My Feldenkrais

My Feldenkrais is in physical therapy. My Feldenkrais is treatment. I have been a physical therapist since 1981. I came across the Feldenkrais Method (FM) in 1987 and began a training in 1988. After my first month of training I came back to my practice and told my partners that I was not doing PT anymore but FM instead. I had great partners and plenty of chronic pain patients with whom to experiment. It took 6 weeks before I experienced my first significant "response"- The patient was prone and I was pushing on the heel to affect the lumbar spine when suddenly the spine relaxed and went soft and springy. What was hard and resistant was now responsive. I have been chasing that response ever since. In fact, that relationship of leg to trunk is even more paramount after all these years- how we stand on each leg.

When doing ATM, I became very focused to "**awareness of movement**" as the process and source for **"awareness through movement"**. I found myself going deeper into awareness of movement to greater define and differentiate the skeleton. It is this continued search deeper into differentiation and then integration of the skeleton that has driven the awareness through movement for me.

PhD and all things Science

Delving further and deeper into awareness of movement extended beyond my own body to a PhD in trunk kinematics and a continued hunt through the medical and scientific literature on biomechanics, motor control, comparative vertebrate anatomy, function and evolution and neuroscience of movement and being human. So there has been the experiential learning from hours and hours with patients/students and there has been academic learning from hours and hours at my desk and in the libraries. There are two aspects of the experience and the science to My Feldenkrais that I want to present in this discussion: 1. the kinematic brain- the science of observing another person move, and 2. weight bearing with a trunk and two legs- from the fish to humans and the posture revolution- what you can tell from experience and what you know from science.

the kinematic brain

We have a kinematic brain, like it or not (1,2). The human brain models and interprets the actions of others. When we observe another human in action we create a visual and motor image of that action- we see and we feel the other person. We perform the action ourselves off line, that is, the observation invokes a response in the same brain regions of the observer that are working to produce the action of the observed. The neurons responsible for action observation are called the mirror neurons. Much research has been conducted on mirror neurons and action observation (AO). One very revealing area of AO is in sports. The more skilled you are at an action, the more you can define and interpret the kinematics of that action and the faster and more appropriate your response (2). Briefly from Agliotti and others in 2008, professional basketballers observed video of another professional basketballer throwing hoops (2). Some went IN and some went OUT. The basketballers could predict whether the ball was going IN or not before the ball left the hand of the basketballer in the video. How is this possible? Novice observer predictions were less accurate and the call was made with the ball in the air on the way to the hoop (for more details see 2). The researchers studied the video and found three distinguishing features that differentiated IN versus OUT for the ball. Early in the shot there was greater knee

extension, then greater elbow extension and finally greater little finger flexion for the OUT shot. The basketballers knew intuitively from experience how to pick IN versus OUT, their knowledge was a feeling from experience, without being able to say why, whereas, the science could define the particular kinematics of the differences in action for IN versus OUT. In FM, we are both the basketballer and the researcher (if you want it). Moshe's definition of the human skeleton initially as five body segments is a kinematic definition. Kinematics is the study of solid objects orientation and movement in space without any reference to effort or the forces involved. Kinematics is a stick figure image of movement which can be defined by the five major lines or body segments (trunk, two arms and two legs) and then subdivided all the way down to the little finger etc. In FM, by experience, we get the "feel" of the other person and where to go to influence their movement but not necessarily being able to define what that is or why that matters. This is the art of FM. I like to define and differentiate the actual kinematics and biomechanics of that initial determination, this is the craft. I recall Moshe's statement about applying oneself to a field and the longer and harder you explore the more you come to an intuitive understanding of that field, well, there is a science for that intuitive understanding, it is not mystical. Moshe also talked about the unconscious versus low level consciousness. I like also the notion of non-conscious. The basketballers were unconscious or non-conscious of the why about their determination of IN versus OUT, but, if they paid enough attention to the videos they themselves may eventually be able to determine and verbalize what it is that they know intuitively. This is my quest.

weight bearing-with a trunk and two legs

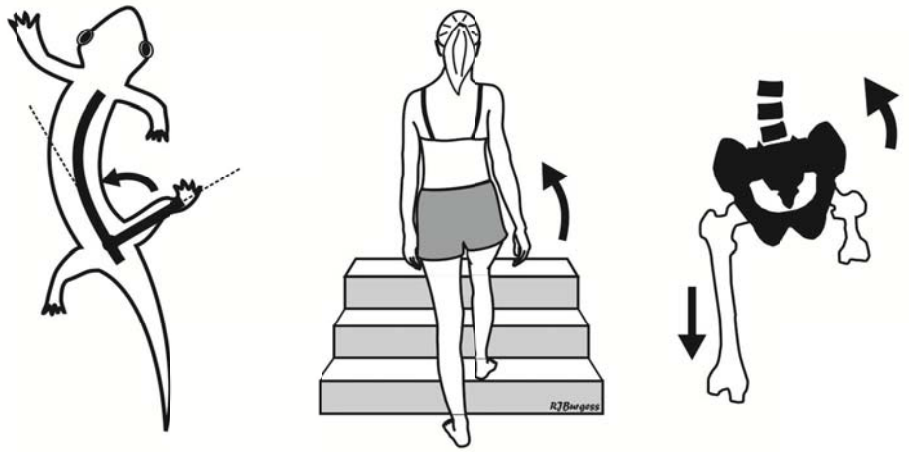
The fish made it onto land. The fins transformed into weight bearing struts. The trunk had limbs. Splayed legs like the alligator became semi vertical then fully vertical on all four limbs and then up onto two legs. This same process actually occurred during the evolution of the reptiles, TRex being the last of the dinosaurs.

A favourite animal story is the tetrapod origins 375 million years ago. The evolutionary missing link of the fish on its path from water only to land only was predicted to be an animal with hind fins for swimming and fore fins for weight bearing. In 2004, after five years of searching in the Canadian arctic where there exists 375 million year old exposed rocks, Shubin and his group discovered Tiktaalik, the famed missing link (3) - the fish that could do pushups! Why a favourite story? Legs came last. The body drives our locomotion and the legs are an extension of this function. I don't see or treat a knee or hip, I see a leg, a structure from toe to hip that operates as a weight bearing strut as an extension of the spine. Legs have only two essential functions, they push against the earth (passively when straight or actively when bent) and they retreat from the earth in preparation for the next step. Leg action can be very passive as illustrated by passive dynamic walkers (see metal legs walk endlessly aided only by gravity (4). Much of motor control is making use of struts, gravity and mechanics minimizing energy usage and muscular control ((5)-an entire pdf book free).

A friend's apartment was on the third floor and she had to descend to the ground floor to let me in. I would follow her up a steep narrow staircase to her apartment. One day I began to notice her pelvis and low spine action for ascending the stairs. I saw a side bending of the pelvis and spine lifting the leg onto the next step and simultaneously driving the opposite leg into the lower step to lift the body upward. In an instant flash I saw a **"Crocodile on the Staircase"**. This is the most powerful action of human stance

and locomotion (Figure 1). It is elusive because in normal walking it is small and almost imperceptible, but on stairs, ladders and the cat walk, it is exaggerated, beautiful and powerful to observe. I am not the first to appreciate that we still have the reptilian in our gait and that we walk with our spine as well as our legs (6).

Figure 1. Crocodile on the Staircase



Leg-Trunk Coordination-
The most powerful human action

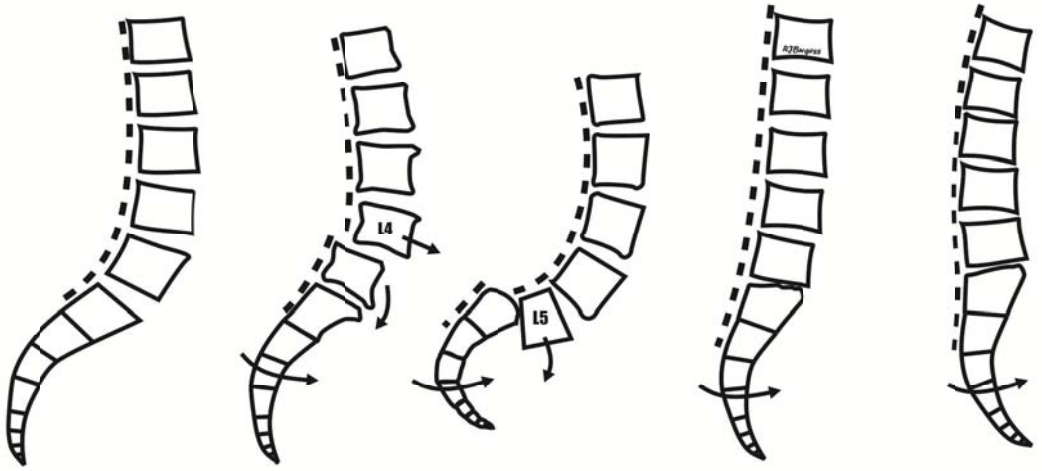
The crocodile image illustrates the main contribution of the pelvis and lumbar spine to human leg action and locomotion. The lengthening of the spine on one side extends the forward swing of the leg and on the weight bearing side it assists and drives the leg into the earth enhancing the power of leg action. Wherever the leg goes, the trunk contributes to the range of leg motion, the power of action and the speed of action. Specifically, the thigh, pelvis and low lumbar spine connection are critical and also unfortunately can be diminished, less effectual. These three linkages control and determine the power and direction of the leg stride. Any minor or major interruption of the synchrony, harmony of this connection will affect the forces in these structures and the legs and contribute to all and any pain syndrome from the spine to the feet.

My first major success with hands on was the leg-trunk relationship then came along the crocodile on the stair case and I have been back and forth between table and the books for years to develop a well-defined understanding of the relationship between the three linkages and beyond. Modelling of the first land vertebrate locomotion is particularly revealing- just two control variables of trunk side bending and alternate leg extension and flexion defines and determines the leg-trunk coordination and the animals locomotion (see the Ijspeert's robotic videos (7)).

The posture revolution

In the world of spinal surgeons there has been a revelation and a revolution in a static snap shot of the sagittal profile of a standing human. This revolution has determined more than a dozen parameters that define the orientation of the pelvis, the shape and tilt of the lumbar and thoracic spines. All major spinal conditions like low back pain, scoliosis, spondylolisthesis, spinal stenosis, disc disease, disc herniation, have a unique spinal shape. Actually, the number most common feature to all spinal conditions is a tail under pelvis and a flat low back. I became fascinated with the spondylolisthesis story, where there is a small fracture of the low back that allows L5 to slide forward from its regular position over S1. L5 actually slides and it rotates into flexion away from its normal extended position (eg Figure 2 L5 slip). But at the same time, the vertebrae above L5 rotate in the opposite direction of L5, they become more extended. So the sagittal profile of people with isthmic spondylolisthesis reveals a large increased arch in the lumbar spine, however simultaneously, the pelvis is rotating in the direction of tucking the tail under and L5 comes along with it. (By the way there are two major forms of spondylolisthesis- the childhood type isthmic spondylolisthesis with a fracture and slip of L5, and the adult degenerative type and no fracture- and a slip of L4. See newsletters and video here (8)). To me this was also a revelation. It explained what I was seeing in the clinic- a flattened very low back and an increased arched upper lumbar spine. L5-S1 is a critical junction in the human spine and internal and external forces can regionalize the lumbar spinal shape, that is the upper lumbar spine can become more arched while the low lumbar spine becomes less arched. I now claim that all low back pain is the same story as this spondylolisthesis story- it is a matter of scale, that is in spondylolisthesis the forces are extreme while for low back pain it is much the same forces just not so extreme. I have developed hands on techniques to target specifically L5S1 that I did not learn in my FM training and eluded me until I began to focus more closely to L5S1 and read the spondylolisthesis story.

Figure 2. Sacral and spinal shape



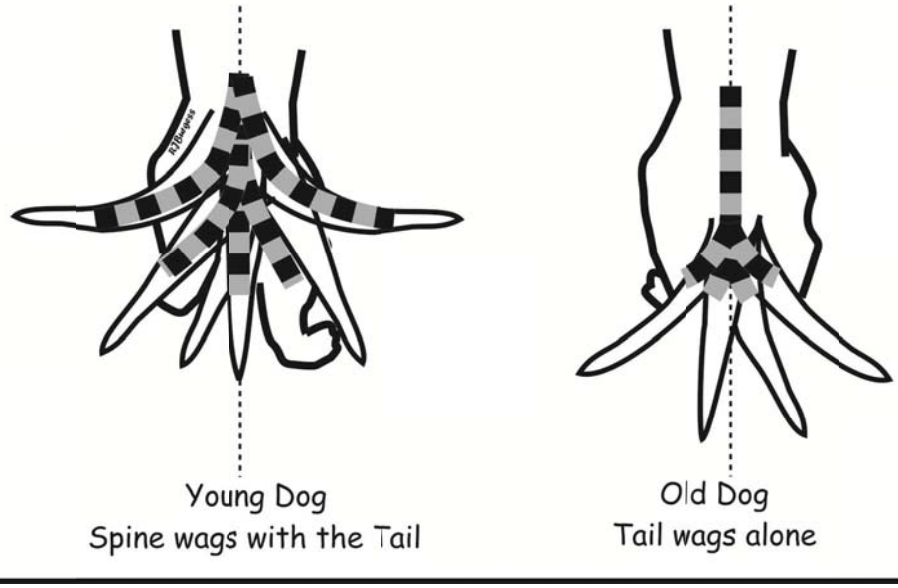
Our kinematic brain can discern very fine distinctions and differentiate what is not differentiating- see below. Standing on two legs is not easy –internal and external forces can deform a normal spine. The

pithy motto from my training regarding pelvic orientation of posterior tilt versus and anterior tilt was: "with a posterior tilt, you are an object and with an anterior tilt you are a subject". The orientation and action of the pelvis is key to the internal forces and resultant spinal shape (Figure 2).

I say: "**Stiffness is Undifferentiated Action"**. Feldenkrais stated that compulsive behavior creates "inner muscular tensions that are expressed in the face, neck, abdomen, fingers and feet" (9). Such tension, especially of the flexors is always matched by an extensor response, a compensation, resulting in an increased co-contraction of muscles and therefore increased compression and resistance to motion in the trunk. Co-contraction of spinal muscles is a major issue for patients with low back pain. And more specifically, it is the L5-S1 that loses range and posture - the human animal tucks its tail under and up, flattening the lower spine and compressing it. We stiffen from the bottom up. This habit I call the **"Old Dog Syndrome"**- when the old dog wags its tail the tail, wags alone and when the young dog wags its tail the entire spine wags with the tail (Figure 3). Excessive co-contraction leads to a stiffening of the lower spine and to undifferentiated action. Differentiation is the key to pain-free and powerful action and this is where awareness of movement becomes the process for change.

The old dog syndrome image defines one effect of abdominal tightening as Moshe stated, and it is very specific to what I observe in any one with low back pain from any diagnosis, be it common low back pain, degeneration, stenosis or spondylolisthesis. The mechanics of the old dog syndrome has been measured form range of motion and spinal shape at one level and all lumbar levels. My search in the literature has again realized and inspired verbalization of what I might be grappling with intuitively- it gives credence to my observation and hypotheses. When I observe someone, I have an image of their movement and what might be done to make standing and moving easier.

Figure 3. The Old Dog Syndrome



The cause of Idiopathic Scoliosis according Dr. Karski from Poland is due to how adolescents stand on their legs (10). He states that they "stand at ease on their right leg" due to hip contracture and

immobility at birth. Dr. Karksi's view is unique, the majority of researchers view scoliosis as a spinal deformity of the spine-this is not the place for a full discussion on scoliosis. Karski's very clinical statement about stance, I feel, has an emotional/psychological interpretation - that perhaps, these adolescents stand differently on each leg and therefore on each side of the body, from foot to head and not just at the hip. It is never just the hip (see a "crocodile on the staircase" above) and this standing at "ease" is perhaps being comfortable with the current state of being and not prepared to push for the next stage of life. Is standing at ease the same as Feldenkrais's stopping oneself? Is it that these kids don't want to be adolescents or adults, they are happy being kids or daddy's little girl? For adolescents with scoliosis, their pelvic and lumbar sagittal shape aligns with their father (11). From the clinic, all adolescents with scoliosis have greatly diminished pelvic motion with trunk bending especially with backward bending which is typically non-existent for the pelvis which is compensated for by excessive lumbar spine extension.

Trade versus craft

I have been asked to write about a trade versus craft. A tradesman has great skills and is taught from well-structured teaching methods whereas a craftsman is more self-taught with a structured curriculum. The Feldenkrais Method is taught in a manner similar to how a child learns to stand and walk- self-taught. The claim is that this process of learning leads to genius, intuition and inventiveness. Perhaps a tradesman might limit himself to just the skills of his trade but I don't see why he also can't become inventive and intuitive in his work in the course of a day. Both Michelangelo and Da Vinci worked for masters before developing their own methods. Sir Isaac Newton famously quoted, "If I have seen further it is by standing on the shoulders of giants". I think anyone can discover their genius, inventiveness and intuition, whatever their training. But, whatever the training, the genius arrives from the self- no matter how great or poor the teacher, the individual finds the way to genius by himself. FM creates a method to assist this process of discovery of the self by the self. It depends what the intention is. If FM is to remain a personal journey, then FM is fine as it is. If FM was to become a profession, it may need some structured academic learning as well as the inherent organic growth. For myself, I have followed my nose for what interests me be it self-taught or structured- same thing. So beyond the self-learning of the self, I am passionate about the entire story of human movement, from our fish beginnings to muscle spindles to mind-body and for how movement can be affected.

Humans evolved from a quadrupedal to a bipedal stance and gait. The demands of being a body on two legs has evolutionary roots, particular functions, like legs as struts, particular connections like leg-trunk coordination and the shape and tensions of the pelvis and spine in stance and action. Delving into the skeletal orientations and actions, that is, awareness of movement, leads to a greater understanding and knowledge of the self in action, awareness through movement. A major focus of My Feldenkrais is with the awareness and biomechanics of movement that drives the awareness through movement.

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