

## The Accordionist's Hand

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Medical School: Anatomy - Architecture Physiology - Function Pathology - Diseases, Disorders Diagnosis - What is Wrong Therapeutics – Treatment

Anatomical Terms: Finger Names and Numbers - Thumb, Index, Middle or Long, Ring, and Little Fingers versus Digits Second longest finger? ANATOMIC VARIATION  
Proximal (close), Distal (far), Flexion (forward), Extension (backward)  
ABduction (separation), ADduction (closing)

Bones - Radius & Ulna – forearm bones Carpal Bones (8) – wrist bones  
Metacarpals (5) – hand bones Phalanges (14) - finger bones

Joints - Wrist (radial carpal) Joint, Carpometacarpal Joints (CMC), Metacarpophalangeal Joints (MP), Proximal Interphalangeal Joints (PIP), Distal Interphalangeal Joints (DIP)

Hinge Joints – interphalangeal, thumb metacarpophalangeal  
Multiaxial (universal) Joints – wrist, index through little metacarpophalangeal joints (not thumb MP), thumb carpometacarpal joint

Second and third metacarpals and carpal bones act as single unit.  
A joint does not imply useful movement . There may be none.  
Passive joint motion may not match possible active motion.

Connective Tissue (gristle)

Ligaments (hinges) – attach bone to bone at a joint

Ligamentous Laxity – thumb to forearm test

Tendons (lines or leaders) – attach muscles to bones

Finger abduction (separating or spreading) and adduction (closing) are limited by tight hinge ligaments when MP joints are in flexion. MP hinge ligaments are looser in extension.

Therefore, greater finger spread when MP's are extended.

Muscles (~34)

Extrinsic (within the forearm) – Strength

Intrinsic (within the hand) – Dexterity, Fine Motion

Construction Crane Principle – Motor at distance from point of action

– Strongest finger muscles are in proximal forearm

Physiology

Muscles can only pull, they cannot push. Therefore, every muscle has an antagonistic (opposite) muscle. Any motion is the result of several muscles acting in concert, and often in a partially antagonistic manner.

FDP – One muscle – Four tendons and EDC – One muscle – Four tendons

Do not permit finger independence

Quadriga = four horse chariot = "four-in-hand" reins

Finger Independence

Independent finger flexors – Flexor Digitorum Superficialis - Index, middle, ring, little

Independent finger extensors – Extensor Indicis Proprius (Index), Extensor Digiti Quinti (Little Finger) Intertendinous bands or Juntura – Can Palpate

Cannot fully flex any finger without some flexion of adjacent finger(s)  
Cannot independently extend middle and ring fingers  
Finger DIP and PIP flexion not isolated  
Index DIP flexion with thumb IP flexion

#### Antagonistic Muscles

Increased lift of middle and ring fingers off keyboard with flexor antagonism from firmly planted index and middle fingers – Finger to finger or against hard surface

#### Proprioception

Fingers meet palm simultaneously  
Fingertips fall in SAME PLANE when fingers held in any relaxed semiflexed position  
Plane unaffected by wrist position  
Allows fingers to all be at same distance from keys and buttons.

#### Functional Alignment

Accordionists play with hands in neutral rotation.  
Pianists play with both hands in maximum pronation.  
Violinists play with one hand in supination and other in pronation.

#### Position of Comfort

At rest - Semi flexed fingers, mild wrist extension, elbow semiflexed  
Maintain or return to this position.  
Limit time in positions of discomfort.  
Acute wrist flexion limits finger flexion and strength  
Extreme ulnar wrist deviation makes finger motion uncomfortable.

Thumb - most independent digit - motion has minimal effect on other digits

FDP to Index slightly effected

Thumb is most mobile digit. Thumb abduction accounts for ½ thumb to little finger span. Can oppose (touch) every other finger

Opposition (rotation), a peculiarly human trait felt to explain dexterity, is not required to play accordion.

The thumb is only finger that can completely cross under any other finger

- Indispensable when playing a keyboard
- Some can partially cross index or little fingers.

Playing the Accordion; Thumb crosses under other fingers, with reflex wrist extension, and 4th and 5th metacarpal flexion. Opposition (rotation) is about 90 degrees. Full terminal opposition is not used. Thumb can even cross OVER the index finger to play black note.

What is the Most Common Hand Pathology ? Injury, Arthritis, Tendonitis, Trigger Finger, Carpal Tunnel Syndrome, Dupuytren's Contracture, Ganglion Cyst, Musician's Dystonia

Hand injuries common from Lawn Mowers. Power Saws. Snow Blowers, Paint, Grease, and Nail Guns, Kitchen Knives, Garage Doors, Folding Tables. Hammers. Broken glass or pottery. Hand injuries from environmental exposure - wear work and thermal gloves Avoid heavy manual jobs, Politician's handshake. Protect hands lifting accordions and other heavy weights - Dollies, Wheeled Cases, Multiple Cases, Padded Handles, Lifting Hooks and Straps. Hand injuries are not likely from playing accordion.

Playing an accordion is not dangerous to hands.

Playing an accordion is excellent hand therapy after injury or surgery !