

POSTURE MATTERS

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Newsletter May 2010

The Feldenkrais Method: Better Body - Better Mind - Better You

Human Posture

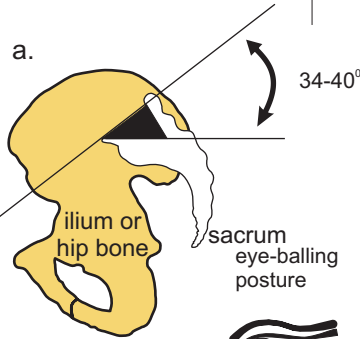
Humans stand with a unique shape to the vertebral column. Many animals can stand upright but only humans stand so vertically as a primary posture.

The Pelvis

The base of spinal posture is the pelvis. Two ilia or hip bones straddle the sacrum and coccyx or tail bone (figure a). The sacrum being five fused vertebrae makes the largest and lowest vertebrae and is the true base of the spine. The sacrum, as well, as part of the spine, it also is part of the pelvic function of transferring the weight of the body to the legs (Peleg et al 2007).

Postural Parameters: Sacral Slope (SS)

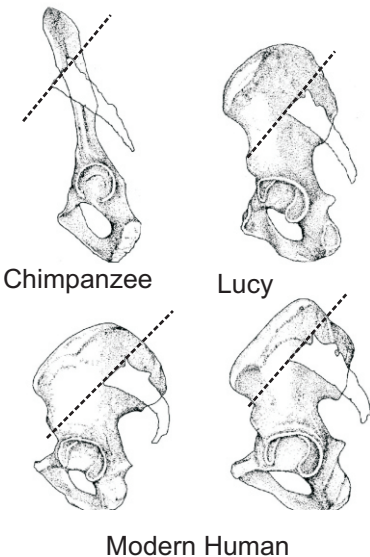
The upper surface of the sacrum aligns at 40 degrees to the horizontal (Kuntz et al 2007 review)(Figure a). SS is a radiologically determined postural parameter but can be eye-balled by observing the vertical alignment of the posterior surface of the sacrum-normal having some forward tilt (Figure b) and abnormal being more vertical (Figure c).



b. normal sacral alignment

c. more vertical sacrum

d.

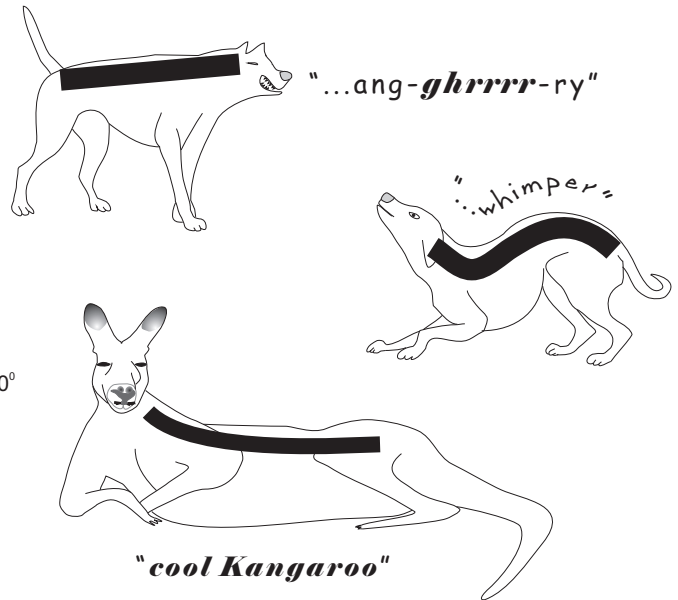


SS & the Chimp

A 40 degree alignment for SS is true for the Chimpanzee, Lucy (Australopithecus afarensis- the human hominoid precursor living 3.2 million years ago) as well as modern humans (male & female figure d). This constant sacral orientation contributed to the development of a lumbar lordosis for erect standing (Peleg et al 2007).

From Lovejoy 2005

Darwin's Dogs: Posturing & Posture



The Expression of Emotion

Charles Darwin wrote four books, one of which was titled "On the Expression of Emotion in Man and Animals" (1872). In this book the two dogs illustrated above in a modified line drawing appears to demonstrate two different attitudes for the dogs. One dog (left) is clearly angry and the other obviously submissive to its master (right). I have added a definitely "cool" Kangaroo- lazing, relaxed, no great axe to grind.

The word **Posture** is a noun referring to a static shape whilst **Posturing** can be a verb describing an action or readiness for action and an attitude in action. Dr. Feldenkrais coined the term "**Acture**" to describe posture in action (Feldenkrais 1972). I like **Posturing** because in our society it clearly invokes an image of an emotional or behavioral attitude and a physical expression of that attitude/behaviour.

Posture, as a static shape, is the result over time of **Posturing** in that shape. If performed persistently, angry posturing leads to an angry postural shape and similarly for submissive posturing.

Any persistent habit emotional/attitudinal or physical posture will lead to postural affects.

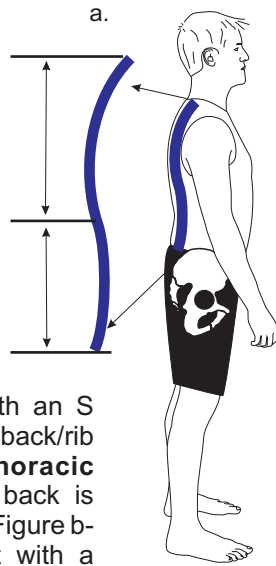
Bottom line: Posture is something we do and create; it is not a necessary fact of life or aging. Mostly, **Posture is the result of Habit.**

How do you present to the world? Angry, submissive or cool or....

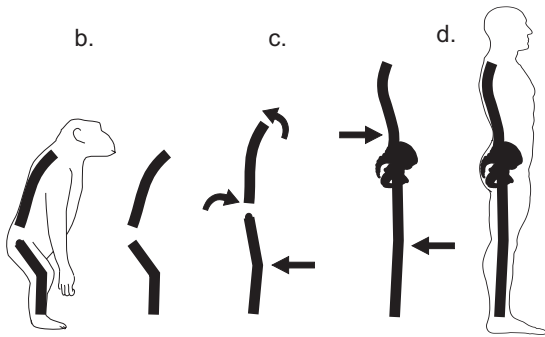
Spinal Curves

thoracic kyphosis (TK) →

lumbar lordosis (LL) →



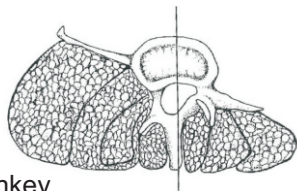
The natural human stance occurs with an S shaped spine. The middle and upper back/rib cage is somewhat rounded = **thoracic kyphosis** and the lumbar spine/low back is somewhat arched = **lumbar lordosis** (Figure b-d). Apes can stand on two legs but with a



Early human ancestors like *Ardipithecus ramidus* (4.4mya) and *Australopithecus afarensis* (3.2mya) were already upright and bipedal (White et al 2009). More permanent uprightness, straight legs and an arched back allow for more energy efficient standing and locomotion.

A straighter spine also requires less effort to stand up because of the vertical alignment of the thorax over the pelvis (eg Figure b versus figure d), hence we have smaller erector spinae or back muscles compared to the Old World Monkey or the Baboon (Figure e below, from Lovejoy 2005). Added bonus: smaller muscles allows greater flexibility. Hence also we make the smaller T-bone steak!

e.



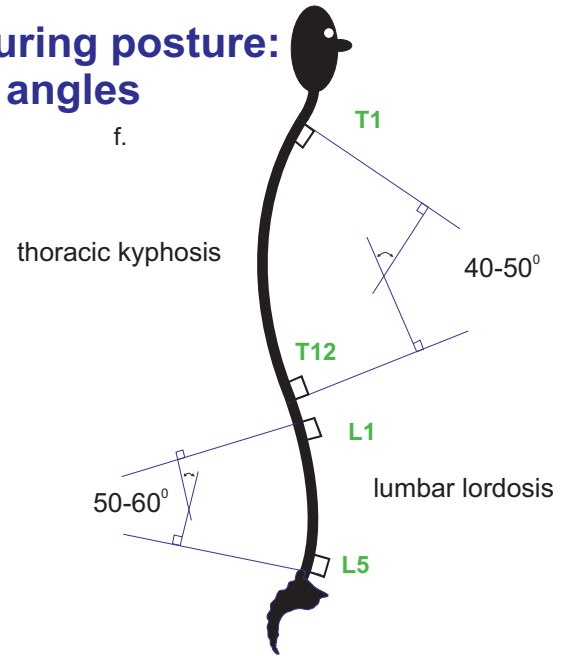
Old World Monkey & the Baboon

Modern Man

From Lovejoy 2005

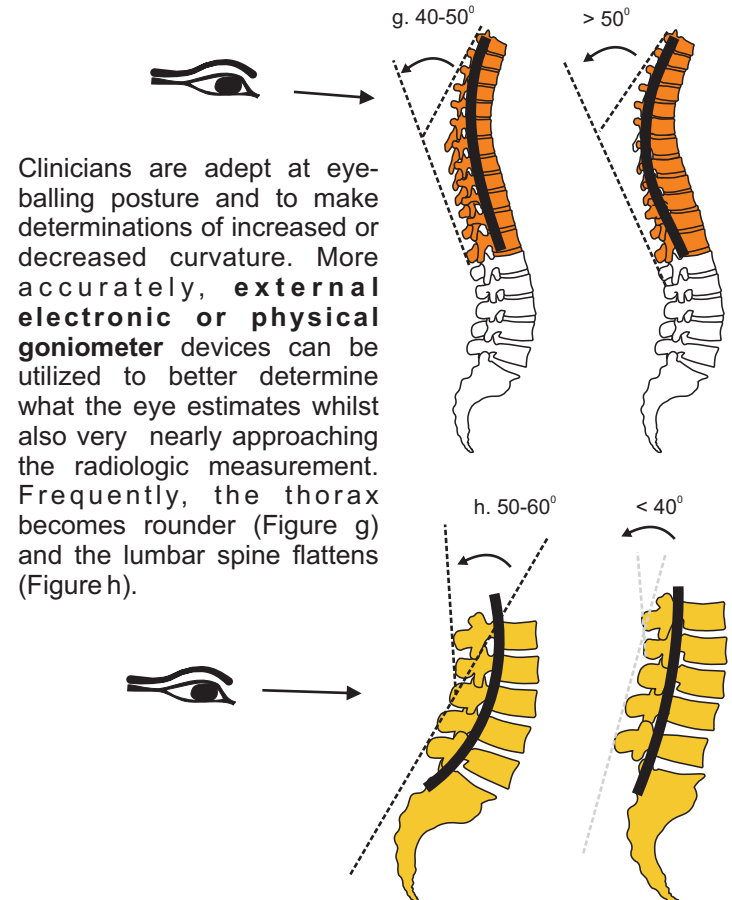
Whilst 3-5 millions of years of evolution has brought Man to an upright stance from a quadrupedal one, it is vulnerable to "imperfections, mis-adaptations and regression" (Abitbol 1997). Hence Humans are meant to stand upright on 2 legs but this remains shaky and susceptible.

Measuring posture: Cobb angles



Cobb angles, determined from Xrays, are the most common way to measure spinal posture and give the most accurate record of spinal shape (Figure f). Thoracic kyphosis measures 40 to 50 degrees whilst mean lumbar lordosis is 50 to 60 degrees (Lord et al 1997, Kuntz et al 2007). Radiologic imaging (Xrays) is most accurate but involves exposure to radiation.

Eye-balling posture

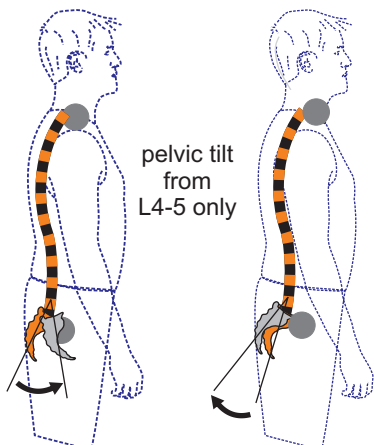
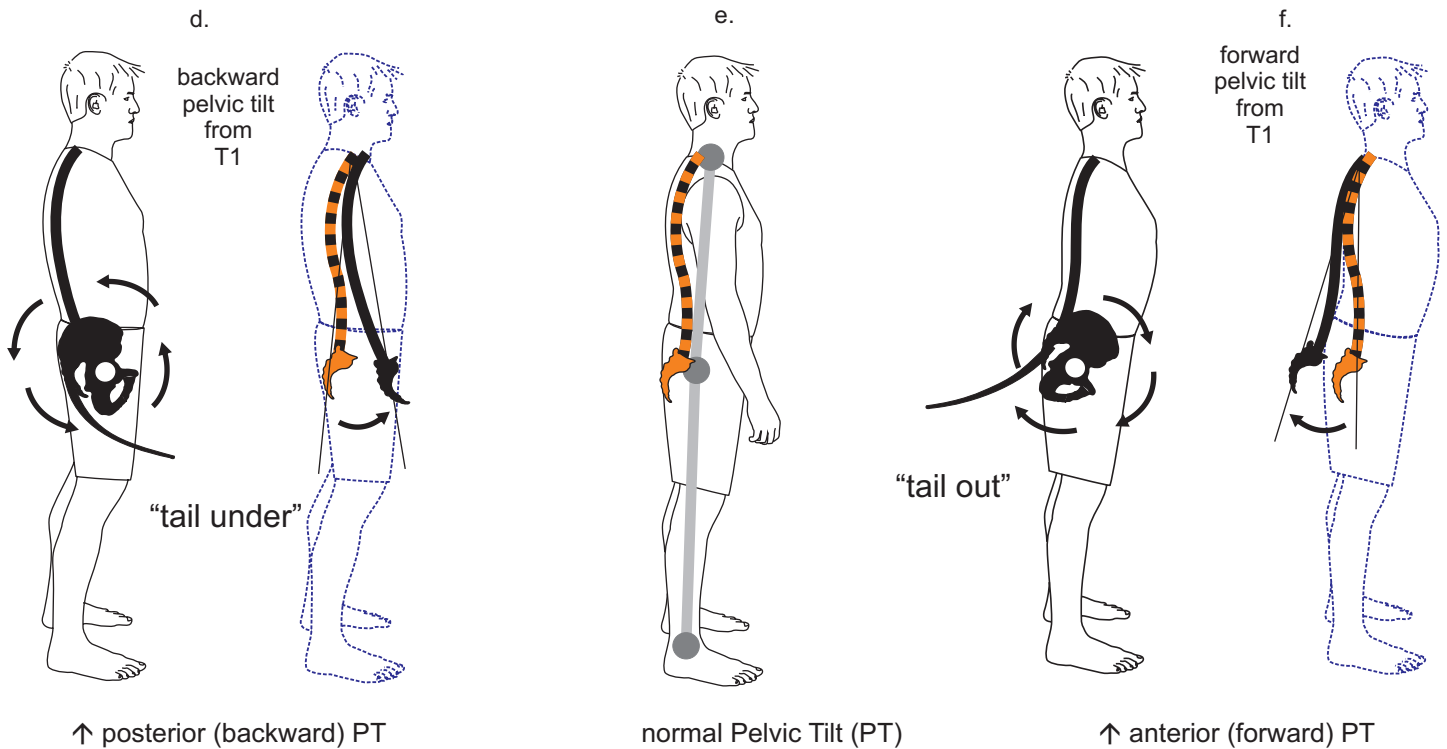
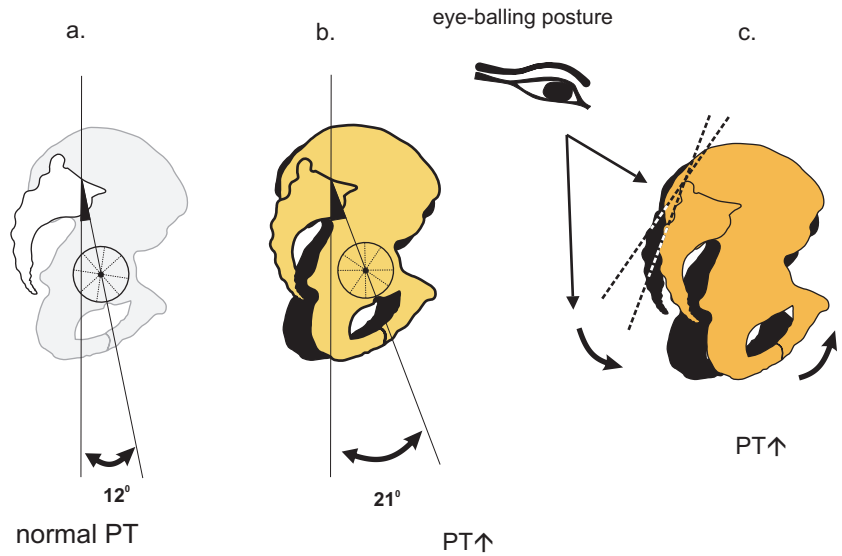


Clinicians are adept at eye-balling posture and to make determinations of increased or decreased curvature. More accurately, **external electronic or physical goniometer** devices can be utilized to better determine what the eye estimates whilst also very nearly approaching the radiologic measurement. Frequently, the thorax becomes rounder (Figure g) and the lumbar spine flattens (Figure h).

Pelvic Tilt (PT)

Pelvic tilt refers to the angle of rotation of the pelvis around the hip joints relative to a vertical line through the sacral plate- average = 12 degrees (Figure a). A backward tilt of the pelvis (tail under- see imaginary tail in Figure d,f) is increased posterior/backward PT or increased PT (20 degrees) (Figure b,c & f), while forward rotation of the top of the pelvis (tail out) is increased anterior/forward PT (Figure d)

As with SS, PT can be eye balled and assessed as either increased or decreased for a postural stance. In standing, an increased posterior or backward pelvic is achieved by tucking your tail under and between your legs (Figure d). Similarly, an anterior pelvic tilt can be increased by sticking the tail out (Figure f).



Posture and Movement

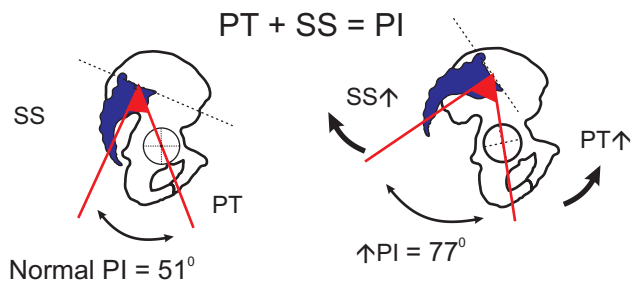
Notably, pelvic tilt is a rotation of the pelvis around the hips with an amount of the spine contributing. In the figures above (Figure d & f), pelvic tilt is achieved using the entire length of the spine from the level of the shoulders (T1) to the lumbo-sacral junction. This is good movement. However, many people only use a small number of the vertebrae to contribute to this motion-say at L4-5 only (Figure g). Typically, the levels involved in this limited action are also the ones that become painful. This is one cause of Low Back Pain (See subsequent newsletter).

Posture is not static. Posture reflects how we move. Poor movement and poor posturing is accompanied by increased strain in the vertebral system.

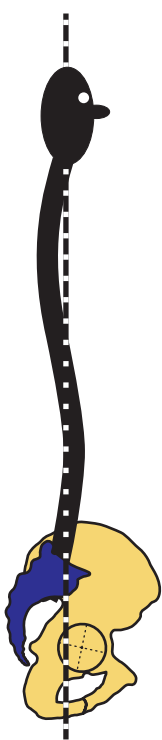
Pelvic Incidence (PI)

Normally, we think of the pelvis as one solid object with only minimal motion at the sacro-iliac joints (SIJ). However, under 20 years of age there can be an abnormal amount of motion between hip bones and sacrum such that they move apart creating a large open 'pelvic incidence' (Figure a). **PI is defined as the angle between the line perpendicular to the sacral plate midpoint and the line from this point through the center of the hip joints. PI is in fact the algebraic sum of sacral slope (SS) and pelvic tilt (PT)**(Figure a) (Legaye et al 1998). PI measures a mean 51 degrees with a range from 33 to 77° (Boulay et al 2006). In normal spines, lumbar lordosis, pelvic tilt, sacral slope and pelvic incidence are all highly correlated (Boulay et al 2006). PI is a significant parameter in spondylolythosis (see subsequent newsletters).

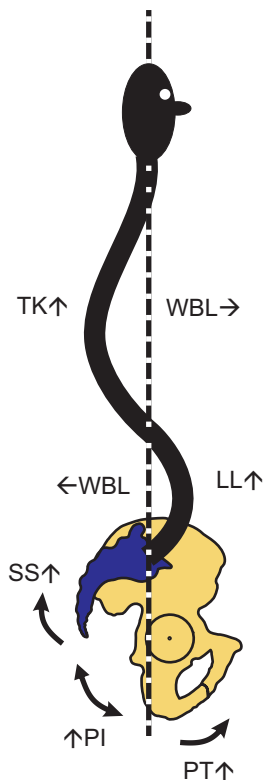
a. pelvic incidence PI



b. "Good"



c. "Not Good"



d. "Not Good"



Pelvic & Spinal Parameters Team Up

Pelvic and spinal parameters occur in relation to each other and do not exist as isolated separate postural components. No one parameter exists without the simultaneous occurrence or creation of another. Increased lumbar lordosis is accompanied by and possibly determined by an increase in thorax kyphosis (Tuzun et al 1999). And, "A large pelvic incidence indicates a steep sacral slope and large sagittal curves" (Legaye et al 1998) (Figure c-d).

Optimal Sagittal Spinal Balance

When a person stands with a normal alignment of the pelvis and spine, the spinal muscles are silent, however when this alignment is disturbed the muscles contract (Legaye et al 1998). Silent lumbar and abdominal muscles during normal stance reduces nervous system demand and lowers compression on lumbar joints. A more active muscular effort due to altered postural alignment, requires greater nervous system activity and increases lumbar loads. Equally perhaps, greater nervous system activity creates excessive muscular tensions distorting posture. Increased thorax kyphosis (Briggs et al 2007) and increased anterior projection of the thorax (Harrison et al 2005) produce greater stresses on the lumbar spine.

Increased PI predicts increased lumbar lordosis (LL) and thoracic kyphosis (TK)(Legaye & Duval-Beaupere 2007)(Figure c-d). The line of weight bearing (WBL = the line of the head over the pelvis, i.e. dotted line in Figures b-d) moves forward in the thoracic spine and backward for the lumbar spine.

However, the head remains over the sacrum and hips (Figure c-d).

Posture Matters

Posture is not a static structural fact of life or aging that we have no determination over, rather it is the result of functional dynamic habits continually performed over years. Changing posture is not merely age or aging but aging of habits.

Poor posture is linked to low back pain, shoulder and neck pain, poor respiration, osteoporosis and even mortality (See Newsletter 2 The Thorax for a discussion of the affects of poor thorax mobility and posture of the thorax).

Bottom line: Posture Matters.

Posture (& Posturing) begins when we are young.

Posture mostly originates from Habit, therefore it is reversible.

Attend to your shape and attitude.

References:
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Bottom line
Posture matters.

Next Issue:
Posture & Spinal Disease.

POSTURE MATTERS

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