Anatomical terms of motion

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 (Redirected from Adduction)

Braus 1921 290.png

This article is part of a series on

Anatomical terminology

Motion

Location

Muscle

Bone

Neuroanatomy

v t e

Motion, the process of movement, is described using specific anatomical terms. Motion includes movement of organs, joints, limbs, and specific sections of the body. The terminology used describes this motion according to its direction relative to the anatomical position of the joints. Anatomists use a unified set of terms to describe most of the movements, although other, more specialized terms are necessary for describing the uniqueness of the movements such as those of the hands, feet, and eyes.

In general, motion is classified according to the anatomical plane it occurs in. Flexion and extension are examples of angular motions, in which two axes of a joint are brought closer together or moved further apart. Rotational motion may occur at other joints, for example the shoulder, and are described as internal or external. Other terms, such as elevation and depression, refer to movement above or below the horizontal plane. Many anatomical terms derive from Latin terms with the same meaning.

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Classification

Motions are classified after the anatomical planes they occur in, although movement is more often than not a combination of different motions occurring simultaneously in several planes. Motions can be split into categories relating to the nature of the joints involved:

Gliding motions occur between flat surfaces, such as in the intervertebral discs or between the carpal and metacarpal bones of the hand.

Angular motions occur over synovial joints and causes them to either increase or decrease angles between bones.

Rotational motions move a structure in a rotational motion along a longitudinal axis, such as turning the head to look to either side.

Apart from this motions can also be divided into:

Linear motions (or translatory motions), which move in a line between two points. A rectilinear motion refers to a motion in a straight line between two points, whereas a curvilinear motion refers to a motion following a curved path.

Angular motions (or rotary motions) occur when an object is around another object increasing or decreasing the angle. The different parts of the object do not move the same distance. Examples include a movement of the knee, where the lower leg changes angle compared to the femur, or movements of the ankle.

The study of movement is known as kinesiology. A categoric list of movements of the human body and the muscles involved can be found at list of movements of the human body.

Abnormal motion

The prefix hyper- is sometimes added to describe movement beyond the normal limits, such as in hypermobility, hyperflexion or hyperextension. The range of motion describes the total range of motion that a joint is able to do. [5] For example, if a part of the body such as a joint is overstretched or "bent backwards" because of exaggerated extension motion, then it can be described as hyperextended. Hyperextension increases the stress on the ligaments of a joint, and is not always because of a voluntary movement. It may be a result of accidents, falls, or other causes of trauma. It may also be used in surgery, such as in temporarily dislocating joints for surgical procedures. [6]

General motion

Body Movements I.jpg

These are general terms that can be used to describe most movements the body makes. Most terms have a clear opposite, and so are treated in pairs.

Flexion and extension

See also: List of flexors of the human body and List of extensors of the human body

Flexion and extension describe movements that affect the angle between two parts of the body. These terms come from the Latin words with the same meaning.

Flexion describes a bending movement that decreases the angle between a segment and its proximal segment. For example, bending the elbow, or clenching a hand into a fist, are examples of flexion. When sitting down, the knees are flexed. When a joint can move forward and backward, such as the neck and trunk, flexion refers to movement in the anterior direction. Flexion of the shoulder or hip refers to movement of the arm or leg forward.

Extension is the opposite of flexion, describing a straightening movement that increases the angle between body parts. When a joint can move forward and backward, such as the neck and trunk, extension refers to movement in the posterior direction. For example, when standing up, the knees are extended. Extension of the hip or shoulder moves the arm or leg backward. When the chin is against the chest, the head is flexed, and the trunk is flexed when a person leans forward.

Abduction and adduction

See also: List of abductors of the human body and List of adductors of the human body

Abduction and adduction refer to motions that move a structure away from or towards the centre of the body. The centre of the body is defined as the midsagittal plane. These terms come from the Latin words with the same meaning.

Abduction refers to a motion that pulls a structure or part away from the midline of the body. In the case of fingers and toes, it refers to spreading the digits apart, away from the centerline of the hand or foot. Abduction of the wrist is also called radial deviation. For example, raising the arms up, such as when tightrope-walking, is an example of abduction at the shoulder. When the legs are splayed at the hip, such as when doing a star jump or doing a split, the legs are abducted at the hip.

Adduction refers to a motion that pulls a structure or part toward the midline of the body, or towards the midline of a limb. In the case of fingers and toes, it refers to bringing the digits together, towards the centerline of the hand or foot. Adduction of the wrist is also called ulnar deviation. Dropping the arms to the sides, or bringing the knees together, are examples of adduction.

Ulnar deviation is the hand moving towards the ulnar styloid (or, towards the pinky/fifth digit). Radial deviation is the hand moving towards the radial styloid (or, towards the thumb/first digit). (See: https://o.quizlet.com/uDf07L6r7LRa.H4VxXXziQ\_m.jpg for appropriate image)

Elevation and depression

See also: List of elevators of the human body and List of depressors of the human body

The terms elevation and depression refer to movement above and below the horizontal. They derive from the Latin terms with the same meaning

Elevation refers to movement in a superior direction. For example, shrugging is an example of elevation of the scapula.

Depression refers to movement in an inferior direction, the opposite of elevation.

Rotation

See also: List of internal rotators of the human body and List of external rotators of the human body

Rotation of body parts is referred to as internal or external, referring to rotation towards or away from the center of the body.

Internal rotation (or medial rotation) refers to rotation towards the axis of the body.

External rotation (or lateral rotation) refers to rotation away from the center of the body.

The lotus posture of yoga, demonstrating external rotation of the leg at the hip.

Rotating the arm away from the body is external rotation.

Rotating the arm closer to the body is internal rotation.

Other

Anterograde and Retrograde flow, refers to movement of blood or other fluids in a normal (anterograde) or abnormal (retrograde) direction.

Circumduction refers to a conical movement of a body part, such as a ball-and-socket joint or the eye. Circumduction is a combination of flexion, extension, adduction and abduction. Circumduction can be best performed at ball and socket joints, such as the hip and shoulder, but may also be performed by other parts of the body such as fingers, hands, feet, and head. For example, circumduction occurs when spinning the arm when performing a serve in tennis or bowling a cricket ball.

Reduction refers to a motion returning a bone to its original state, such as a shoulder reduction following shoulder dislocation, or reduction of a hernia.

The swinging action made during a tennis serve is an example of circumduction

Special motion

Special motions of the hands and feet

Flexion and extension of the foot

Dorsiflexion and plantar flexion refers to extension or flexion of the foot at the ankle. These terms refer to flexion between the foot and the body's dorsal surface, considered the front of the leg, and flexion between the foot and the body's plantar surface, considered the back of the leg. These terms are used to resolve confusion, as technically extension of the joint refers to dorsiflexion, which could be considered counter-intuitive as the motion reduces the angle between the foot and the leg.

Dorsiflexion where the toes are brought closer to the shin. This decreases the angle between the dorsum of the foot and the leg. For example, when walking on the heels the ankle is described as dorsiflexion.

Plantar flexion is the movement which decreases the angle between the sole of the foot and the back of the leg. For example, the movement when depressing a car pedal or standing on the tiptoes can be described as plantar flexion.

A ballerina, demonstrating plantar flexion of the feet.

Dorsi and plantar flexion of the foot.

Flexion and extension of the hand

Palmarflexion and dorsiflexion refer to movement of the flexion (palmarflexion) or extension (dorsiflexion) of the hand at the wrist. These terms refer to flexion between the hand and the body's dorsal surface, which is the back of the arm, and flexion between the hand and the body's plantar surface, which in anatomical position is considered the anterior side of the arm. The direction of terms are opposite to those in the foot because of embryological rotation of the limbs in opposite directions.

Palmarflexion refers to decreasing the angle between the palm and the anterior forearm.

Dorsiflexion refers to extension at the wrist joint. This brings the hand closer to the dorsum of the body.

Praying Hands by Albrecht Dürer, demonstrating dorsiflexion of the hands.

Pronation and supination

See also: Pronation of the foot

Pronation and supination refer to rotation of the forearm or foot so that in the anatomical position the palm or sole is facing anteriorly (supination) or posteriorly (pronation).

Pronation at the forearm is a rotational movement where the hand and upper arm are turned inwards. Pronation of the foot refers to turning of the foot outwards, so that weight is borne on the medial part of the foot.

Supination of the forearm occurs when the forearm or palm are rotated outwards. Supination of the foot refers to turning of the sole of the foot inwards.

Supination and pronation of the foot

Supination and pronation of the arm

Inversion and eversion

Inversion and eversion refer to movements that tilt the sole of the foot away from (eversion) or towards (inversion) the midline of the body.

Eversion is the movement of the sole of the foot away from the median plane. Inversion is the movement of the sole towards the median plane. For example, inversion describes the motion when an ankle is twisted.

Example showing inversion and eversion of the foot

Eversion of the right foot

Inversion of the right foot

Special motions of the eyes

Main article: Eye movement § Terminology

Unique terminology is also used to describe the eye. For example:

A version is an eye movement involving both eyes moving synchronously and symmetrically in the same direction.

Torsion refers to eye movement that affects the vertical axis of the eye, such as the movement made when looking in to the nose.

Special motions of the jaw and teeth

Occlusion refers to motion of the mandibula towards the maxilla making contact between the teeth.[36]

Protrusion and Retrusion are sometimes used to describe the anterior (protrusion) and posterior (retrusion) movement of the jaw.

Examples showing protrusion and retrusion.

Elevation and depression of the jaw.

Other

Other terms include:

Nutation and counternutation refer to movement of the sacrum defined by the rotation of the promontory downwards and anteriorly, as with lumbar extension (nutation); or upwards and posteriorly, as with lumbar flexion (counternutation).

Opposition refers to the movement that involves grasping of the thumb and fingers.

Protraction and Retraction refer to an anterior (protraction) or posterior (retraction) movement, such as of the arm at the shoulders, although these terms have been criticised as non-specific.

Reciprocal motion refers to alternating motions in opposing directions.

Reposition refers to restoring an object to its natural condition.

Nutation at left, counternutation at right

An example of opposition

Example of opposition of the thumb and index finger