

Intelligent Evolution

The historical importance of human movement training science in the maintenance and evolution of our body's design

Human Locomotion in the Gravitational Field

- anthropological argument
- aquatic phase
- persistence hunting
- dance and the evolution of human bipedalism

Many of the well-intended exercise regimes and physio-therapeutic approaches I have observed seem not take into account that the daily task of locomotion uses asymmetrical, sequentially deployed support systems that require coordination for negotiating a shifting perspective and a wide variety of speeds. With near uniformity, they all insist on a simultaneous activation of both arms and legs or the folding of both hips or the folding of the body trunk in a single direction as a starting point. According to recent neuro-science, our brains grow or shrink depending on the challenges we set it. If this is true, then it would be logical to assume that the oversimplification of our perception of the three dimensional field we inhabit to bisecting right angles and 40 degree diagonals could limit the ability of the nervous system to respond to situations where the appreciation and use of a more subtle geometry would save time and injury. It is interesting to note, that in most training approaches the world over, multi-axial motions are limited to essentially bi-axial circumduction. Also, in many dancers preparations, there is an attempt to approach dynamic states while maintaining postures more appropriate to static ones.

It should be obvious to all of us by now that muscle strength and motor control are not equivalents. Conditioning can provide support, but will not protect us from coordination-related injury, nor will conditioning improve our ability to execute movements with more integration and alignment. Many training systems regularly work with static, rectilinear postures, or repetitive, mono-axial, single-plane movements that do not reflect the sophistication of everyday motion, such as normal walking. Such methods, instead of reinforcing or improving on good habits, can cause the student to remove natural patterns of appropriate weight distribution that are vital to efficient motion, setting them up for rapid decline and injury. Rectilinear stretches that push the joints to the maximum and beyond do nothing to insure alignment and security in dynamic situations either. The deciding factor in efficiency is in the deployment of kinetic energy and inertial principles for stress-reduction. This issue remains absent in many or most standard approaches. I would like to ask the entire industry to re-examine their training systems in the light of human locomotive needs, and call on my colleagues assist me in devising logical ways to prepare the people who place themselves in our care for real life.

Each living organism gathers itself into pouches and tubes, within pouches and tubes (Stanley Kelleman), and defines an external membrane, barrier or limitation to monitor exchange with the environment, and in so doing sets parameters for activity. Within these parameters, the variations are limitless and unpredictable when allowed; the fractal, an infinite line in a finite space. Dimension and movement, density and mass; all are inextricably linked to physics.

Over millions of years, anyone who has instructed their children in the appropriation of inherited gestures and postures, or anyone who has simply procreated has passed on a genetic legacy of instinctive scientific inquest into kinetic energy generation, conservation and loss inside of the earth's gravitational field. Perhaps it is also pertinent to note that the current humanoid species has been around, more or less in its present form for at least the last 4 million years. This could mean that the solution to moving that our ancestors found 4 million years ago is still valid today, and if this is so, it would also be logical to assume that they knew a thing or two about how to use the body, even way back then. This prospect dwarfs every modern training system... and I include our oldest recorded ones... because what does 3 or 6000 years have on 4 million?

In an emergent universe such as ours, there are no fixed equations, everything changes... but it is not stated what kind of changes we will undergo... it depends a lot on what we do. The other amazing fact about human beings is that through training, an individual is able to take the same nervous system, the same basic muscular apparatus, and harness and generate superior amounts of energy.

In each culture, a different dance, a different way of holding the body creates a new base pattern. People from one culture generally have difficulty adapting to the particularities of another. We seem to be gifted with the potential for imprinting. We come to this world with a huge amount of yet-to-be appropriated brain, nerve and muscle material, meaning that even though we share common genetic design, our bodies offer a great deal of room for variation through education. These considerations have given me a will to patiently study the structures of the body... attempting to read the passage of time in the bones and muscles, to feel... to verify, the intimate relationship of the body's structure with mass and inertia.

For me, the study of anatomy only makes sense in the context of its origin... movement. Specifically functional, fall-driven, efficient deployment of support elements, adaptability, subtlety in the transitions, appropriate breath mechanics... and necessarily, tri-axial movement, the context where the legacy of the chaos principle has left clear clues for strength, health, freedom and restraint.

Understanding limitations nature has set as guidelines is a humbling but ultimately freeing task. For example, bi-axial, or two-axis motion, usually visible in a standard circumduction, is only relative, none of the motion centers in the body are entirely devoid of the tri-axial potential, but some are structurally inhibited. For example, the atlanto-occipital interface offers clear tri-axial potential, while the base of the neck is essentially bi-axial. The base of the thoracic spine is again clearly tri-axial, while the lumbar basically bi-axial. The hips and shoulders are wildly tri-axial, while the knees and elbows reduce the possibilities for safe motion enormously, the elbow because

of its ingeniously stable locking hinge pin, and the knee more by default than design. The knees, although remarkable in many ways, require patient schooling and muscular reinforcement because of their questionable ability to rotate externally when flexed.

If the body was designed to get around, and in so doing to obtain and process air and other kinds of food, it follows that our movement training systems, in order to be functional, would reinforce the co-ordinations that would assist us in doing these things. Would, or could even make it easier for us to do these things, to do them better, with less stress and wasted energy. The skeleton, as the non-contiguous element in the tensegritous symbiosis of our body's play with gravity, communicates the notions of existing playing fields through the sections it establishes to the muscles, and offers first-level check-points and limitations for the body's well-being. The skeleton argues our motion potentials on the basis of 19 sections: head, neck, upper arms, lower arms, hands, upper torso, abdomen, pelvis, upper legs, lower legs, and feet; five central and twelve peripheral pieces. Even though individual parameters vary somewhat, the range of motion (ROM) of the intersections joining these sections is clearly defined. The central skeleton is called "Axial", and it includes all the bones of the Skull, all the Vertebrae, the Ribs, the Sacrum and the Pelvis. The arms are considered "Upper limb", the legs "Lower limb".

What is "getting around" for us, I mean besides sitting in a machine that is doing the work for us? Human locomotion can be summed up by the term "walking". Walking can be described as: a continuous controlled falling and rising that requires the sequential deployment of support elements. The centralized mass of our head, torso, abdomen and pelvis gets adequate support from the efficient placement of these support elements along the trail our mass is blazing. The same central masses compensate, roll and pitch, undulate tri-axially in order to take advantage of the support. I cite the different sections Head, Torso and Abdomen, because they have motoric value in driving the body forward in space. The head and neck are often working together even though they are distinct pieces, the thoracic spine is a very obvious unit, and then it is the weight of the entire abdomen that must count as a motoric factor as well. I call these masses motors, and specifically, proximal motors, because of their symbiotic marriage to the axial skeleton. The typical motion is a contra-lateral counter-rotation that uses the mid-spine as a universal hinge. Healthy walking requires good posture, i.e.: bringing skeletal joint surfaces together in moments of impact, compression, decompression, or torsion. In other words; all spinal curves hips, shoulders, knees, ankles, wrists, feet and hands held within neutral values during locomotion. Healthy walking requires irregular breath patterns that are adapted to immediate oxygen and CO₂ requirements.

If we accept this definition of healthy walking or locomotion, then we can also agree that any training system that disturbs or removes these co-ordinations represents a potential challenge to the health of the practicing individual.

That would be; any training system that:

- insists on flat uses of space, rectilinear flexions and extensions
- pulls the skeleton out of line or apart
- de-trains the counter rotation
- inhibits undulation
- uses two or more supports for the same function (reception/propulsion) at the same time
- inhibits natural, irregular breathing, or does not promote efficient breathing

Now, lets examine the idea of sequential deployment. This concept implies a division of roles, in other words each support element will be doing something else than another. Movement patterns become blocky and inefficient when two or more supports are used at the same time for the same thing. For example, the turned out back-step. A typical move from many training systems that places the back leg in the role of the front one. Inwards shear on the knees, flattening foot arches are common side-effects.

What about over-stretching? Dynamic adaptation becomes very difficult when the ligaments are no longer offering passive support for the skeleton. Youthful muscular mass can create the illusion of freedom from this constraint. Atrophying muscular mass will show up the instability caused by over stretching.

What about isolated muscle building or still poses? These positions and simplistic movements tend not to use the tri-axial potential in the joints, and are most often done out of context of walking or locomotion. Therefore it is reasonable to assume that they do not reinforce good walking habits or co-ordination.

The Axis Syllabus (AS) is a movement analysis and training method that comprises a fund of clinical as well as empirical knowledge and a symbol system for describing the body in motion in terms of orientation, anatomical structures and physics. The information contained in the AS is expressed through an ethical approach to teaching people how to move efficiently; namely the aspiration to convey physio-emotional principles of stress-reduction, energy generation and conservation and encourage a process of scientific inquest and creative endeavor without recourse to either physical or mental abuse.