Gravity, Human Movement & Parkinsons Disease

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Inherited Grace and Power — Species By Species



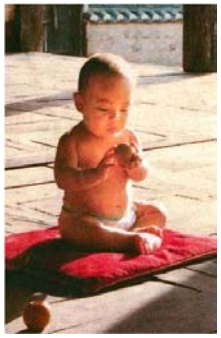

Human Beings Are No Different

At the Core of Our Inherited Movement Potential Is
The Ability to Upright with Minimal Effort and Maximum Freedom

Uprighting is the act of lifting our spinal column into verticality — raising our head to its maximum height while keeping our hands free to manipulate objects in a way that no other species can. The ability to upright is a defining human characteristic.

We are uprighting virtually all of our waking hours. It is a central aspect of all sitting, standing and locomotive activities. The uprighting ability we are born with is the product of millions of years of evolution. It has been finely tuned.

As infants/toddlers, we learn it. We are sitting beautifully at 6 or 7 months. At a year, or so, we stand and walk. We learn this all on our own, without instruction from anyone else.


Unwittingly, We Trash our Innate Uprighting Coordination Early in Life

Infants

5-Year Olds

Downward-Moving Body Mass Supplies Enormous Power
But When Mis-Used, It Ends Up Working Decidedly Against Us

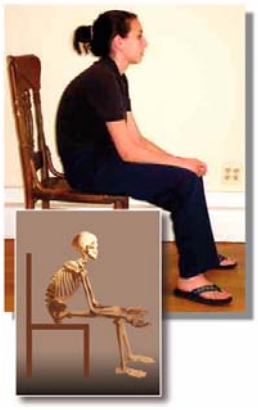
Innate uprighting works in a particular way. It is not haphazard. It requires gravity's influence. Gravity compels our body mass *straight* down towards the center of earth. This straight-down influence sends the energy of our body mass (our weight) through our balance points into key ground-contact points on the feet and sit-bones. The energy generated interacts with our skeletal form to power the act of uprighting in a manner similar to how the energy of falling water generates the hydro-electricity that lights up a city.

But we can — and do — interfere with gravity's straight down influence!

Something happens between the age of 2 and 5 that leaves us uprighting in a manner far removed from the innate, filled with muscular strain and skeletal distortion. What's worse, we transition from the sublime to the ridiculous without any recognition of having lost anything, and without awareness of how it is affecting us physiologically.

Routine Sitting — A Cultural Rite of Passage
It's All Backwards

The only skeletal structure we have to receive our weight and catapult us upwards.



While falling backwards, over-extending our hip joints, in order to continue to maintain a functionally vertical head/ neck requires that we over-flex the upper spine. Otherwise, we would look something like our friend in the middle.

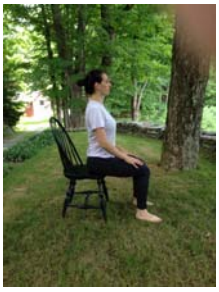
As infants/toddlers, while in the midst of claiming our incredible uprighting inheritance, we are at the same time watching all of our elders throw their body mass backwards in the utterly normal act of sitting-back into chairs, sofas, car seats, etc. These images make an indelible impression. They leave us 'convinced' that sitting-back is a perfectly appropriate activity for human beings. We don't question it. How could we? We can't even talk yet. This subliminal conditioning represents a cultural epidemic, with far-reaching consequences affecting everyone. Without knowing it, we all get sucked into a behavior that is enormously self-destructive.

There are no skeletal structures behind us to catch our weight. All ground-support is directly underneath and in front of us. When we throw our weight backwards, our 'base brain' registers this as an emergency situation. If our backwards topple were allowed to continue, our skull might soon crash to the ground. Moreover, without instant correction, we could no longer sustain functional head/neck verticality. Our base-brain jumps into action, making the necessary adjustments. This comes in the form of muscular strain and skeletal distortion. It all transpires subconsciously. We don't notice anything out of the ordinary. We continue to function normally, as if nothing at all is happening.

Hidden in Plain Sight

Calm & Casual — Yet Unaware of What we are Doing to Ourselves

By age 5, we are lost in habit. We have no idea we have set ourselves up for a lifetime of needless stress and strain — bad posture, joint injuries, back and neck pain, wasted energy. We forget what we 'knew' as infants/toddlers: that to go up easily, we need to be in synch with gravity, and go *straight* down.

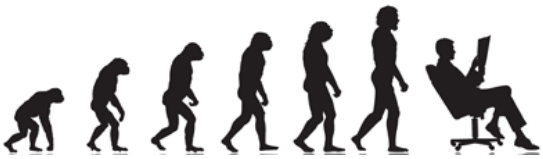


Because of our continued reliance on a chair-back for 'support,' when we need to sit without a back support, or when we need to orient forwards — such as to write at a desk or eat at the dinner table — we have no idea how to lift our spines constructively. We either slump or use our arms for support, or both. Or, when implored by our parents or teachers to "sit-up-straight," we do so employing monumental effort — effort that cannot be sustained. That's why no one can sit up straight for very long.

Going Against Millions of Years of Evolution

Eons ago we were horizontal creatures. Over many thousands of years, we learned how to lift the *front* part of our body mass. As *homo sapiens*, we are able to lift our entire front body mass into verticality using only the hind legs.

In sitting-back, we position the bulk of our body mass *behind the hip joints*. The act of lifting ourselves into verticality from this backwards position is a completely different — and far less efficient — act than innate uprighting which has evolved to lift *front positioned* weight.



A Tale of Two Curves

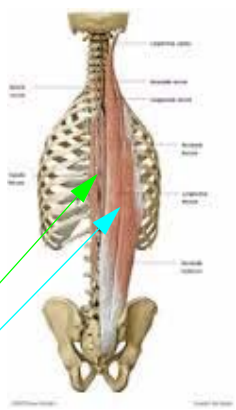
Sitting back into chairs and sofas, repetitively for years, is the source of the common "C" curve slump. Actually there are two slumps created. A backwards slump of the pelvis and lower spine; and a forward slump of the upper spine. To pull ourselves out of these slumps requires enormous muscular effort.

To pull the pelvis and lower spine out of its backwards slump requires the use of our powerful ilio-psoas muscles. These muscles are hip *flexors*. They should not be active in uprighting, which is the act of *extending* our joints, not flexing them. Chronic overuse of ilio-psoas muscles goes a long way in explaining today's lower-back-pain epidemic.

To pull the upper spine out of its forward slump requires the use of large erector spinae back muscles, running the length of the spine. The deep, small intrinsic muscles of the spine, connecting vertebra to vertebra, don't have the strength for this unnatural work. They lay dormant.

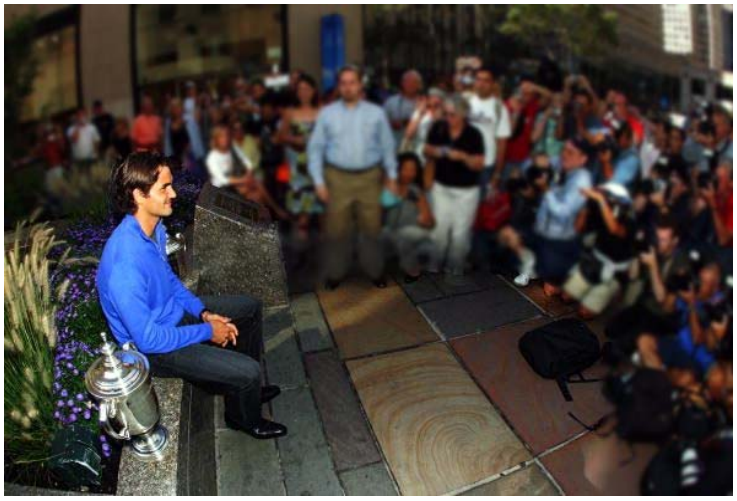
When we bend ourselves out of shape, it takes continual, strenuous effort to simulate the natural human form. This makes sitting-up-straight very tiring.

Ilio Psoas Muscle



Deep, Intrinsic Muscles of the Spine
Large Erector Spinae Muscles

Extraordinary Human Performance



Clearly, there are people who demonstrate graceful and powerful movement. Many artists and athletes fit this bill: Michael Jordan, Fred Astaire, Mohammed Ali, to name a few. They have all learned how to maintain amazing efficiency in performance of the activity in which they excel. But what about in day-to-day life?

The above images of Roger Federer, among the greatest tennis players of all time, show the difference between his performance coordination and his habitual, routine coordination.

While he has clearly maintained excellent coordination in his tennis playing, his manner of sitting has been crafted in the same way as everyone else's: by repetitively sitting back into chairs and sofas without thought or awareness. And his body shows it.

Despite his athletic prowess, it is his social conditioning and habitual sitting behavior that determine his body's shape.

How Poor Uprighting Habits Affect People with Parkinsons

In standing and walking, automatic neuro-muscular-skeletal reactions needed to preserve our uprightness leave us in a near constant state of muscular strain.

In sending our body mass down to earth on a trajectory other than straight down, we make the act of uprighting a lot more strenuous. We start doing this early in life, as we have no choice but to join our elders in throwing our weight backwards in common sitting. This is how we lose touch with gravity's straight-down influence and its value to us.

Our insensitivity spills over into how we stand and walk. Here the stakes are higher. Our head is much further from the ground. A big screw-up can be life threatening. Plus, we have no direct ground support for our torso as we do in sitting. Instead, the torso is supported (and lifted into verticality) atop two thigh bones (only one at a time when walking). The thigh bones themselves need to be lifted atop the foot and the lower leg.

Our perch atop the legs is precarious. One way or another we need to establish security. Utilizing our amazing innate uprighting ability — by allowing gravity to take us *straight* down — enables security *and freely moving joints throughout the body.* In early childhood, when we start to mis-commit our weight repetitively — leaning to the left, right, backwards and/or forwards — we automatically develop compensatory muscular responses. Over time, they become deeply entrenched habits. Their purpose is simple: to keep us upright.

Moment-by-moment, in all sitting, standing and locomotive activities, we are continually adjusting to the changing trajectory of our downwardly-moving body mass — a trajectory that we ourselves impose. We brace ankle, knee and/or hip joints with muscle tension to prevent further loss of balance. We employ large pelvic and torso muscles to bend the spine back towards center so that our head and neck can continue to function normally. All of this — our weight mis-commitments and our recovery responses — happen out of our awareness.

Mis-committing body weight has negative physiological consequences, even for people without Parkinsons: bad posture, chronic lower back and neck pain, damaged knee and hip joints that often need replacement. But because these are long-term consequences that develop over years, the problem is obscured. Prior to the onset of pain, in spite of our bad posture, we consider ourselves to be successful at uprighting. We are able to stand and walk without noticeable difficulty. This is good enough for most everyone. We never fall over (unless we trip on something).

But for people with Parkinsons, “good enough” no longer works very well. The self-corrections that once-upon-a-time were money in the bank, and had enabled continual uprighting without concern, are no longer readily available. A brain short on dopamine has difficulty handling, on the fly, the multitude of uprighting tasks required of it. It must receive signals from detection systems communicating a momentary loss of verticality. It must process those signals to determine what particular actions need to be taken. And it must send motor signals to the many muscles that need to act. And it must do this near-instantaneously.

An essential aspect of uprighting is to keep our head from colliding with the ground. This is a matter of survival. For people with Parkinsons, whose self-correcting back-up system is now compromised, another back-up system needs to be established. The base-brain of people with Parkinsons clearly recognizes its compromised state. It knows it can no longer respond quickly enough to meet the uprighting demands brought about as we unwittingly mis-direct our body mass. So it develops a new strategy: to strongly guard verticality by imposing movement-thwarting muscular control. While this subconsciously-imposed strategy does afford Parkinsons people important protection, it comes at significant cost. The restriction on movement broadly-speaking can become extreme, even to the point of “freezing.” But you can't freeze and walk at the same time. So, to allow walking, the freezing has to be abandoned. This can result in the build-up of forward momentum that is often difficult to stop. Quite a double bind.

Prior to its onset, people with Parkinsons are just like people without it, taking their uprighting for granted in all activities. Little, if any, attention is brought to bear. There is almost total reliance on our species’ self-correcting ability. It is worth noting that this *over*-reliance is a relatively new development in the lineage of human beings. For tens of thousands of years, we, and our predecessors, were judicious in the use of our self-

correcting ability. We used it only when a literal bump in the road required it in order to keep us upright. Back then, we were in very much in touch with our body and knew what it could do. We were sensitive to the power of our body mass. Most of the time, we used this power well, and employed our very effective uprighting ability, which was an aspect of our existence even before we had language.

We modern human beings are all born with this ability. In the first year of life, our keen kinesthetic sense leads us directly to it. Even if it has basically laid dormant most of our lives, we still have it. To begin to recover it, we need to reestablish sensitivity to our downward moving body mass. This can be done. I've done it. My students have done it. Doing so has a great up-side, particularly for Parkinsons people.

Body mass falling down to earth creates weight-bearing sensations at ground contact. These weight-bearing sensations tell us on what trajectory our body mass is falling. When we fall straight down, we create ground contact at skeletal points that allow for optimal leverage, optimal lifting. This should be no surprise. After all, it is a highly-evolved system.

By tuning in to our weight-bearing sensations, we can begin to witness, on a conscious level, events that have, for years, alluded our awareness. This witnessing of 'what is' is key to transforming it. Through witnessing ourselves mis-committing our weight, and recognizing the reactions that follow to preserve our uprightness, we begin to actually see and feel the connection between how we go down and how we go up. I believe that this sensitivity happens in a very old part of our brain, a part not compromised by Parkinsons disease. That is why I believe that re-developing sensitivity presents a great opportunity for Parkinsons people. As we gradually regain the ability to fall straight down, our uprighting coordination automatically improves, enabling a freer stability and easier movement.

Figure 1

The talus is the top foot bone. It does not touch the ground, and has no muscles attached to it. The two tali make up our balance points. When we allow gravity's straight down influence: (a) all of our support joints flex a tiny bit (ankle, knee, hip, vertebral and occipital) resulting in a slight descent of our body mass, (b) our weight moves through the tibia, the large lower leg bone, and through each talus, (c) the body rocks forwards slightly on our rounded heel and on the ball-of-the-big-toe (Figure 2), and (d) it rocks medially on the heel (Figure 3), taking us towards the strong, medial edge of the foot — the longitudinal arch — running between the pivot point on the heel and the two, small sesamoid bones under the big toe.

This tiny flexing and medial motion stimulates the stretching of our deepest extensor muscles running the length of the body, including the powerful plantar muscles under the longitudinal arch. Our sensitivity to the shifting ground contact at the heel and the ball of the big toe, enables us to stop near-instantly the downward-forward-medial motion. In stopping, we capture the energy of our descent and employ it to power the contraction of stretched extensor muscles. These muscles lift us with maximum ease and efficiency, ground to crown.

Again, allowing gravity's straight down influence engages the most powerful part of the foot, it's medial edge. It is represented by the blue line in Figure 4.

All other parts of the foot I call our "safety net." This safety net protects us when we commit our weight too far forwards, backwards or out to the side laterally. We have no need for a safety net out to the side of the foot *medially* because the whole other foot is there. When we bear weight upon any of these safety net structures, we can be sure that large leg and torso muscles will be working extra hard to keep us upright, and pelvic and torso muscles will be working hard to keep a semblance of centeredness. How hard depends on the degree of our miscommitment.

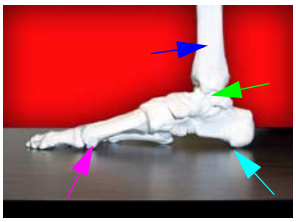


Figure 2

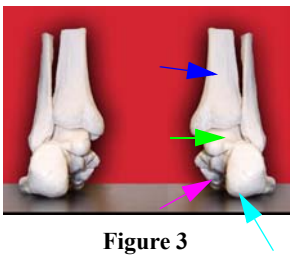


Figure 3

Figure 4

Common Standing Habits

Requiring Significant Compensatory Muscular Effort Causing Noticeable Skeletal Distortion

Left: Committing weight backwards, bearing weight on the back edge of heels.
Center: Committing weight backwards and to left, bearing weight largely on the back lateral edge of left foot.
Right: Committing weight backwards, but then tensing psoas muscles sufficiently to pull the pelvis forwards so that weight is borne on the balls of the feet.

Each of these common standing postures strain leg, pelvic, torso and neck muscles. Thus, none of them can be sustained beyond a few minutes. When long term standing is required (e.g. waiting for a train), people tend to alternate frequently between methods somewhat akin to the above.

Walking

In walking, although our destination is almost always forwards, our balance points are always directly underneath us. To the extent we commit our weight in a direction *other than* straight down, strenuous muscular activity will be required to keep us on our desired path. We navigate an *optimal* path when we stay atop the strong, medial edge of each foot. This is contrary to habit which tends to take us too far out to the side, where we bear too much weight on smaller, weaker, lateral metatarsals. Also worth considering is that moving laterally on one foot takes us away from the other foot, upon which we will soon be landing. This requires extra effort by large leg muscles to hold the ground.

Then there is the problem of building up too much forward momentum. This is a problem even for people without Parkinsons. If we were round, like a ball, we could build up as much speed as we wanted. But we are not round. Human beings have a particular, vertical orientation. In walking, we not only move forwards, but we also need to continue uprighting every step of the way. For this, we need to slow ourselves down. This fact is obvious when we are walking down hill. It is less obvious, but no less true, when walking on level ground. We slow ourselves down optimally not by muscular effort alone. We do so by utilizing the solid ground contact directly underneath us, alternating, as we move forwards, between the pivot point on the heal and the ball of the big toe. This happens in a manner similar to a pole vaulter running full speed during his approach, and then jamming his pole into the ground to abruptly change his direction from forwards to upwards.

Models Show the Strain & Skeletal Distortion That Occurs When Our Weight is Mis-Committed

Notice the locked knee joint on the support (rear) leg.

An Unfortunate Transformation

Toddler easily finding straight-down and straight-up while standing on tilted ground.

Same exact person at age 22 can't find straight-down standing on a level, tiled floor.

ABOUT MICHAEL PROTZEL

In 1980, Michael Protzel was very bad shape. At age 30, he couldn't get through a day of simple office work without substantial neck pain. A few years earlier he had to give up sports, no longer able to handle the strain. He was at the end of his rope, living with foot, knee, hip, and back problems that began before he was 10 years old and that were getting progressively worse. That's when he discovered the Alexander Technique. His teacher told him about natural human coordination and said that he was interfering with it. And that this could be changed.

After two years of private lessons, he entered a four year teacher-training program. He was certified in 1986 by STAT (the original, British teachers' society) and in 1987 by NASTAT (now AmSAT, the USA's teachers' society). He was *NASTAT News* Editor from 1989-1997 and Chair of AmSAT's Professional Conduct Committee 2001-2009.

In the early 1990's, Michael had an experience during a Tai Chi lesson that brought him in touch with motor-control phenomena that were not a part of traditional Alexander Technique theory or pedagogy. He was doing an exercise that required generating power through each leg, alternately. He had no problem with the right leg, but could generate no power through the left. Initially puzzled, he soon recognized that he was "mis-committing his body weight" — too far backwards and way out to the left. Suddenly, his lifetime of injuries flashed before his eyes, finally making some sense — beginning as they did with a serious left knee injury before the age of eight. He has been studying weight commitment and uprighting in depth ever since.

Michael is involved in other long-term self-observation processes in addition to the Alexander Technique and Tai Chi, including psychoanalysis, Carl Stough's Breathing Coordination, and the study of jazz guitar. In the mid-1990s, Michael worked with Alexander Technique teacher Ed Bouchard and his AT student, University of Chicago measurement guru Ben Wright, on *Kinesthetic Ventures, Informed by the Work of F.M. Alexander, Stanislavski, Peirce & Freud* (MESA Press, 1997). This book explores the languages of art, psychology, philosophy and cognitive science to describe the Alexander Technique lesson experience.

Michael maintains a private teaching practice in New York City and northern New Jersey.

In addition to teaching, Michael is President and CEO of Gann Law Books, one of the few remaining small, independent law publishers in the United States. Gann specializes in high-end, New Jersey legal treatises — used primarily by lawyers and judges — that comprehensively analyze the law in a particular field of legal practice — in print, online and E-books.