physiological purpose, signalling the need to protect tissue from further damage. Chronic pain lasts months or years longer than expected and may not serve a physiological purpose. Myofascial pain, which may be chronic or acute, stems from local irritation in fascia, muscle, tendon, or ligament. It has specific reproducible pain patterns and associated autonomic symptoms.

Evaluation of pain may include a graphic representation of pain, in which the patient marks painful areas on a drawing of the human body; analog pain rating scales, joint or muscle palpation to identify areas of local pain or qualitative changes in soft tissue; and trigger point sensitivity

- **Physical Examination**

It is helpful to observe the positioning and use of the patient's upper extremity in the waiting area before the meeting. On examination, look at the entire unclothed upper extremity for posture, guarding and gesturing, atrophy, and oedema.

Because distal symptoms are often caused by proximal problems, it is important to perform a cervical screening , which is a proximal screening assessment of the neck and shoulder, to identify additional areas requiring intervention

- **Wounds**

Evaluate wound size in terms of length, width, and depth. Wound drainage (exudate) is bloody (sanguinous), serous (clear or yellow), purulent (pus), or deep or dark red (hematoma). Wound odour is absent or foul.

The three-color concept (red, yellow, or black) dictates wound care. Wounds can be one of or a combination of these three colours. A red wound is healing, uninfected, and composed of revascularization and granulation tissue. A yellow wound has an exudate that requires cleansing and debridement. A black wound is necrotic and requires debridement. The goal of wound care is to convert yellow and black wounds to red wounds

- **Scar Assessment**

Observe scar location, length, width, and height. Hypertrophic scars stay confined to theKeloids area of the original wound and usually resolve within a year. proliferate outside the area of the original wound and do not usually become smaller or less pigmented with time. Note any scar tethering or adherence of skin and tendon causing restricted movement. Any wound or scar crossing a joint may form a contracture , which restricts passive motion. An immature scar has a red or purplish colour imparted by its vascularity. It blanches to touch. A mature scar is flatter and softer. It has a neutral color and does not blanch to touch

- **Vascular Assessment**

Cyanosis, erythema, pallor, gangrene colour indicates vascular compromise. To test digital capillary refill, apply pressure to the fingernail or distal pad of the involved digit. Colour should return within 2 seconds of release of pressure. Compare the refill time to that of uninvolved digits


Gangrene of the tip of ring finger
Early ischemic changes

- **Oedema**

Circumferential measurement is quick to perform and provides a good alternative when it is not possible to use a volumeter. Be consistent with measuring tape placement and tension. Volumetric measurement is contraindicated for open wounds, percutaneous pinning such as Kirschner wires, plaster casts, or vasomotor instability.

- **Range of Motion**

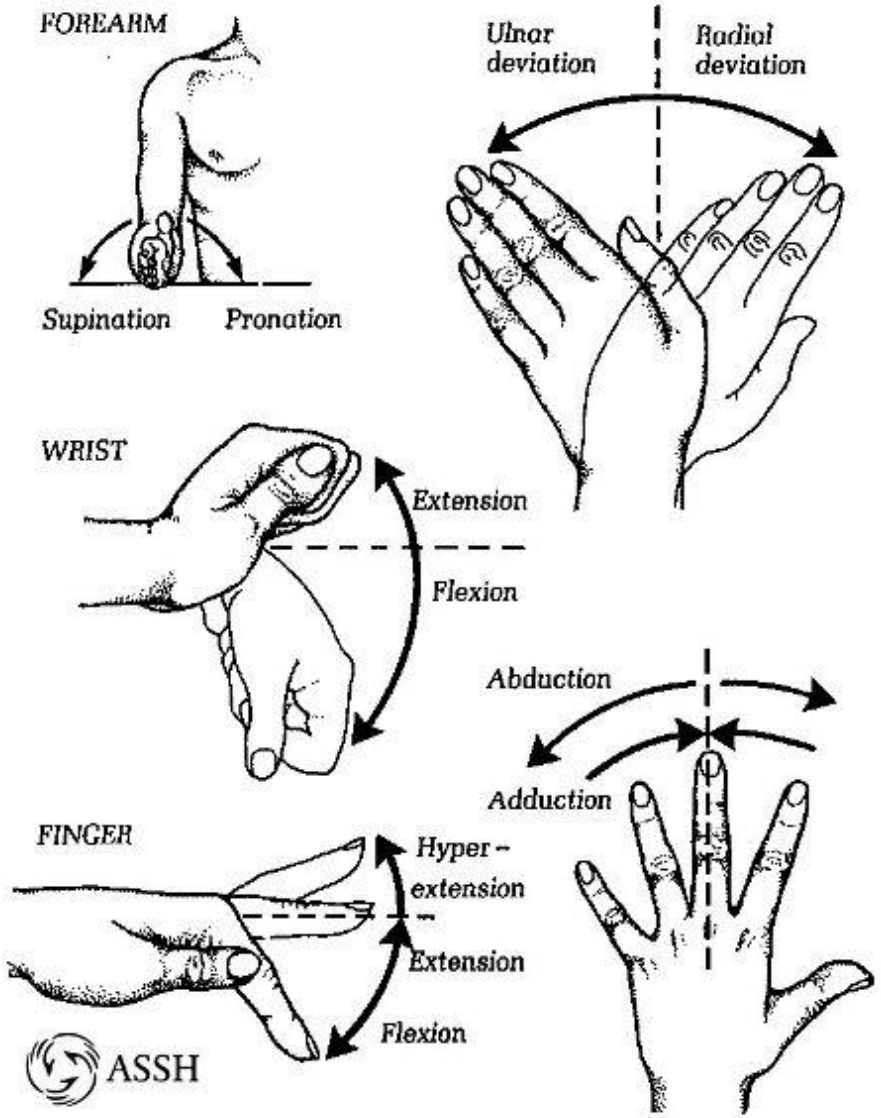
In hand therapy, both AROM and PROM should be evaluated and compared to the uninjured extremity. Facilities usually have their own guidelines for measuring ROM. As expected, consistency of retesting is important.

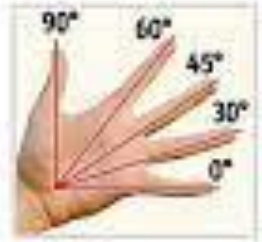
Total active motion (TAM) or total passive motion (TPM) measures the sum of composite digital flexion and extension. This measurement is used in some studies.

Normal TAM and TPM are 270°

Total Active Motion (TAM) and Total Passive Motion (TPM)

- Add the measurements for flexion of the MP, PIP, and DIP joints.
- Subtract the combined deficits in extension for those joints.
- For example, if the digital AROM is MP: 10–50, PIP: 20–70, DIP: 0–40, the total active motion (TAM) would be 160 (flexion total) minus 30 (extension deficits total) = 130 TAM.


FOREARM
Supination
Pronation
Ulnar deviation
Radial deviation
WRIST
Extension
Flexion
Abduction
Adduction
FINGER
Hyper – extension
Extension
Flexion
ASSH

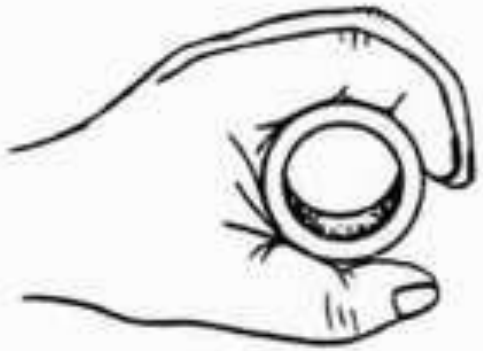

90°
60°
45°
30°
0°

- **Grip and Pinch**

When properly calibrated, the Jamar dynamometer is one of the best instruments to assess grip strength because of its reliability, face validity, and accuracy.

Hand therapy authorities recommend comparing scores with those of the contralateral extremity rather than using norms. Goals for grip and pinch strength depend on occupational factors and dominance. There ma be approximately 10%–15% difference in strength between dominant and nondominant hands, with dominant hand usually being stronger. It is routine to measure three pinch patterns: lateral, three-jaw chuck, and tip. As with grip, compare pinch scores with those of the contralateral extremity.

Types of Prehension



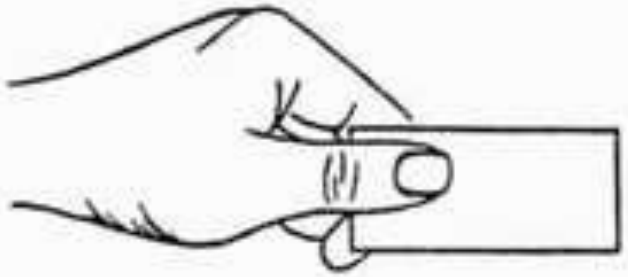
Cylindrical Grasp

Tip

Hook or Snap

3 Jaw Chuck

Spherical Grasp



Lateral

3-Jaw Chuck Grasp

Tripod Grasp

No linear relationship exists between improvement in grip and pinch strength and improvement in function. Rice, Leonard, and Carter (1998) noted that even debilitated, deformed hands could be surprisingly functional. These authors found only weak relationships between grip and pinch strength and the forces required to open six containers used commonly in the home. Thus, grip and pinch testing are not substitutes for ADL assessment with contextual relevance (Liepert, 2010). To promote occupational functioning of people with hand impairments, it is far better to have intervention and goals reflect personally meaningful ADL than grip or pinch strength measures.

- **Manual Muscle Testing**
- Manual muscle testing is particularly useful for monitoring progress following peripheral nerve lesions. Facilities usually have their preferred method of grading, which may be numerical or descriptive.

- **Sensibility**
- Inspect the patient's hand for dryness, moistness, and calluses. Blisters may be an alert to injurious hand use because of sensory loss. "Wear marks" illustrate where and how the hand is used and which parts of the hand avoid use, indicating sensory impairment.
- The Semmes-Weinstein Monofilament Test and the Two-Point Discrimination (2PD) test are most commonly used in hand therapy. The Semmes-Weinstein Monofilament Test assesses pressure threshold, and the 2PD assesses density of receptors. The Moberg Pickup Test is a functional test appropriate for use on patients with median or median and ulnar nerve lesions.

- **Sensory Examination**

Exam in this order

  - Superficial (Exteroceptive) sensation
  - Proprioceptive(deep) sensation
  - Combined cortical sensations.
- If the superficial sensation is impaired then some impairment is also seen in deep and combined sensations.
- Sensory tests are done from the distal to the proximal direction.

Superficial Sensation	Deep Sensation	Combined Cortical Sensation
1. Pain Perception 2. Temperature Awareness 3. Touch Awareness 4. Pressure Perception	1. Kinesthesia Awareness 2. Vibration Perception	1. Stereognosis Perception 2. Tactile Localization 3. Two-Point Discrimination 4. Double Simultaneous Stimulation 5. Graphesthesia 6. Recognition of Texture 7. Barognosis

- Pain Perception

- It is also known as sharp/dull discrimination. To test this sensation, the sharp and dull end of any objects like a safety pin, a reshaped paperclip, or neurological pin is used. The sharp and dull end is randomly applied perpendicular to the skin, should not be applied too close to each other or in a too rapid manner to avoid the summation of impulses. The patient is asked verbally to indicate sharp/dull when a stimulus is felt. All areas of the body should be tested. After testing the instrument should be sterilized or disposed.

- Temperature Awareness

- Two test tubes with stoppers are required for this examination; one should be filled with the cold water (between 5°C to 10°C) and warm water(40°C to 45°C). It should be taken care that the temperature should remain within this range for accuracy. The test tubes are randomly placed in contact with the skin area to be tested. All skin surfaces should be tested. The patient is asked to respond hot and cold after each stimulus application.

- Touch Awareness

- A piece of cotton, camel-hair brush, or tissue is used to perceive the tactile touch input. Light touch or stroke is applied in the area to be tested. The patient is asked to indicate where he/she recognizes that a stimulus has been applied.

- Pressure Perception

- The therapist's fingertip or a double-tipped cotton swab is used to apply a firm pressure on the skin surface. The patient is asked to indicate when an applied stimulus is recognized.

- Kinesthesia Awareness

- Awareness of movement is known as kinesthesia. The Therapist passively moves a joint through a relatively small range of motion and the patient is asked to describe the direction of movement. The patient can also respond by simultaneously duplicating the movement with the opposite extremity.

- Proprioception Awareness

- Proprioception includes position sense and awareness of joint at rest. The joint is moved through a range of motion and held in static position by the therapist, the patient is asked to describe the position either verbally or by demonstrating on another limb.

- Vibration Perception

- The perception of a vibratory stimulus is tested by placing the base of the vibrating tuning fork on the bony prominence(sternum, elbow, ankle). Generally, the tuning fork should be of 128Hz. If there is impairment patient will be unable to distinguish between a vibrating and nonvibrating tuning fork. Therefore, there should be a random application of vibrating and nonvibrating stimuli.

- Stereognosis Perception

- Tactile object recognition is determined in this test. A familiar object of different shape and size are required like keys, coins, combs, safety pins, pencils). A single object is placed in a hand and the patient manipulates it to identify the object and say it verbally. For speech impairment patients sensory testing shield can be used.

- Tactile Localization

- The test checks the ability to localize touch sensation on the skin. This test is not performed in isolated manner rather it is done in combination with pressure perception or touch awareness.

- Two-Point Discrimination

- It determines the ability to perceive two points applied to the skin simultaneously. Aesthesiometer or the circular two-point discriminator are the devices to test. The two tips of the instrument are applied to the skin simultaneously with the tip spread apart. With each successive application, the two tips are gradually brought closer together until the stimuli are perceived as one. The smallest distance between the stimuli that is still perceived as two distinct points is measured.

- Double Simultaneous Stimulation(DSS)

- DSS examines the ability to perceive a simultaneous touch stimulus on opposite sides of the body; proximally and distally on a single extremity; or proximally and distally on one side of the body.

- Graphesthesia(Traced Figure Identification)

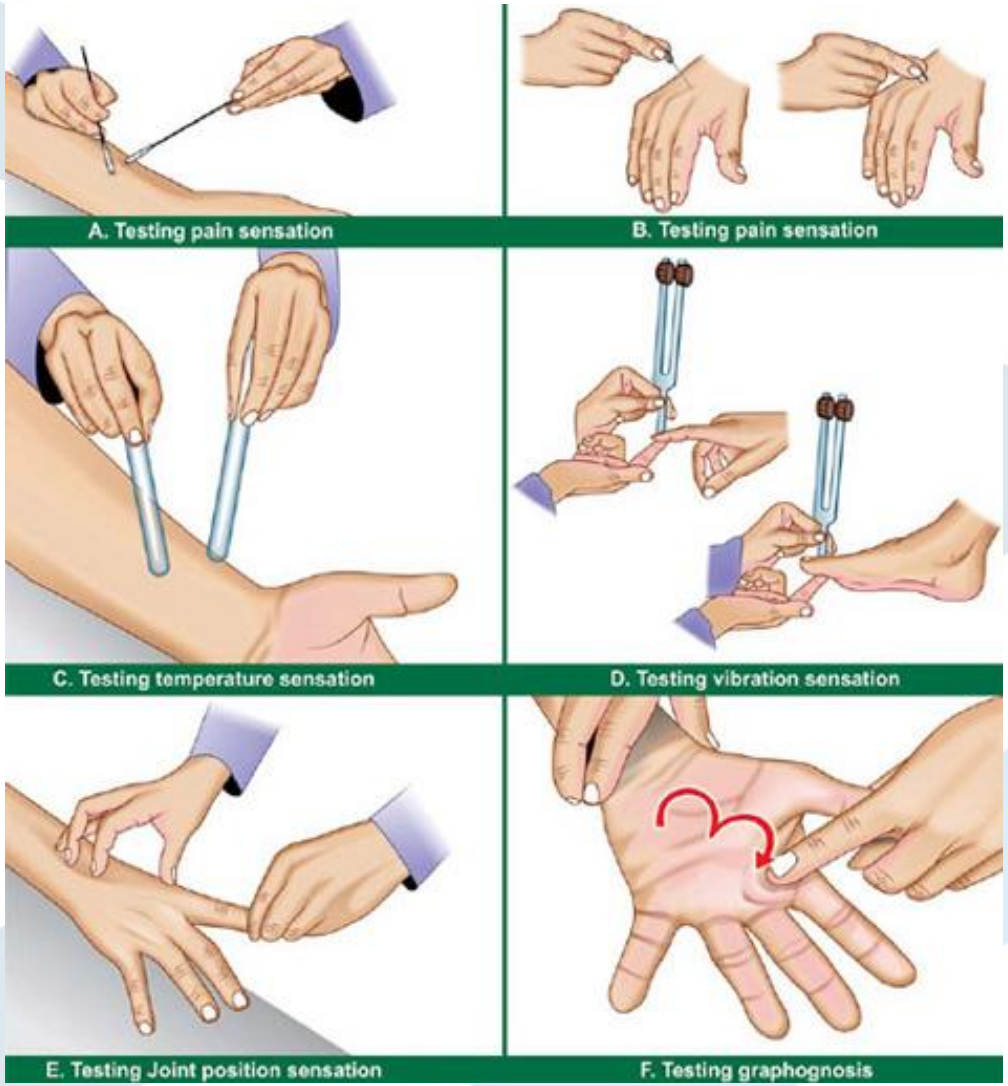
- The ability to recognize letters, numbers, or designs traced on the skin is examined using fingertip or the eraser end of the pencil. the patient is asked verbally the figures drawn on the skin.

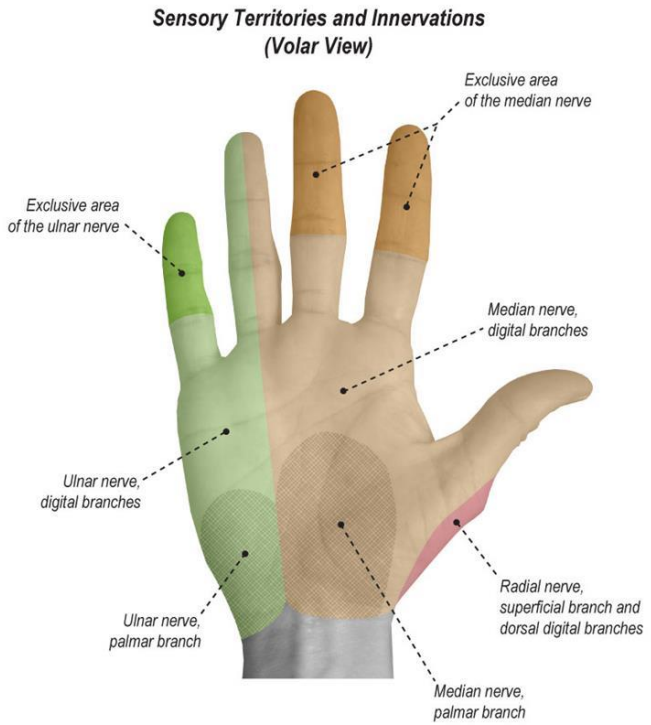
- Recognition of Texture

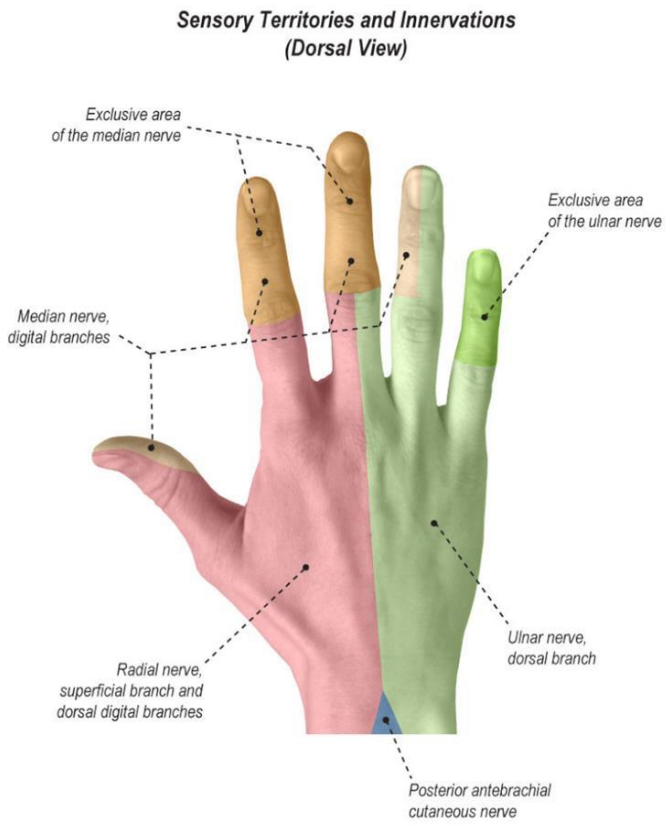
- The test examine the ability to differentiate among various textures like cotton, wool, or silk.

- Barognosis(Recognition of weight)

- For the test different weights are used. the therapist may choose to place a series of different weights in the same hand one at a time, place a different weight in each hand simultaneously.


A. Testing pain sensation
B. Testing pain sensation
C. Testing temperature sensation
D. Testing vibration sensation
E. Testing Joint position sensation
F. Testing graphognosis


Sensory Territories and Innervations
(Volar View)
Exclusive area
of the median nerve
Exclusive area
of the ulnar nerve
Median nerve,
digital branches
Ulnar nerve,
digital branches
Radial nerve,
superficial branch and
dorsal digital branches
Ulnar nerve,
palmar branch
Median nerve,
palmar branch

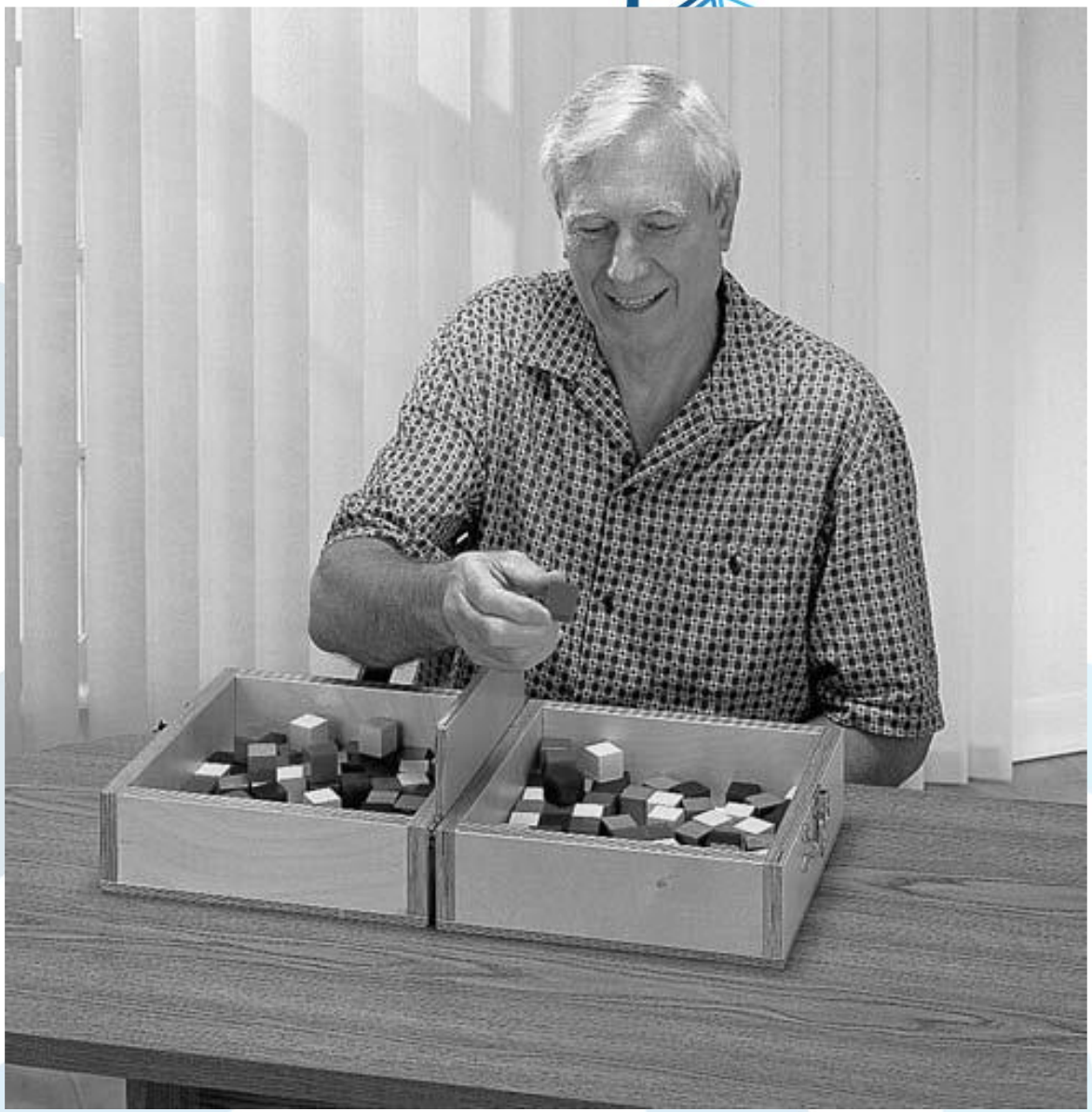

Sensory Territories and Innervations
(Dorsal View)
Exclusive area
of the median nerve
Exclusive area
of the ulnar nerve
Median nerve,
digital branches
Ulnar nerve,
dorsal branch
Radial nerve,
superficial branch and
dorsal digital branches
Posterior antebrachial
cutaneous nerve

- **Dexterity and Hand Function**

No one evaluation covers all features of hand function

Box and Block Test

The Box and Block Test measures gross manual dexterity. It was developed to test people with severe problems affecting Coordination. The subject transfers 1-inch blocks from one side of the box to the other. The score is the number of blocks transferred in 1 minute for each hand.



Administration Procedures for the Box and Block Test (Mathiowetz et al., 1985)

- Place the test box lengthwise along the edge of a standard-height table (Fig. 37-2).
- The 150 cubes are in the compartment of the test box to the dominant side of the patient.
- Sit facing the patient to monitor the blocks being transported.
- Give these instructions: "*I want to see how quickly you can pick up one block at a time with your right [left] hand [the therapist points to the dominant hand]. Carry the block to the other side of the box and drop it. Make sure your fingertips cross the partition. Watch me while I show you how.*"
- Transport three cubes over the partition in the same direction the patient is to move them. After the demonstration, say, "*If you pick up two blocks at a time, they will count as one. If you drop one on the floor or table after you have carried it across, it will still be counted, so do not waste time picking it up. If you toss the blocks without your fingertips crossing the partition, they will not be counted. Before you start, you will have a chance to practice for 15 seconds. Do you have any questions? Place your hands on the sides of the box. When it is time to start, I will say 'Ready' and then 'Go.'*"
- Start the stopwatch at the word *go*. After 15 seconds, say "*Stop*."
- If the patient makes mistakes during the practice period, correct them before beginning the actual testing.
- On completion of the practice period, return the transported cubes to the compartment.
- Mix the cubes to ensure random distribution, and then say, "*This will be the actual test. The instructions are the same. Work as quickly as you can. Ready; go. [After 1 minute:] Stop.*"
- Count the blocks transported across the partition. This is the patient's score for the dominant hand.
- If the patient transports two or more blocks at the same time, subtract the number of extra blocks from the total.
- After counting, return the blocks to the original compartment and mix randomly.
- Turn the test around so that the blocks are on the nondominant side.
- Administer the test to the nondominant hand using the same procedures as for the dominant hand, including the 15-second practice.

From Mathiowetz, V., Volland, G., Kashman, N, & Weber, K. (1985). Adult norms for the box and block test of manual dexterity. *American Journal of Occupational Therapy, 39*, 386–391.

Table 37-1 Average Performance of 628 Normal Subjects on the Box and Block Test[a]

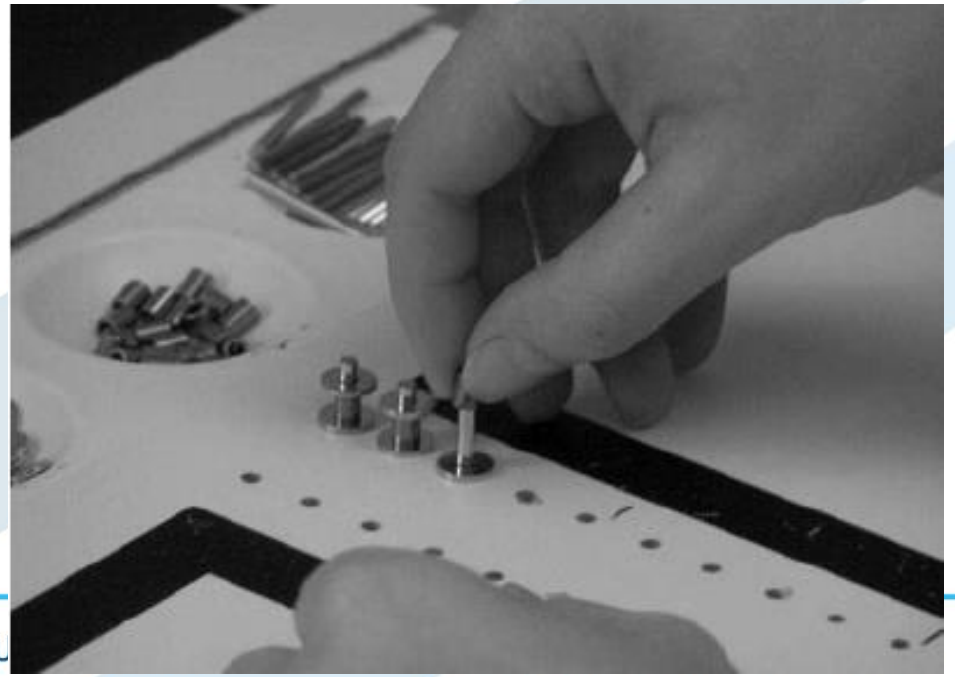
Age (Years)	Males		Females		Age (Years)	Males		Females	
	Mean	*SD*	*Mean*	*SD*		*Mean*	*SD*	*Mean*	*SD*
20–24					50–54				
Right hand	88.2	8.8	88.0	8.3	Right hand	79.0	9.7	77.7	10.7
Left hand	86.4	8.5	83.4	7.9	Left hand	77.0	9.2	74.3	9.9
25–29					55–59				
Right hand	85.0	7.5	86.0	7.4	Right hand	75.2	11.9	74.7	8.9
Left hand	84.1	7.1	80.9	6.4	Left hand	73.8	10.5	73.6	7.8
30–34					60–64				
Right hand	81.9	9.0	85.2	7.4	Right hand	71.3	8.8	76.1	6.9
Left hand	81.3	8.1	80.2	5.6	Left hand	70.5	8.1	73.6	6.4
35–39					65–69				
Right hand	81.9	9.5	84.8	6.1	Right hand	68.4	7.1	72.0	6.2
Left hand	79.8	9.7	83.5	6.1	Left hand	67.4	7.8	71.3	7.7
40–44					70–74				
Right hand	83.0	8.1	81.1	8.2	Right hand	66.3	9.2	68.6	7.0
Left hand	80.0	8.8	79.7	8.8	Left hand	64.3	9.8	68.3	7.0
45–49					75+				
Right hand	76.9	9.2	82.1	7.5	Right hand	63.0	7.1	65.0	7.1
Left hand	75.8	7.8	78.3	7.6	Left hand	61.3	8.4	63.6	7.4

- **Purdue Pegboard Test**

The Purdue Pegboard Test of finger dexterity assesses picking up, manipulating, and placing little pegs into holes with speed and accuracy. It tests finger or fine motor dexterity.

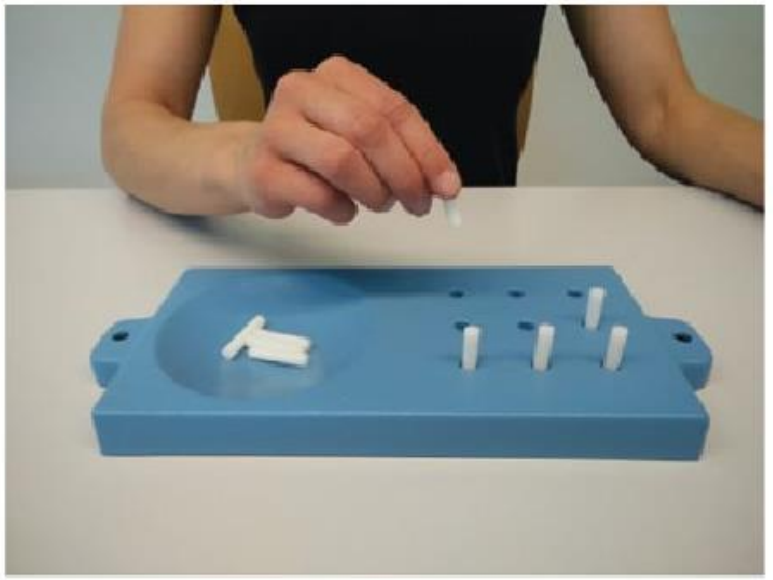
It has a wooden board with two rows of tiny holes plus reservoirs for holding pins, collars, and washers. The four subtests are performed with the subject seated. To begin, there is a brief practice. The subtests for preferred, nonpreferred, and both hands require the patient to place the pins in the holes as quickly as possible, with the score being the number of pins placed in 30 seconds.

- The subtests for preferred, nonpreferred, and both hands require the patient to place the pins in the holes as quickly as possible, with the score being the number of pins placed in 30 seconds. The subtest for assembly requires the patient to insert a pin and then put a washer, collar, and another washer on the pin, with the score being the number of pieces assembled in 1 minute. The Purdue Pegboard Test manual provides normative data using percentile tables for adults and different categories of jobs and for children 5–15 years of age by age and sex.



- **Nine-Hole Peg Test**

The Nine-Hole Peg Test measures finger dexterity among patients of all ages. Test administration is brief, involving the time it takes to place nine pegs (7 mm diameter, 32 mm length) in holes in a 5-inch square board and then remove them.



- Scoring:

- The number of seconds it takes for the patient to complete the test.
- Alternative scoring - the number of pegs placed in 50 or 100 seconds can be recorded. In this case, results are expressed as the number of pegs placed per second.

- **TEMPA**
- TEMPA is an acronym from the French for Upper Extremity Performance Test for the Elderly. It consists of nine tasks, five bilateral and four unilateral, reflecting daily activity. Each task is measured by the three sub scores of speed, functional rating, and task analysis.
- The nine tasks are 1.to pick up and move a jar, 2. open a jar and take a spoonful of coffee, 3. pour water from a pitcher into a glass, 4. unlock a lock, 5. take the top off a pillbox, 6. write on an envelope and affix a postage stamp, 7. put a scarf around one's neck, 8. shuffle and deal cards, use coins, and 9. pick up and move small objects.

- The test takes about 15–20 minutes for an unimpaired elderly subject and about 30–40 minutes for an impaired elderly subject. Advantages of the TEMPA are clinical use, especially with hand patients older than 60 years of age.

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Thank you