The Organization of Movement — A Response to Ted Dimon

By Michael Protzel

[Ted's articles can be found at www.dimoninstitute.org. See "Downloads."]

I have enjoyed reading the first two installments of Ted Dimon's 4-part series of articles, *The Organization of Movement - Four Talks on the Primary Control ,* published in the AmSAT Journal. The first installment focuses on our "architecture"; the second, on "stretch reflexes." The organization of movement is surely a topic of vital importance to Alexander Technique teachers.

This paper offers a different perspective on how human movement is organized and on the optimal functioning of stretch reflexes.

Form vs. Function

In *The Architecture: How Muscles Work in the Context of the Skeletal Framework* (AmSAT Journal, Issue No. 3, Spring 2013), Ted asserts that it is our "tensegrity design" that organizes our movement and enables us to function optimally:

"...a varied and complex system of struts - the skeleton - maintains stretch on muscles while the elastic muscles maintain tension or tone to support the bones. This marvelously complex architectural design for upright support distributes the work of the muscles over many meters of connective and muscle tissue so that the burden does not fall on just a few muscles....[Our] muscles act within the context of a structure that lengthens them and what keeps them lengthening is the design of the structure itself." (pgs 22, 23)

Understanding our basic human structure is obviously very important. This structure establishes the relationships among our parts. These relationships have substantial influence on our movement possibilities. It is to our benefit to understand our structure in as much depth, and from as many perspectives, as possible. Ted provides valuable information on the nature and workings of our structure.

But I have a different viewpoint on what organizes human movement. I do not believe that "what keeps [our muscles] lengthening is the design of the structure itself." (pg 23) I believe it is **what we do and how we do it** that dictates how our muscles function. Ultimately, it is how we act that determines the in-the-moment shape of our structure. Without acting, we are just a pile of flesh and bones on the ground, with no particular shape at all.

As bi-peds, we spend the vast majority of our waking hours **uprighting** — **lifting** ourselves up into verticality — be it in sitting, standing, or walking. Only when we are reclining or lying down — with our heads in full contact with the ground — are we not lifting. As I see it, it is this species-defining activity of uprighting that organizes our movement and shapes our form, which is malleable.

Uprighting — Lifting Our "Load"

Lifting our load is no small task. Ted writes of our "load [being] *distributed* over the entire tensegrity structure" by virtue of our design. (pg 23, emphasis added) It seems to me that distribution of our load has to be viewed within the context of our lifting. Lifting is too integral an activity to not be factored into the equation.

We are lifting ourselves continuously, throughout virtually all of our daily activities. Efficient lifting creates a shape resembling the classic medical-chart skeleton — with the ideal spacing of our bones and the ideal length of our muscles. Inefficient lifting, beset by stress and strain, creates a different shape altogether. To have our load distributed optimally requires *efficient* lifting.

Uprighting, Gravity and Stretch Reflexes

In his most recently published article, Ted writes about the importance of our "stretch reflexes." (*Stretch Reflexes and the Musculoskeletal Framework: How Stretch Reflexes Convert the Musculoskeletal System into a Spring-like Framework*, AmSAT Journal, Issue No.4, Fall 2013).

Clearly, gravity plays an essential role. Ted and I are in agreement on this, as we are on the "spring-like" functioning of our muscular-skeletal system. When all is working well, it is the reflexive action of our stretched, deep extensor muscles that lift/extend us with minimal effort — segment by segment, ground to crown.

When working unimpeded, gravity will cause all of our major joints to flex a little bit. Ted calls this flexing, "buckling," (*Stretch Reflexes*, pg 16) and refers only to the knee joint. But, of course, occipital, vertebral, hip, and ankle joints also flex. This flexing of the joints — which requires absolutely no effort on our part — results in our descending in space a little bit, and causes the stretching of our deepest extensor muscles, spanning the length of our organism. The energy generated by our slight descent — 'captured' at skeletal ground contact points directly underneath us — is stored within each stretched muscle, and released in the reflex contraction — as Ted describes in discussing the quadriceps as part of knee-joint extension.

Absent from Ted's discussion of stretch reflexes, however, is any reference to the fact that human beings can — and regularly do — interfere with gravity's influence. This is important because this interference disables the key stretch reflex activity of our deepest extensor musculature.

Our ability to use the energy of our downward-moving body mass to our advantage is a necessary ingredient of our lifting ourselves with minimal effort. In effect, we bounce ourselves up off the ground — in an ongoing flexing/extending cycle, as breathing is an ongoing inhaling/exhaling cycle. In roughly 6 months on earth, infants teach themselves

to sit beautifully. By one year, or so, we are standing and walking. But by age 5, we've gone a long way towards trashing this incredible system.
(www.uprighting.com/Illustration1.pdf)

Disturbing Gravity's Influence

Our innate uprighting capability is deep within our DNA. As infants/toddlers, we all learn to lift ourselves with exquisite efficiency and power. We learn to do this on our own, without being taught. When we upright well, we get "neck free, head forward and up, back lengthening and widening."

Ted says: "If this system is interfered with — in other words, if we tighten the neck and interfere with head balance so that the back muscles are shortened — muscles throughout the body must compensate to maintain upright support." (*Stretch Reflexes*, pg 19)

My perspective on "tightening the neck" is different. It is not muscular activity that interferes with head balance. In my view, our neck tensing is clear indication that head balance **has already been** interfered with. This is *why* we tense our necks — to re-establish head security. Tensing the neck is a *consequence* of our interference — our interference with the force of gravity.

Gravity pulls us straight down to the earth. But each of us has the power to over-ride this straight-down trajectory. We can direct our body mass down to earth on any trajectory we choose. We can do this consciously or, as is more frequently the case, subconsciously. Either way, it is within our individual control. When we direct our body mass away from our balance points — the sit bones in sitting, the tali in standing — we initiate a momentary topple.

It is this topple that creates the need for neck tensing and other compensatory muscular effort. Large superficial leg, pelvic, torso and neck muscles must work extra hard to hold us up, and keep us functional amidst our topple.

Innate Uprighting

As infants/toddlers, we are on a mission. We strive to sit, stand and walk ASAP. Learning to fall straight down is a prerequisite. Falling straight down puts the power of gravity to work *for* us.

Take standing. Falling straight down moves us directly into solid ground contact at the heel (and, to a lesser degree, the ball of the big toe). Yet, curiously, our heel is rounded. This roundedness is key to our innate uprighting ability. Falling straight down rocks us off the *pivot point* on each heel — a key structural location very much worth getting to know kinesthetically. Rocking off the pivot point results in our whole body descending a little bit — in concert with the tiny flexing of occipital, vertebral, hip, knee and ankle joints. This descent creates a build-up of energy. We 'capture' this energy when we stop our descent slightly forward and medial to the pivot point on each heel. We rock in this

direction because a straight-down trajectory takes our body mass directly through the talus, our balance point on each foot, which is located forward and medial to the pivot point on the heel. (www.uprighting.com/Illustration2.pdf)

It is from these ground contact points directly underneath us that we lift ourselves with optimal leverage. Plantar muscles under the longitudinal arch are stretched. Their reaction provides the initial upthrust. Deep ankle extensors lift the lower leg. In rapid fire, all of our joints are extended, with each skeletal segment lifted atop the segment below.

As toddlers, there is no other way for us to stand. We have not yet developed the musculature to support an other-than-straight-down trajectory. As we leave our toddler years, however, this musculature develops. We become 'free' to interfere with gravity and still gain our end, still remain standing. And this is what we do. We soon lose the ability to fall straight down.

Losing our Kinesthetic Compass

Shortly after birth, as soon as we are able to see, we witness our elders sitting back in chairs, sofas, car seats, etc. Constantly. These images are foisted upon our consciousness when we are very impressionable. They represent a form of subliminal conditioning. We are being taught about life in our society. Through this teaching, we learn that sitting-back is the most normal thing in the world — and that we ourselves will soon be doing it. It is a rite of passage we cannot avoid. But we don't start doing it right away.

As infants/toddlers, we cannot help but actualize our amazing evolutionary capacity. Our desire to upright is so strong and our attention to our motor sensations so dedicated, we simply can't go wrong. But by age 3 or 4, we move on to 'bigger and better things.' Our attention to our kinesthesia lapses dramatically. We do as we see — without giving it a second thought, without asking any questions and without a sense that anything is wrong. We simply follow our elders. Our consciousness is not developed enough to know what's happening, to know that we are going along with something very detrimental to our well being. We sit back with staggering repetition — day-in, day-out — throughout our childhood, and beyond. We lose the 'understanding' we had as infants/toddlers — that tapping the full force of our gravity-compelled body mass is an essential aspect of efficient uprighting.

This loss of kinesthetic sensitivity, however, doesn't stop us from continuing to upright. We "end-gain" it — satisfied in achieving our desired result, numb to the muscular straining and skeletal distortion that come with our new "means-whereby." Our use declines. We don't even remember having ever employed our innate system.

In sitting-back repetitively, we get trapped in the habit of maintaining a functionally vertical head/neck while our body mass moves towards earth on a backwards trajectory. We are totally comfortable doing this. The act feels right to us. Common sense alone should tell us that to *intentionally* fall backwards is inane. Yet, somehow we are not able to summon this common sense. We keep doing it, regularly. To fall backwards is to mis-

direct, pure and simple. It is antithetical to innate uprighting and good use. Moreover, our kinesthetic disconnect does not magically disappear when we get out of a chair. Our falling-back habit is deep within our consciousness. Of course it spills over into how we stand — and eventually it affects all of our movements.
(www.uprighting.com/Illustration3.pdf)

Our Falling Body Mass & Stretch Reflexes

Ted and I agree on several key events. Gravity acting upon our body mass will cause our major joints to flex a little bit. This will stretch our deep extensor muscles, which will then automatically contract, and thereby re-extend the joints, keeping us lifted.

This can only happen, however, when we allow our body mass to fall straight down. Falling straight down is what produces the necessary joint flexing and skeletal ground contact that results in our muscular-skeletal system functioning as it has evolved — as a loaded spring that uses the energy of our body mass to catapult us upwards.

Trouble is, we are not very good at falling straight down. When we commit our body weight down to earth on a trajectory other-than-straight-down, we disrupt the entire system. Our deep extensor muscles will no longer be working to upright us. Other muscles will. Large leg, pelvic, torso and neck muscles are immediately and subconsciously summoned to deal with the momentary, off-center topple we have created — limiting our freedom of movement in the process.

Falling Backwards — Stretching Flexor Muscles Instead of Extensor Muscles

When we fall backwards — which is our habitual tendency — hip joints *over-extend* (in standing, ankle joints also over-extend and knees lock). This stretches hip joint *flexor* muscles (plus ankle flexors in standing), and leaves our deep extensor muscles **UN**stretched. When we fall backwards, we absolutely need the effort of flexor muscles to keep us upright. Using flexor muscles to sustain extension, however, is a contradiction in terms and clear evidence of our interference with our stretch reflex system. It all stems from our habit of falling backwards.

In standing, as soon as we commit weight backwards — rocking us off the pivot point on the heel, even just a little bit — our 'base brain' registers this as a state of emergency. It recognizes that we are toppling over and that our head is in danger of having a life-threatening collision with the ground. Our brain's immediate response is to tense neck muscles to stabilize the head, and to take whatever action is needed to keep our feet firmly on the ground. Towards this latter end, we immediately tense the ilio psoas muscles which connect the pelvis and lower spine to the top of the femur. (www.uprighting.com/Illustration4.pdf) Without the tensing of these powerful hip flexors, we would not be able to remain upright. Our pelvis and torso would just keep falling backwards. (Often in standing, we mis-commit weight laterally as well as backwards. This results in the common mis-use pattern of standing basically on one leg,

with our weight borne way back on the lateral, posterior corner of the heel. This adds a torquing influence that compounds the stress.)

The ilio psoas muscles, in my view, are the most over-used muscles in the body. I believe that their mis-use goes a long way towards explaining the lower-back epidemic now plaguing modern civilization. The ilio psoas muscles are *emergency* muscles, for when we *accidentally* lose balance backwards and over-extend the hip joints. Here we absolutely need these flexor muscles for our own protection, to pull the pelvis and lumbar spine forwards, to keep them connected to the legs, to keep the hip joints from over-extending further. But because of our falling-back habit, we work them to death.

Under normal, non-emergency uprighting circumstances, when we are not interfering with gravity's influence, the ilio psoas muscles have no role. When we fall straight down, no muscular effort is needed to flex the hip joints. They flex non-muscularly, simply because we have more head and torso weight in front of the hip joints than behind them. This flexing from falling straight down is what appropriately stretches our deep hip *extensors* (and all other extensors, for that matter).

In sitting, falling backwards sets off a chain reaction. As in standing, it immediately stimulates neck tensing to stabilize the head. Unlike in standing, we can lighten up a little bit on the psoas tensing (though not completely) as we let the pelvis and lower spine roll back and down. After all, we know the back of the chair/sofa is there waiting for us. We use psoas tension simply to regulate our backwards fall, so that we don't slam into the chair-back. The backwards movement of the pelvis and lower torso necessitates a forward compensatory flexing of the thoracic spine (i.e. "shortening the stature," slumping). Thoracic flexing, in turn, requires additional neck tensing to tilt the face up so that we keep a relatively level sight-line (i.e. "pulling the head back"). Then, when we want to come off the chair-back — to ‘sit up straight’ — we need to employ significant ilio psoas tension to pull the pelvis and lower spine out of their backwards collapse (i.e. "narrowing the torso," sway back), and we need to employ significant erector spine tension to lift our slumped thoracic spine (i.e. "lifting the chest"). And we need to keep up these efforts for as long as we wish to continue sitting-up-straight. This makes very hard work of something that we were able to do with virtually no effort when we were only 6 months old.

SUMMARY

As a practical matter, it is important to recognize that the act of lifting/uprighting is our predominant activity as human beings — an aspect of virtually everything we do.

Interference with the act of lifting affects all of our sitting, standing and loco-motive activities.

Recognizing that we are, in fact, doing this lifting enables us to consider efficient vs. inefficient means of lifting.

The downward trajectory of our body mass is the key factor in determining the efficiency or inefficiency of our lifting.

Gravity itself imposes a straight down trajectory on our body mass. But each individual controls — consciously or subconsciously — the trajectory of his own body mass and, in effect, can alter gravity's influence.

When an individual effects an other-than-straight-down trajectory, this constitutes interference with gravity.

The stretch reflexes that are an integral part of innate uprighting — i.e. activated in response to the stretching of our deepest extensor muscles — are stimulated only when we allow ourselves to fall straight down. We interfere with the working of these stretch reflexes by committing our body weight in an other-than-straight-down direction.

Falling backwards — as we have been 'trained' to do since birth and as we have practiced again and again in sitting back in chairs, sofas, car seats etc. — stretches ankle and/or hip *flexor* muscles and leaves our deepest extensor muscles UNstretched.

This aborts our highly-evolved innate uprighting system, forcing us to use inferior means of uprighting/lifting.

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