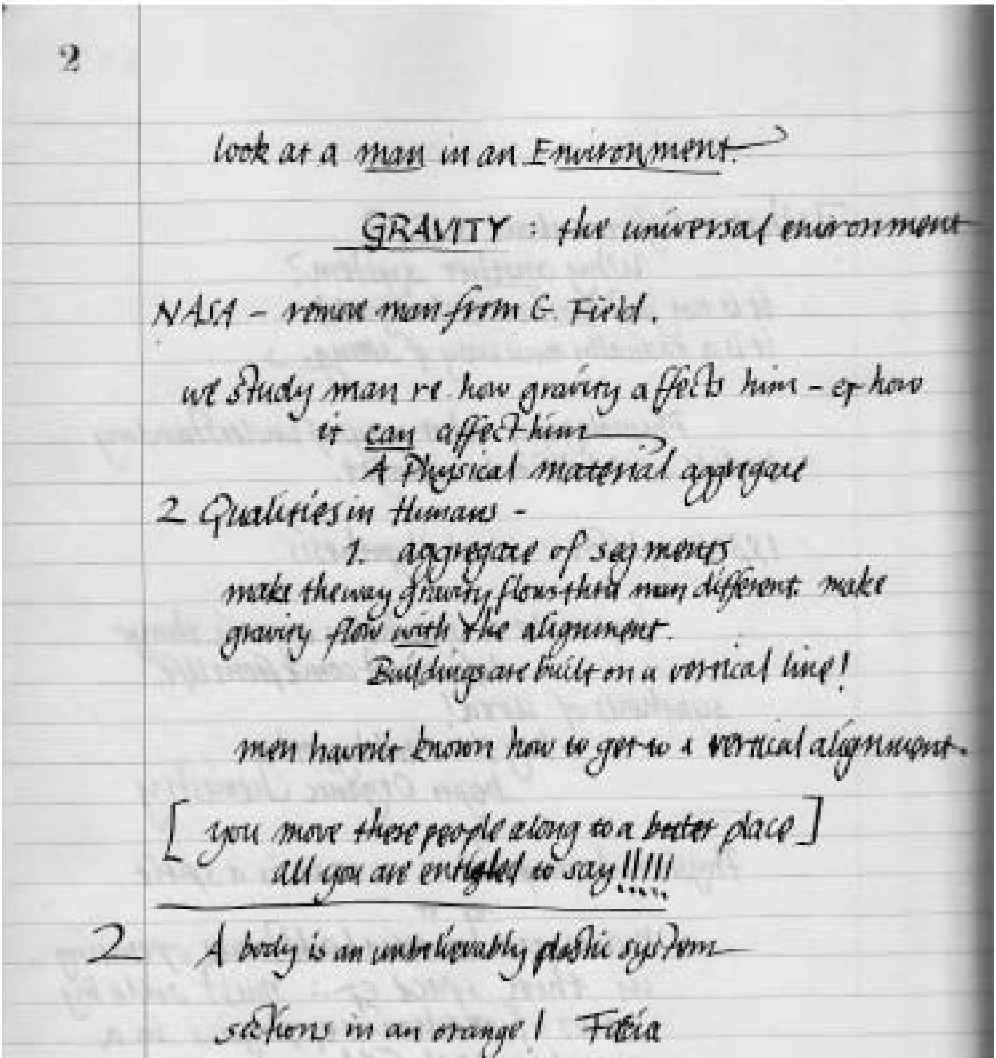
Refining Dr. Rolf's Lateral Line

A Brief Exercise in Theoretical Morphology

By Richard F. Wheeler, Certified Advanced Rolfer™, Rolf Movement® Practitioner

During Dr. Rolf's class in 1972 I took careful notes. Having recently learned calligraphy, I wrote my notes in a freshly minted italic hand (see Figure 1).


2

look at a man in an Environment

GRAVITY : the universal environment

NASA – remove man from G. Field.

we study man re how gravity affects him – or how it can affect him

A Physical material aggregate

2 Qualities in Humans –

1. aggregate of segments

make the way gravity flows thru man different. make gravity flow with the alignment.

Buildings are built on a vertical line!

men haven't known how to get to a vertical alignment.

[you move these people along to a better place]
all you are entitled to say!!!!

2 A body is an unbelievably plastic system

sections in an orange!

Figure 1: Page 2 from my calligraphed 1972 class notebook. Dr. Rolf was introducing her ideas about plasticity, gravity, and alignment.

Rolf's lectures began with a discussion of her hypothesis about plasticity: that the basic material substances that compose most of anatomical structure are collagenous proteins. Observing the physical chemistry of these proteins, Rolf asserted that they could undergo a state change, from hard to soft, when simple pressure was applied to regions of hardened tissues.

Rolf went on to demonstrate how body structure could be changed by direct manipulation. She showed us how to make changes that were dramatic and immediately positive in nature, resulting in measurable improvements to a person's breathing, posture, balance, and general body functioning. As a biochemist, she based her investigations on physical principles of living systems and she argued that, due to the existence of plasticity, it is possible to create higher degrees of order and physiological functioning in the human structural pattern.

Then she proceeded to discuss how gravity, as a very significant force field in our environment, deeply influences human structural balance and movement (see Figures 2 and 3).

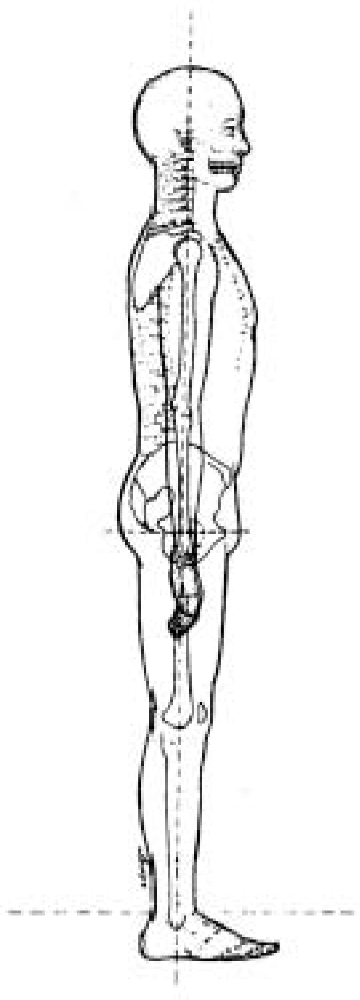


Figure 2: In this view, Rolf's lateral line intersects the tip of the fibula. This alignment places the majority of the body's weight behind the tops of the arches of the feet. (From *Rolfing* by Ida P. Rolf, PhD. Published by Healing Arts Press, a division of Inner Traditions International, 1989. All rights reserved. www.innertraditions.com. Reprinted with permission of publisher.)

Gravity is not the only force in our environment. There are others – including thermal radiation, nutrition, light, sound, and evolution. Rolf did not address these. In this paper I am looking at evolution as a force with strong thermodynamic and biochemical origins that affects our physical structure through the mechanism of inheritance over deep time.

The human form first evolved its amazing complexity in water. Then we took a circuitous evolutionary route through time spent by our primate ancestors in the trees, until we finally adapted to living on land. It was a long and arduous journey, and along the way our ancient ancestors survived all that nature's long-term process of natural selection could throw at them.

From the perspective of deep time, therefore, as structural integration (SI) practitioners, when we touch the human body, we are putting our hands directly on the results of about 4.3 billion years of evolution. In addition to this, we have the far shorter, but still powerful, single lifetime perspective of each person's individual growth, development, and personal history.

The question I am going to explore in this article is, therefore, in the context of both deep time and personal history: what does it mean to say we are going to non-surgically 'improve' a person's form? The idea of modeling or morphing the body towards some improved or more ideal form, state, and function requires having a clear idea of what the end result might look like.

Imagining the ideal morphological change for any given body might look quite different for any given person. Rolf taught her students a 'Recipe' for applying her ideas; however, it was never her idea that the discipline of SI be defined by the application of any specific technique, formula, recipe, or algorithm. There are many different ways of creating changes that enable the body to re-integrate and function differently. What does optimized functional and structural integration look like? Rolf invoked gravity as a framework for evaluating the results of her manipulative strategies, and she was very successful in objectively demonstrating an amazing range of results, both to clients and to her students.

In my SI practice, I use a method for introducing very positive change in form and function that works in an experimental way. Briefly, I deliberately introduce 'disorder' (by pressing on tissue in an area

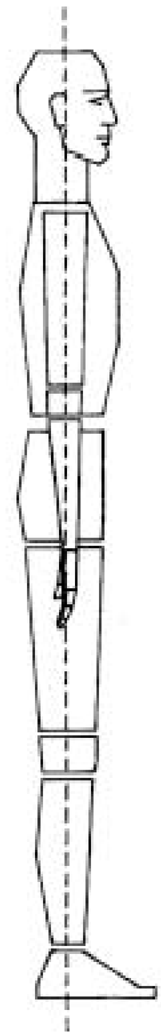


Figure 3: This geometrically more explicit view of Rolf's lateral line again places the majority of body weight behind the tops of the arches in the feet. (From *Rolfing* by Ida P. Rolf, PhD. Published by Healing Arts Press. Reprinted with permission of publisher.)

that is in trouble or disordered) and then watch as a greater level of order emerges naturally in the area I've just worked and, often, right around that area. As I observe what new forms and functions emerge from this intuitive process, I can take things to their next level, and the next, and the next . . . . Order is disorganized chaos, and as chaos resolves – a consequence of putting energy into an open thermodynamic system – higher levels of order appear. I'm trusting the body's 'innate intelligence' to reorganize itself, rather than attempting to impose my idea of what it should look like. I figure I'm not nearly as smart as my client's own body!

La Brea Lessons

After completing my advanced training at the Rolf Institute® in 1980, I knew I was ready for more anatomical study. But where? What did I most want and need to learn that would improve the quality of my work?

I initially thought that I wanted to learn more about human osteology and needed to work with human bones. Then, at a party in Los Angeles, I met an expert in non-human bones, paleontologist Dr. William 'Bill' Akersten, from the Page Museum (aka the 'La Brea' Tar Pits). We had a fascinating conversation at the end of which Bill invited me to come to the museum's lab for a look around.

When I went to the lab for a visit, I discovered that I'd stumbled into a major, world-class fossil repository of more than three million ice-age bones that had been trapped and perfectly preserved in thick and sticky liquid asphalt. The size of this immense collection more than doubled in 2006, with the addition of twenty-three large container-sized boxes of fossils, still embedded in asphalt, extracted from a local construction site that filled an entire square city block near downtown Los Angeles.

The specimens in the Page Museum collection represent a cross-section of southern California's ecosystem during the Pleistocene era (10,000-60,000 years ago) and include extinct big cats, mammoths, horses, wolves, bison, giant sloths, rodents, birds, turtles, and more.

Wow!

Like many boys, I had been deeply into dinosaurs as a kid. I now had an epiphany: I could be greatly enriched by comparing what I knew of humans with other equally successful forms of life. After all, the forms and functions of other vertebrate species are, by definition, equally successful at living in gravity as humans are.

This '*aha*' moment' led to my spending the next eighteen years working part-time at the Page Museum, first as a research volunteer, then as part-time paid staff, where I was encouraged to pursue and publish original research on 1,000+ sabertoothed-cat skulls. (It's astonishing to appreciate the relevance of fondling sabertoothed-cat skulls to practicing Rolfing® SI on clients.) During this time, I also learned classical scientific illustration, was hired as a senior staff excavator, and ran the summer dig at the tar pits for two years. I had a wonderful adventure learning about wildly different non-human anatomy and evolution, all of which has deeply affected my work today as an SI practitioner.

One museum lesson that greatly impressed me came from observing the museum staff's ability to quickly and accurately identify any bone, or almost any bone fragment. The staff had developed and refined this ability while looking at, handling, and working in the three-million-bones collection. It made sense to me that this sort of knowledge and broadened kinesiological expertise would lead to discovering new manipulation options. And sure enough, the lessons did translate. The longer I worked in the museum lab and ossuary, the more my hands were intuitively finding new and interesting solutions to my Rolfing clients' issues.

Unlike SI practitioners, paleontologists work on non-living subjects. This means they must erect a conceptual frame of reference for the particular subject they're studying, including finding the creature's closest living relatives but also giving due consideration to existing research in the fields of functional and theoretical morphology. Recent advances in all of these fields have helped paleontologists and artists understand how to more accurately model the way ancient creatures with different structures stood, balanced, and moved. These advances have helped transform the venerable T-Rex from a tail-dragging giant swamp lizard into a splendid Jurassic Park jeep-chaser.

At the Page Museum I had a lot of questions. What kinds of morphological changes need to happen to transform any given quadruped into a biped? How are we and the quadrupeds alike and how are we dissimilar? What imaginary animal lies 50% of the way between our species' patterns?

Consider what might be learned by putting one's hands on the many vertebrate bones in a museum ossuary. And it's not just that bones speak to us: the staff also had more than a few very interesting and relevant observations. One great example of this is the following story about the Page Museum's director, Dr. George Jefferson, a highly respected paleontologist who later became the first Associate State Archeologist in Southern California's Anza Borrego Desert State Park.

After a few months of working in the museum lab, I showed Rolf's book to Jefferson. He looked at the illustrations and his immediate observation was, "Human bones aren't shaped like that." Startled, I realized that he was absolutely right. Rolf's illustrator, artist and Rolfing practitioner John Lodge, had 'morphed' the images so as to emphasize the linear nature of the vertical lateral line. With her characteristic scientific integrity, Rolf had labeled each of these illustrations a 'schema' (i.e., a schematic), in order to emphasize that the images were not to be taken literally.

Jefferson's keen observation raised a huge question in my mind that, for me, demanded an answer. If the shapes of the bones weren't 'right', then what would happen to the placement of the lateral line if the shapes of the bones were 'corrected'? All of the 'Before' and 'After' images from our many Rolfing classes clearly show that we SI practitioners are really good at making big visible differences in side views and I, for one, had taken Rolf's placement of the lateral line pretty much for granted as a literal frame of reference. Jefferson's comment made me realize that I needed a much better grounding in bone morphology. And so I began a quest to understand more about how the human form fits within the predominant vertebrate pattern – and over a far longer period of time.

Observations

Where to start? With something large and obvious! While comparing the various side views of a mammoth, bison, wolf, horse, and other whole, mounted skeletons, I noticed that one of the biggest, most immediately observable, visual differences between human bipeds and quadrupedal animals are the 'Z' shapes of the animals' legs (see Figure 4). The Z is much more explicit in quadrupeds and more implicit in human bipeds, where it is greatly attenuated but still definitely there as a visible design feature and structural pattern, as in all vertebrates.

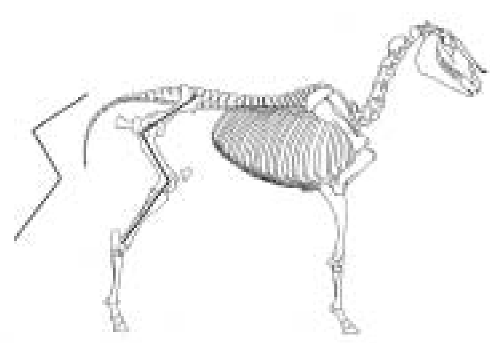


Figure 4: The North American horse has a Z-shaped set of back legs.

The Z is a vertebrate animal's adaptation that enables forward motion by functioning as a loaded spring. All the legs I found in the museum, regardless of species, from mammoth to mouse, had this Z-shape in their structural pattern. They also exhibit curved, or three-dimensional lengthwise complicated twists in their structure (see Figure 5). Both the Z, and the twists, may be seen as gifts from our evolutionary history. The structural pattern of our limbs has been inherited and retained as the cumulative record of successful combinations of forces that got us here.

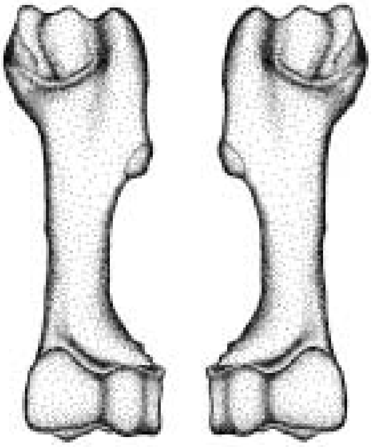


Figure 5: A symmetrically 'exact' pair of North American horse humeri. No Euclidean forms anywhere. (This mirror-image pair was computer generated from a traditional pen-and-ink stippled original illustration by Richard Wheeler.)

Also, I noticed that the center of gravity in quadrupedal animals is over their shoulder girdle, which is located in front of their whole pelvic girdle. The bones of the quadruped shoulder girdle are thickened and massive, a significant structural adaptation for carrying weight. In contrast, standing human bipeds balance the weight of their torso, shoulders, neck, and head over their pelvic girdle and legs.

The physical appearance of this unique arrangement looks strikingly different from the side view of a quadruped. It is very tempting for an artist, looking at a standing person's side view, to draw a pendulum-straight line through the length of both the femur and tibia. However, the bones are not straight, have no straight lines, flat planes, right angles, cubes, or perfect spheres: Euclidian forms are conspicuously absent in the ossuary's millions of bones, regardless of species (Figure 6).

Origins of Form

During the evolutionary transition from fish to man, the fishes' fins went through a large number of transitions. In deep time, the fins flexed, curved, and rotated, becoming limbs that adapted to contact the ground and carry body weight as limbs. When our proto-human ancestors made the transition from quadruped to biped, their legs did straighten, somewhat. A paleontologist would say that humans became more 'graviportal', i.e., adapted for weight bearing. Graviportal adaptations tend to straighten, shorten, and thicken the limbs. The term that is the opposite of graviportal is 'cursorial', more adapted for running. Cursorial adaptations tend to curve, extend, and lighten the limbs. All vertebrate animals are a mix of both characteristics. Mammoths are the biggest, most straightened-out, graviportally adapted animals in the museum, but they still retained a curved, structural twist and Z-shaped form in their legs. And so do humans.

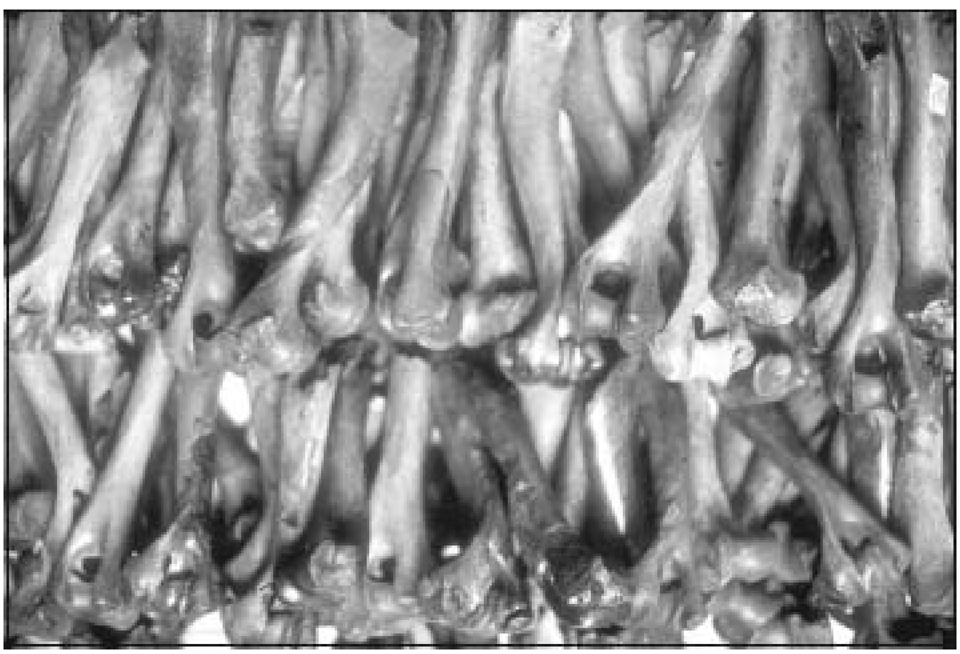


Figure 6: These sabertoothed-cat humeri all have twists and curves in their contours. Photo by Richard Wheeler.

Rolf did not address these subject areas in her class. These two observations, the presence of the Z and of lengthwise twists in all vertebrate leg bones, have led me to reformulate and refine Rolf's model.

The human balances over a region of support in the arches of the feet. The keystones of these arches, the navicular and cuboid bones, are located well forward of the talus. The tops of the arches are very efficient places to load weight. Evolution has given humans a structural design that is congruent with this idea. However, the lateral line illustrations in Rolf's book depict something different.

Figure 7 shows the illustration drawn by Rolf's illustrator, John Lodge. This image has a perpendicular, straight line drawn down through a bony midline in the tibia to connect with the top of the talus, which is located behind the top of the arches where the navicular-cuboid bones perform their keystone function.

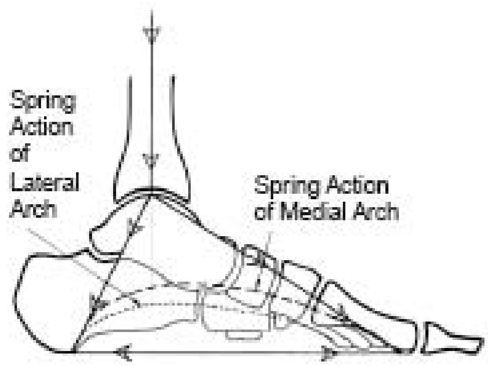


Figure 7: Note that the lower portion of the tibia is oriented vertically. This placement transmits body weight from the midline of the tibia to the talus. (From *Rolfing* by Ida P. Rolf, PhD. Published by Healing Arts Press. Reprinted with permission of publisher.)

This schematic arrangement in Figure 8 emphasizes bony compression in the system as a whole and, functionally speaking, 'bottoms out' the 'springs'. When a spring is bottomed out, it is fully compressed with the coils jammed against each other so that there is no bounce, resilience, give, or springy function left. Imagine, for example, standing with your knees straight and then having someone drop you from just one inch above the ground. There would be no bounce, no resilience. This shows how important our Z-structure is, despite the fact that this structural pattern is very much less obvious than that of our four-legged relatives. The same bottoming out would happen if human bones were actually lined up the way Rolf's schemata portray them.

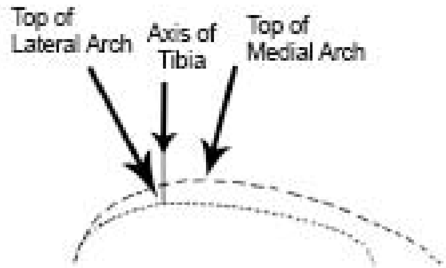


Figure 8: The dotted lines, copied from Rolf's schema in Figure 7, trace the weight-bearing paths of the lateral and medial arches. Note that a vertical tibia will preferentially feed weight to the back portion of the lateral arch.

Seen from evolution's structural context, the Rolf 'Line' would re-model the body's whole front-to-back curve set and straighten it to the degree that it arguably becomes too straight. There is such a thing as being too upright, too stable in gravity, and it has consequences. Consider the amount of push required to initiate movement in a big structure that is very columnar. In a world of Pleistocene creatures that possess virtually immediate response times, a design with response-time lag built in seems to be challenged in terms of survivability. Put another way, if you have to get off balance before you can really start to move, then you are more likely to become lunch.

So I suggest that a reformulation of Rolf's frame of reference is in order, one that takes evolution's contribution to our body's structural pattern more fully into account (Figures 9 and 10). To do this we need to place the Rolf model's body weight forward, about 1.25" (about 3 cm.) over the top of the arches in the feet. A consequence of this is that the joints of the ankle and knee are slightly flexed and the vertical line now passes through the psoas at the top of the leg. This placement supports weight and loads the myofascial springs and enables immediate forward motion, dynamic action, and responsive movement, all while being gravitationally stable and balanced. Flexed knees and floating bones are a part of our inherited structural norm.

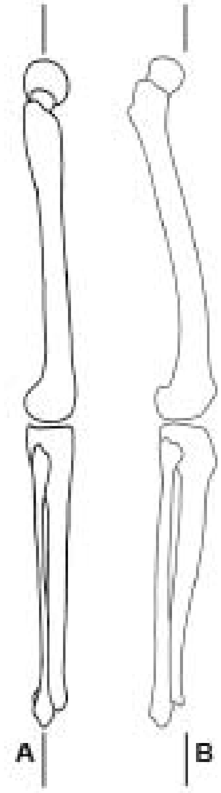


Figure 9: In image A, we see leg bones aligned and subtly re-shaped with reference to a vertical straight line, traced from Rolf's Schema 9-1. (From *Rolfing* by Ida P. Rolf, PhD. Published by Healing Arts Press. Reprinted with permission of publisher.) In image B, we see restored, unmodified bone contours; the bones float in a normal Z-shape within the myofascial web, just slightly behind the central gravity line. This is the integrated alignment suggested by structural design principles found in all vertebrate anatomy, optimizing balance in gravity.

Consider the following chain of functional logic. The center of gravity in vertebrate animals is in front of their hind legs. Humans have inherited the same basic structural pattern as vertebrate animals. Therefore, humans should have a significant portion of their body weight balanced in front of their leg bones.

Normal standing is a dynamic activity with body weight swaying, drifting around, distributing and re-distributing over and through the tops of the arches. You can observe this simply by slowly swaying in any direction as you stand. You will find that you can be relaxed while standing up and sway comfortably over a range of about 1.25" (about 3 centimeters), or more, from front to back. You can sway to distribute your relaxed weight over a large number of places in your knees and feet. Support for

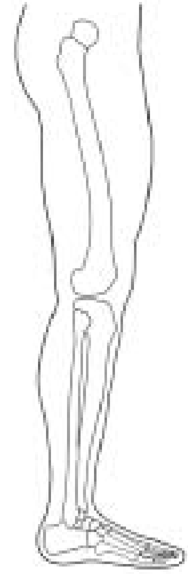


Figure 10: The tibia has been inclined slightly forward (by about four degrees) and the femur is tipped back accordingly to create a flexed knee. This bony arrangement presents a normal set of osseous contours for attachment and relationship to the myofascial web.

standing balance comes from inside an area, not from any single point or line. Figure 11 shows this area inside the intersection of the two big circles.

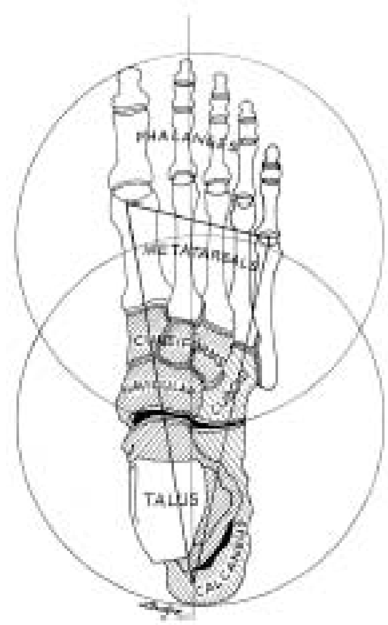


Figure 11: Note that the navicular, cuboid, and cuneiform bones function as keystones of their respective arches. The intersection of the two large circles, the central third of the foot, is the area where body weight is best supported. (From *Rolfing* by Ida P. Rolf, PhD. Published by Healing Arts Press. Reprinted with permission of publisher.)

This re-visioning of the body's lateral line emphasizes inclusion of the mammalian vertebrate model and offers us a view of anatomical structure that is focused towards understanding curvilinear construction. There is linear order in the body and it is curved.

This is a different norm, or frame-of-reference, for understanding the optimal orientation of parts and/or the best relationship of functions when seeking to evaluate and improve a person's level of SI. We can take the evolution of other species' biomechanics into creative and pragmatic consideration when designing and using manipulative protocols in our practice of SI. I invite our SI community to consider exploring what happens if we use our manipulative skill sets to morph body form and function in the service of revealing and clarifying the structural pattern that relates most closely to our evolutionary roots in gravity.

Richard F. Wheeler is a Certified Advanced Rolfer and Rolf Movement Practitioner who has been practicing since 1972. He had the privilege of studying with Dr. Rolf and, over the years, has evolved tools and ideas to support the Rolf work, making it more comfortable, efficient, and effective for clients and practitioners alike. This article is an edited excerpt from Richard's forthcoming book about his career and his life. For more about Richard's activities, please see www.tarpitboss.com and www.gardenofparadise.net.

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