Structural Integration Psoas Intervention Considered in Terms of Normal Stability Response for Hip and Trunk Flexion: A Perceptive-Coordinative View

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Abstract

The psoas muscle topic highlights important differences between structural integration (SI) practice and allopathic approaches to musculoskeletal symptoms and dysfunction. Rolf's SI approach restores system coordination integrity rather than claiming to cure disease or organ, nerve, or muscle pathology. Out-of-balance psoas function is part of a motor control pattern. Psoas issues are part of confused patterns of stabilization: The psoas is frequently recruited as primary or secondary rather than tertiary stabilizer. SI is about restoring primary (normal) stability tendencies so that muscles such as the psoas are available for appropriate function. Rolf made fascial touch with the psoas part of SI protocol and it is integral to the restoration of normal stability and coordination in the SI series. How SI work benefits from this protocol is described as part of a package of coordinative system interventions for primary stability and security. SI work is enhanced by a comprehensive approach to stability that includes perceptive-based self-care programs that mirror the work of the series.

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This article is another in a series of articles that examine underlying premises of structural integration (SI). Contemporary science suggests that SI shifts motor patterns (of which posture is an example) and is not likely to be a direct adjustment to supportive membranes and cables (Frank, 2008). To help us think about structure as coordination rather than a stack of parts, the term movement brain was introduced in a previous article entitled "Body as a Movement System, A Premise for Structural Integration" (Frank, 2008). It's an invented term that points to the elusive and mysterious nature of motor control. We cannot dissect coordination. We do not teach people how to move. Structural integration integrates cortical and sub-cortical processes so normal coordination is restored. Our tools—things like fascial mobilization and perceptual guidance—happen to speak to the system event we call posture and movement. Success is measured in happy accidents of postural and motor improvement, but the controller of these accidents is a complex system of anatomical and neurological events that we are only beginning to understand. Movement brain is a term that respects how much we don't know and but offers a user-friendly name, a reference to the body movement intelligence we are working with. The psoas topic provides an illustration of how new premises apply to how we see and do our work.

The Myth of "Psoas Work"

Psoas is a word you hear a lot in body therapy circles. It's an icon that stands for successful or pathological movement and posture. Rolf steered body therapists to think about the psoas and incorporate psoas "manipulation" into touch therapy. Rolf described healthy function in terms of correct "uses" of the psoas muscle (Rolf, 1989, pp. 101-121). Structural integration training involves learning to administer the classic manipulations developed by or inspired from Rolf's sessions. Psoas work—direct touch to the psoas myofascia, accompanied by active engagement of the muscle by hip flexion and extension and spinal movement—continues to be an important tool.

But are image and reality congruent? Is the psoas the appropriate protagonist of this story? How do mythologies about the psoas serve or hamper the message of structural integration?

Do We Know What Is Going On?

What are we doing when we do what is called "psoas work" in structural integration? What is the logical role of the psoas in the story of body posture and movement? What is the logic behind our model of psoas function?

The psoas muscle is the primary hip flexor. It is also a flexor, rotator, and side-bender of the trunk. When the psoas contracts, as with any muscle, attachment points are pulled toward each other: The lesser trochanter of the femur and the front of transverse processes as well as sides of the bodies of the lumbar spine are pulled toward each other. Depending on movement choreography, the fixed point may be distal or proximal or both. The body's movement control system, the movement brain, recruits synergists and antagonists to establish stable fixed points as necessary for the intended action. Absent good choreography, the psoas is just another means of putting the body into a concentric ball.

The psoas, like all muscles, is a collection of motor units; only some of those motor units will fire as signaled to do so by the body's movement brain. Motor unit selection within what we call the psoas muscle, along with motor unit selection in synergist muscles and antagonist muscles, are the movement brain's way of shaping movement. Motor units are just that. They contract and relax. They respond to innervation by motor nerves. They obey the choreography of the movement brain.

"With Your Knees Bent, Raise One Foot Slightly off the Table"

When we ask a client (supine, bent knees) to raise one leg while we apply manual pressure through the abdomen to encounter a bulge of active psoas tissue, what's the net effect of this technique? What do we say we are doing? How does the psoas narrative fit the overall narrative of structural integration?

Are we rehabilitating fascial tissue associated with the psoas? Are we teaching people to "use" their psoas in a different manner? Such results may occur, but these descriptions are suspect. They imply that one or both muscles are somehow sources of dysfunction. Is psoas function (or dysfunction) the culprit in back pain, temporary scoliosis, compression of the lumbar spine, or walking with legs in front of the body? Or is there corruption at the level of system-wide, motor-control patterning? If the latter, what is the relationship of fascial manipulation to poor motor control?

Fascial touch, combined with strategically initiated movement, in fact demonstrates an efficient means to change motor control.

Does the Movement Brain Know What It's Doing?

What activity do we restore in structural integration? Are psoas muscles the issue? Is the fascia of the psoas the thing we are trying to change? It is convenient to say that it is. It adds mystique to the practitioner's role. It is convenient for marketing the work, (and now many body therapies and workshops market the psoas feature to attract interest) but do we seduce ourselves and our clients into an unfortunate model?

The movement brain is smart. Human beings can do extraordinary things. Acrobats, dancers, jugglers, athletes, and *Parkour* masters, to name a few, fill YouTube clips with astonishing feats of coordination.

If the movement brain is so smart, why do our client's psoas tissues feel so tight? Why does iliacus and abdominal tissue feel tight? Why does the diaphragm feel fixed? Are these tissue issues? Are these neurological issues or organ issues? There may be organic issues, but within the SI scope of practice what is our fundamental point of view?

Structural Integration Is Body Integrity Through Gravity

The prime directive of the human body, of the movement brain, is, "Don't fall down!"

To obey this directive we may practice what is called in the world of physical fitness, *core stability*. Core stability isn't a technique. It's developmental health. Core isn't a thing, although it is marketed as such. Core is normal adaptive response to demand. It is a system event.

Core stability begins in childhood with the stable feeling of being held by the ground, and by competent care givers who offer their own postural stability as a feeling tone for our little selves to absorb. From a place of stability we explore the world, and we encounter "demand." Demand denotes the stuff we need or want to do: the desire to nurse, or reach for a toy; the impulse to push something or someone away; the impulse to stand, to stand and walk; and encounters with many demands from a world that flies in our face with unexpected challenges to our physical or psychological well-being. How we meet demand is a measure of core stability. The movement brain's primary goal is to help us meet demand without falling down.

From the beginning of human life, falling down physically and psychologically are not separate matters. Posture, sense of identity, and physical competence are inextricably linked through biology that senses verticality. Biology of verticality is fundamental to Rolf's view and offers a metric for integrity of function: how well are we negotiating verticality? Rolf understood that biology is at the root of psychology and she saw that our biology forms in response to, and with integral sensitivity to, gravity. Biology doing well with verticality is body security. SI addresses body security and conveniently it underlies psychological security (Frank, 2010).

We can talk about biology and gravity when we talk about the movement brain. The movement brain orchestrates messages of support from our contact with the ground and our orientation to the space around us. These messages, in turn, guide our postural system to stabilize our axis.

The movement brain's primary goal is to help us meet demand without falling down.

It is the job of our movement brain system to provide a dynamic, adaptive response to, among other things, the need of the hip to flex. We do this every moment we walk: Our hip joint flexes so one foot catches our fall. To provoke hip flexion, psoas motor units briefly fire to assist the hip in swinging forward. Why would the psoas need our touch? Interruptions to movement brain response occur. This is a form of motor control confusion.

What Confusions Does our Work Clarify?

Our question regards motor-control confusion—confused coordination—and structural integration addresses this. We support the body so it can sort out confusion and restore integrity. Our work informs the movement brain to clarify postural preparation for actions that necessitate recruitment of psoas motor units. Structural integration refreshes and differentiates the body's proprioceptive and action maps so optimal choices in preparation are once again possible.

What are some of the postural confusions we find in bodies that have wandered off the path of optimum coordination?

Phasic Muscles Substitute for Tonic Muscles

Frequently, we see *phasic* (action) *muscles* used as *tonic* (postural) *muscles*. We find that action muscles are recruited for sustained stabilization. This covers a broad range of situations and includes not only the psoas, but also superficial abdominal muscles, the respiratory diaphragm, pelvic floor, lateral rotators, quadriceps, trapezius, pectoral, and rhomboid muscles (to name a few) enrolled as chronic (as opposed to episodic) postural stabilizers. Put simply, the "last line of defense" (tertiary) stabilizers are used as "set it and forget it" (primary) stabilizers.

Why does this condition arise? What leads to such a dubious choice?

The answer, simply put, is that in moments of overwhelm we compel the body to make temporarily expedient choices.

Movement Brain Gets Overridden

Expedient considerations override the movement brain. We preempt automatic movement intelligence in moments of overwhelm or to serve image-based posture choices. We replace movement-brain choices with effort-based choices, because they feel better, look better, or when it feels like we just have to (lest we fall down!). Some effort-based movement patterns stick right away; others take repetition. In either case, we face one problem: there is no reliable body function to undo; no reset button to restore movement-brain primacy to everyday events, ones in which last-line-of-defense recruitment is reserved for last-line-of-defense moments. Special case override becomes a permanent solution to everyday situations. This is a source of what Rolf called "random bodies." Randomized bodies express confused stability function.

Enter the structural integrator. The offer: assist clients in their path back to appropriate motor control. SI helps people recover automatic responses to demand, body responses that use economical motor-unit choices and synergies.

What Happens When We Touch Psoas Fascia?

We touch the fascia of the psoas to inform the body about preparation and stabilization. We teach the body that with sufficient stabilization—from feet, hands, differentiated and bi-directional orientation of the spine, support from the spatial dimensions of the environment—we may flex the hip without subverting psoas function into a stabilizing function. We touch the fascia of the psoas while insisting that movement be slow and well prepared. We touch the fascia of the psoas while insisting on presence to the sensory landscape of the event. We touch the fascia of the psoas as part of a system-wide restoration of stability.

Fascia is an efficient communication network for differentiating the body's map of itself (Frank 2008). At the same time, it helps to know what we are trying to say when we touch fascia. We touch fascia to help the brain sort out which body parts need support and fixation and which ones need to act. Our touch wants to be informed about stabilizers.

What Are Stabilizers?

The human body is an example, according to Gracovetsky (2005), of *controlled instability*, for which there are evolutionary advantages: We can change our position in space more quickly by "letting go" than by initiating additional muscle activity. A body designed for instability can move quickly and efficiently by letting go. This evolutionary improvement—instability—requires parallel improvements in the mechanisms that assure stability. Rolf proposes that humanity is still working out this part of the equation.

Our upright body is upright only as long as a set of automatic reflexes keeps us upright: for standing, walking, and all the things we do. In his tonic function model, Godard (Frank, 1995) points out the distinction between muscles that are designed to hold us upright, the tonic muscles, and the ones that are for action, the phasic muscles, and how important the tonic system (including tonic muscles) is to understanding the role of gravity and gravity response to the work of structural integration (Frank, 1995). The take-home message for structural integrators: It's the client's gravity response system with which we work.

Tonic muscles are physiologically endowed to function for stability in gravity. The term *stabilizers* (rather than tonic muscles) is more user-friendly for many clients. Stabilizers are muscles (along with fascia) that fixate the body so that other muscles have a fixed point from which to move a body part that is not fixed. In the spine, stabilizers play the role of erecting the spine, holding it erect, and stiffening the spine as necessary to resist bending stresses from muscles or loads applied to the body as a whole.

Different Types of Stabilizers

In the service of stability the body has different structures for different predicaments. The movement brain, in the absence of subversion, will employ primary stabilizers first. Primary stabilizers are less corruptible; that is, we are much less able to manipulate them at our whim. They are economical: optimum geometry, optimum stretch receptor density (lending nuance to amplitude and timing), optimum blood supply, and optimum linking with fascia to help them carry the load better. Optimum economy depends on primary stabilizers performing a "set it and forget it" function that's handy for us (bipeds) to meet the challenges of life.

Primary stabilizers are designed for small amounts of action and large amounts of nuanced and economical stabilization of the spine. But not all stability is provided by primary stabilizers. There is a line of reasoning, articulated by Chaitow and others, that we improve our muscle model by positing three classes of stabilizers (Chaitow, 2009). Thus, stabilizers are broken down into primary, secondary, and tertiary stabilizers.

Secondary stabilizers trade off some stability economy for a greater chance at effecting action. Secondary stabilizers are very important because sometimes we briefly need greater resistance to falling down.

Tertiary stabilizers trade off still more economy and efficiency of stability than secondary stabilizers; they, in turn, achieve greater potential for action-oriented movement. However, when the body needs absolute highest resistance to failure, they can provide robust and dramatic stability.

No particular muscle is bad or good—each has importance for survival and well-being; otherwise we wouldn't have it. However, orchestration of stability can become confused, as mentioned earlier.

Muscle classification can itself be a trap. Focus on muscles won't revive system stability. Focus on trying to activate a muscle usually makes movement worse; and ironically we increase stability confusion. With regard to the psoas, knowing more about function and tissue type may, in this case, help ease our muscle-focused thinking.

Psoas Best Serves for Action—But Can, in a Pinch, Serve for Stabilization

Psoas Considered Through Function

The psoas is a muscle that can move the femur or move the trunk in a large range of motion. Psoas function can exhibit a whip-like, rapid force. We see this in limb movement and also with spinal movement.

An amusing example: Jim Asher, Rolf Institute® faculty member and close friend of Ida Rolf, points to popular athletes to illustrate integrative function. In 1987, he spoke about the amazing ability of football quarterback, O.J. Simpson, to jerk his body sideways to escape being tackled, what Asher referred to as his ability to "juke." Asher mentioned Simpson to demonstrate an unusually skillful move involving the psoas. In this case, the distal attachment of the psoas is momentarily fixed so as to effect the movement of the spine to evade capture. (One observes that Mr. Simpson later developed other capacities to evade capture as well.).

With proximal psoas fixed points, the distal motion of the femur can be similarly dramatic, as with a skillful kick of a ball in the midst of a sprint down a field. Psoas action can also be part of efficient gait as with aboriginal hunters who run 20 or more miles to catch their prey.

The psoas is part of rapid and dynamic trunk or lower limb movement; however, it doesn't function on its own. Our message weakens if we imply it does so, if for no other reason than it steers people to think about the psoas muscle when they move

The Simpson example makes the point that the psoas is an action muscle. It is a phasic muscle. However, it can also act as a powerful stabilizer. Gibbons describes psoas stabilization in terms of axial compression (Gibbons, 2002). Stiffening the spine by compressing it is a form of stabilization, but an expensive form. One can also imagine the evolutionary advantage for early hominids in being able to wrestle another hominid or wrestle a large angry antelope, aided by brief recruitment of the psoas muscle to resist the twisting of the other mammal.

We can think of psoas stabilization as a part of our coordinative repertoire: It enables us to overwhelm prey or resist overwhelm by an opponent or predator. The psoas can powerfully lock the spine, or it contributes to snake-like power. If one holds a house cat still, to treat an injury, it's surprising how it can wiggle out of one's grasp. We need this function and, at the same time, we need to reserve it for special occasions; for moments rather than hours of sustained contraction. Functionally, the psoas fits the picture of what Chaitow (2009) terms a tertiary stabilizer. It can supply high levels of force and stability but is a very expensive choice when other choices are available. (The iliacus belongs logically in the category of secondary stabilizer, not ideal for sustained control, but also less of a mover than psoas. When iliacus functions as a primary stabilizer, like the psoas, its function becomes confused. Differentiation of the iliacus and psoas through fascial touch and coordinative demand is typically part of the structural integration protocol.)

Psoas Considered Through Physiology

Functional assessment of the psoas as an action muscle is bolstered by psoas physiology. Muscle fibers are classified as slow twitch (Type I) and fast twitch (Type II), where slow twitch muscles are set up to provide long-lasting stability and fast twitch fibers are best suited for action. It turns out that the psoas fibers are fast twitch (Type II) at both superficial and deep levels of tissue. Contrast this with multifidus, a primary stabilizer muscle—the fibers of which are slow twitch (Type I) (Regev et al., 2010).

Functionally and physiologically it is logical to think of psoas as an action muscle that can function, albeit expensively, as a stabilizer.

Examples of the Psoas Being Converted to a Primary Stabilizer: Gravity Organization and Psoas Use

The question remains, why and how does the psoas end up committed to stabilization rather than action? What leads to psoas function tied to dysfunction? What leads to the palpatory impression that the muscle has been holding on for dear life, and is painful to be touched?

How do People Find (or not Find) Adequate Support?

A person sits on a chair or bench: where is the support? Do the feet register pressure and weight? It helps to speak about posture in terms of a general gravity center (G) and an upper gravity center (G') (Frank, 2007). If the upper body center of gravity is posterior to the hip-joint axis, what keeps the head and trunk from falling backwards? A chair back offers some support, but does the movement brain register the intended support? Is the lumbar curve kyphotic and therefore evading support? Even with a chair back and especially in the absence of one, we see the psoas, with distal fixed point, used as a back sling. A posterior gravity center issue is amplified in cross-legged posture. Is there weight on the knees and rami, or are these points unloaded? When people sit on the floor with the upper center of gravity behind the hips, the body learns to use the psoas as a primary stabilizer. Psoas is recruited to prevent backward fall. With time, this posture reinforces itself and spinal compression amplifies.

Driving a car is an interesting case: As with other seated postures, the psoas spends time passively shortened in hip flexion. There is a seat back. But is the body relaxed against the car seat?

A G' posterior posture while operating a car is a perceptive conflict. When one drives a car in traffic, an activity that draws the attention forward, it involves a sustained "sit up and lean forward" response, consciously or sub-consciously. The messages to the body are not congruent. One message says, "Lean forward to avoid hitting something," while seat architecture says, "Lean back." For some there will be no apparent conflict. Many persons feel a car is a secure womb from which to calmly weave through the bustle of life. For some, however, a car provokes an extension of body vigilance, to gain advantage or avoid being struck, for which the perceptive system puts the extended sense of body out in front of the car itself. The movement brain tries to help. The psoas activates (futilely) to put the physical body closer to its target of interest. A long car ride can produce many debilitating results; a tight psoas is one of them.

When we observe a person walking or running energetically, but with the upper center of gravity behind the hip joint, the trunk is necessarily "towed" forward by the psoas, while the same muscle is being used to lift the leg out in front of the body to take a step. The psoas has no secure upper fixed point, and at the same time is being used to hold the spine from falling backward.

In contrast, if we observe a person walking or running with the upper center of gravity ahead of the hip joint and the lower center of gravity in front of the Chopart joint of the foot, in other words a person with both gravity centers forward of their respective points of reference, we observe another psoas conflict: the need for both upper and lower psoas fixed points. The strategy requires concentricity of contraction. Respiratory diaphragm and psoas are keeping the feet "suspended" off the ground and, at the same time, paradoxically, keeping the body from falling forward. The psoas is part of a defense against the lack of lower support and acts in a sustained role of stabilization.

Observe a plumber, carpenter, electrician, auto mechanic, logger, or weekend warrior doing backyard chores. The person stands bent forward over his or her task, holding a tool or heavy machine. These situations extend over time—periods in which there is lack of support from hands and feet and directionality in spine. Slowly, surely, the secondary and tertiary stabilizers kick in, but not for brief periods of time. They stay engaged. The psoas is recruited to stabilize the spine to produce work. Unfortunately, forward lean of the trunk combined with axial compression from psoas anterior to the gravity line, compounds gravity load on the tonic extensor muscles in back. The struggle between flexors and extensors of the trunk becomes background to the struggle with the saw or wrench. This struggle goes unnoticed for long parts of peoples' lives.

We observe a person lift a heavy box. He or she anticipates the load with some mix of will power and angst. The upper body doesn't relax forward; it gets pulled forward to grasp the load. Psoas is evoked unnecessarily for trunk flexion. What is the chance that the psoas may remain tensed as the body stands upright and asks for hip extension? The psoas is recruited as a flexor and stiffener that holds the body forward, while the body is being asked to erect itself under load.

In competitive rowing, what happens as the rower is urged to row faster by the coxswain? Does the brief trunk-flexing action of psoas release fully in the pull phase of the stroke? Or does urgency tell her to keep the spine stiff to exert earnest effort? The psoas slowly converts to spinal stabilizer to master the event of competitive rowing, a conflicted pattern.

We watch a client demonstrate the leg-lift portion of the *Five Tibetans* exercise, or any manner of crunch exercises such as the *Hundred* in Pilates training. What gets practiced? Is hip flexion preceded by appropriately stabilized (stiffened spine) prior to engaging hip flexion, or is it more likely that hip flexors (as well as other secondary and tertiary stabilizers) are being asked to stiffen the spine and then simultaneously flex the hip? Again, we see a conflicted use of the psoas, and at the same time, a conspicuous absence of attention to stability. In the author's experience, no client has the level of stability to seriously engage in supine bilateral leg-lifts without exacerbating confused motor control.

The psoas moves from tertiary to primary stabilizer in any manner of ways. The common thread is episodic to habitual subversion of the psoas from action-oriented—or tertiary stability—role to primary stabilizer role. The reader is encouraged to consider his or her own list of examples.

Examples of Psoas Free to Respond to Demand

Human gait shows optimum stability and harmony of hip flexion when we don't see localized points of tension and effort. What we read as tightness, effort, or tension usually involves agonist and antagonist co-contraction, and secondary or tertiary stabilizer muscles recruited to hedge against failure.

A healthy human body walks in a manner that suggests a flow of highly-differentiated events, brief and nuanced, as to give the observer a sense of fluidity. A healthy walk looks both effortless and, at the same time, secure. Falling down appears unlikely, even if a surprise occurs on the way. The psoas muscle stops being a source of concern as star or villain of movement.

What Coordinative Exercises Expand the SI Tool Box?

Rolf's "psoas work" was, as previously mentioned, an advance in teaching clients to find improved posture and function. This article affirms the value and efficacy of what we already do.

Structural integration fascial work typically combines with movements such as: bent knee raise supine, knee extension and flexion supine, segmental flexion and extension of lumbar spine accompanied by guided touch anterior and posterior to spine, and lateral flexion of spine supine. In addition, seated work can include lumbar flexion and extension, lateral flexion and rotation of the spine, and hip extension. The list is not exhaustive but suggests the breadth of dynamic movement and coordinative challenge that accompanies attention to the psoas in structural integration.

We reframe and clarify the action of our work by understanding the role of the psoas in relationship to the role of primary stability, biomechanically and experientially. We clarify our message when we support clients discovering what stability feels like. Clients are happy to find that perception-based exercises arouse the sense of having received a session. In this way, Rolf's claim that change improves over time becomes more plausible. Clients are less likely to think of their practitioner as someone who cures them of "psoas problems," which is a false idea. Additionally, we update the SI message so it reflects contemporary models of motor control and stability.

What Are the Goals for Exercises?

Exercises for core stability will be different done in an SI context than when done in most other exercise or therapy contexts. As SI practitioners, we know that if we wish to make a deep change, a lasting change, we will want to contact gravity orientation.

Our goals for exercise are specific:

- Stabilize first at the level of orientation
- Stabilize at the level of perception
- Invite recognition of the feeling (and pleasure) of stability
- Sustain the perception and recognition of perception
- Then execute a sufficiently feasible challenge to amplify stability from demand

This approach supports movement brain priority: establish position in gravity; establish the sensory landscape of body and action space; receive the experience of body security; respond to demand.

An additional goal: Experience how the spine can lengthen as demand load increases. As load increases and spine lengthens, the sense of personal "doing" reduces, or disappears. For most people, this is a relief and an unusual experience. It's counterintuitive but also a welcome contradiction to our belief that life is effort.

Lengthening response to load is part of human birthright, one that we may never have known. Rolf's message points to this phenomenon with passion, and is communicated by bodies in which it has comes alive. The mission of structural integration is to transmit this message.

A body that lengthens with increased load is a body in which the psoas functions well. Psoas function is a reflection of how well the body has prepared for psoas recruitment. The ground of the psoas movement, the background activity that precedes the psoas action, is the basis for exercises and the basis for living life.

Stability exercise is mostly impeded when we think about specific muscles. The exception is when we interrupt the interruption of muscles that don't belong in primary stability, such as rectus abdominis.

Strategic Considerations for Exercise

The 20% Rule

The figure 20% describes the level of effort desirable for improving stability. Richardson mentions the figure 10-15% (Richardson, 1999). In any case, the point is to reframe exercise as something more perceptual than physical but physical enough to arouse the body's interest. If an exercise provokes too much effort we risk perpetuating stabilizer error, which we also call strain patterns.

Low Reps

Exercises are designed to challenge the body, but more important is to challenge and capture the imagination. The mind is bored with many repetitions. The work needs to stay fun and interesting. Three repetitions per action prevents boredom; if the exercise involves both sides of the body, three repetitions per side. The goal is presence. We need the full attention and engagement of the whole person. We want to continually challenge the notion that we are building "stuff" (such as bigger, harder muscles). We are reviving system intelligence. We treat the movement brain with respect and recognition of its sensitivity.

Stop

If an exercise starts to feel wrong, stop. Stop completely, then re-build the perceptive basis and start again, slowly. Pre-movement is just that. It has to happen before we move. After we are moving, it's too late to fix. The quicker we stop a mistake, the better the brain learns.

Small Demand and Larger Demand

In this style of work, a small demand precedes a larger demand. Often stability happens twice. Stability is provoked as we use perception or use perception and add a small demand. Stability adjusts and amplifies as a stronger demand is introduced.

Walk

After a short cycle of exercise, walk. Notice what you experience, what has happened. Perceptive work needs confirmation. Our experience needs to know that a system event, a change in coordination, has occurred. Typically such a change is instantaneous. When, after perceptual preparation, we do a brief exercise and feel a change in coordination, we receive an important message about how body systems work. This experience reinforces the value of what we are doing. Taking time to notice right away makes a habit out of tracking sensory experience which, in turn, makes a habit out of anchoring change.

Don't Wait (I)

Start early in the series: Don't wait. Introduce stability-based movement to the structural integration process on day one. Make it logical to test client stability, so the issue is framed. As you progress, stability work has precedent. Simple exercises usually take many episodes of repetition so an early start makes it possible to review, modify, and add new material, multiple times. Stability work creates a context for further work. Rolf's advice was to only do ongoing work (past the ten series) if you can take the work to a deeper level of integration. Improved coordination, better integrated into life, constitutes deeper integration.

Don't Wait (II)

Consider exercise instruction as a way to start the session rather than (only) to finish it. You may be surprised to find that it makes the session more efficient. Practitioner and client define session relevance in the terms of a simple stability challenge before and after.

Movement Brain

Teach the client about the movement brain concept and the "where and what" model of movement brain versus cortical brain. Work with peripheral gaze and the various perceptive skills involved in SI, the activities that assist in reviving movement brain primacy (Frank, 2008, 2010). Practice these skills in the course of most fascial interventions in the SI series.

Select Exercises to Support Normalized Stabilization in the Context of Structural Integration

Brief exercise descriptions follow. A manual for teaching and learning the exercises is beyond the scope of this article. Some are described in *How Life Moves, Explorations in Meaning and Body Awareness* (McHose & Frank, 2006) and in articles in the Resources in Movement article archive. Others, not currently documented, will appear in future articles or video at the Resources in Movement website. Typically, perceptive core stability catches the interest of practitioners in rehabilitative and somatic movement therapy fields more than fitness trainers. This is slowly changing. Motivation comes from the experienced failure of conventional approaches. Once motivated, it helps to have in-depth instruction for clarity.

The exercises are part of the repertoire that is currently taught at Rolf Institute Principles classes and Rolf Movement® Certification classes, as well as CE classes by the author and other Rolf Movement instructors.

Exercises for Perceptive Core Stability in the Context of Structural Integration

Straight Leg Raise Supine

Leg raise supine is central to our discussion of psoas function. Base line: The client is asked to raise one leg with extended knee. Client is invited to feel what happens. How does the body respond to this demand? Client is asked to do whatever he or she can to keep the pelvis from rotating in the transverse plane while doing the leg raise. This is a good opportunity to speak about primary, secondary, and tertiary stabilizers, and to review the anatomy of the psoas and the transversus abdominis and multifidi.

Intervention: Client is instructed to induce a small demand by pressing the contralateral heel into the table or the entire calf against the table, perceiving the directionality of the press, and maintaining perceptions of directionality in the space and weight on the table. Client is asked to sustain downward press of contralateral foot, then to feel upward directionality of the foot to be raised, a directionality toward the ceiling, and then to follow that direction in movement. Client raises foot and straight leg (see Figure 1).

Evaluate the degree of stabilization in lumbar spine and pelvis—how much rotation occurs during leg raise. Are abdominal wall and coastal arch relaxed and soft? Soft abdomen is essential. If stabilization is secure, recommend a few repetitions per day. If stability is poor, shorten the lever arm of the movement with a bench under the calves, knees bent

Figure 1. Straight Leg Raise Supine: heel of stability leg pressed into table; action leg raises; hand checks for soft abdomen and no rotation of pelvis or spine.

Figure 2. Calf presses bench; opposite leg raises; belly soft; no rotation of pelvis or spine.

at 90 degrees (see Figure 2). Then repeat the pre-movement and the leg raise. Other interventions to help stability include: exploring missing places of orientation and evoking upper girdle stability as a pre-demand for lower limb stabilizing movement.

Emphasize that the psoas can only produce competent action when the axis of the body is sufficiently stabilized. With spinal stability assured, the psoas is relieved of a potential dual function. It doesn't have to be stabilizer and mobilizer at the same time.

(Leg raise prone is very similar but works with hip extension rather than flexion. As with leg raise supine, a small demand with the contralateral foot evokes stabilization that amplifies as leg extension starts.)

Lordosis: Range of Motion Revival

As addressed in the discussion of lordosis in *How Life Moves* (McHose & Frank, 2006, pp. 99-131), the investigation into mythology around lumbar lordosis is fertile territory for client education. It's helpful to interview clients to find out about the stories they live with on this topic. It's useful to know what the client's beliefs are. Since the mid-twentieth century, lordosis has been a convenient, if simplistic, target of blame. Ironically, lordosis is the evolutionary leap that permits human beings to be upright.

The structural integration point of view is that lordosis is part of adaptive capacity to demand. An adaptive lordotic curve is often inhibited at the body image or body schema level. Inhibition means the spine doesn't freely change shape to meet circumstance, often because the lordosis is not free to move fully into extension. Revival of the full range of lordotic movement is an important example of work to revive adaptive spinal movement.

To revive latent capacity to move into whatever degree of lordosis a client is physiologically able, is already a profound step toward improving the stability equation. A spine that is held "out of lordosis" is a spine stabilized through confusion. Yet many of our clients are in this condition. Reviving lordosis through perceptive work gives the movement brain vital information.

SI practitioners have the opportunity to revive lordosis with support from the hands and feet seated or on "all fours" (on floor supported by hands and knees). In either instance, the process is part reassurance and education, and part strong touch to the spinous processes of the lumbar vertebrae.

Figure 3. Client finds support from hands and knees, allows front of spine to lengthen and pressed segment to move to anterior end point.

Figure 4. Client links support of hands and knees to pressed segment and presses segment posterior. Belly and chest feel soft. Breath is easy.

Lordosis Range of Motion "On the Floor" Version

Client is educated about the "front of spine" idea. Ideally the client is shown what we mean by front of spine, when we pass a finger up and down the anterior line of the bodies of the vertebrae on a model skeleton. The client is invited to imagine the front of his or her spine as an alive sensory experience.

With an imagined sense of front of spine, combined with directionality out of top of head and out of end of tail, peripheral gaze, and sense impression in hands and knees and toes, the client is prepared for supported spinal movement (see Figures 3 and 4).

Hands are supported by the floor. Practitioner applies anterior pressure on one lumbar spinous process. Mindful of support, the client allows that spinal segment to move anterior, allowing the whole spine to move in concert with the segment being pressed anterior. At end point of range of motion, the practitioner maintains some pressure for a moment. This gives the movement brain information about what coordinative pattern may prevent further anterior movement. Client then refreshes perceptions of support and directionality, and then presses the segment posterior against resistive pressure from practitioner. One or two repetitions typically lead to improved anterior and posterior range of motion. Anterior and posterior range of motion can be practiced in several segments. This sequence is at the heart of perceptive core stability: Hands and feet, directionality of spine, and orientation to gravity lead to segmental competence and stability. Stay within client's capacity to stay present and to feel supported in the process.

Sitting Backwork for Anterior and Posterior Movement From Hands and Feet

The seated version of the preceding lordosis work fits naturally into the seated backwork typical to Rolf's classic series. Emphasis shifts slightly from tissue work to articulated segmental stability supported by perception of hands and feet; the client's feet on floor and hands resting on the edge of the bodywork table or on handles fixed to wall or floor (see Figures 5 and 6). Other planes of motion of spinal segments can be adapted to the stability issues of the client.

Figure 5. Client is supported with hands and feet; front of spine is allowed to lengthen and pressed segment moves anterior.

Figure 6. Client supports posterior movement of segment from hands and feet.

Although it is not unusual for facet fixations to release in the course of this work, it is not the primary goal. The goal is restoration of coordinative integrity, linked to a comprehensive program to empower the client in stability understanding and maintenance.

Have the client walk after doing a small amount of work. A walk reveals changes of coordination as stability is provoked. Practitioner and client want to see and feel the consequences of each piece of the process.

Arabesque (One-Legged Stance)

The *arabesque* is a figure from ballet. Godard (2002) adapted arabesque for stability exercise in structural integration (see Figure 7).

Preparation for arabesque is similar to other exercises. One foot stabilizes while the opposite leg extends. The stabilizing foot is aroused to receive contact with the floor. Space above and around the head is evoked as a field of interest and attraction. It takes practice to make these perceptions simultaneous and easy. A practitioner can shorten the client's learning time with his or her own embodiment of them. Clients see the practitioner's perceptive preparation if the practitioner demonstrates contrast between strong perceptive field and absence of same.

Figure 7. Arabesque expresses the bi-directionality of the spine and epitomizes stability from perception. Arabesque is a snapshot of the stance phase of gait as well as Rolf's Fourth Hour.

The up and down sense between space overhead and ground below foot is amplified until the trunk lengthens easily and the opposite hip abducts slightly so that hip can extend with foot clear of the floor. Arm and hand swing forward slightly on the side of hip extension.

The moment of hip extension should be brief, especially at first. Range of motion can be small. Preparation contains most of the benefit, but actual execution of the movement keeps the movement brain convinced stability must mobilize.

We do the exercise to arouse the coordination of trunk stability and sacroiliac stability. Arabesque also offers a snapshot of landing phase of gait. It is a snapshot of Rolf's Fourth Hour in which the standing leg lengthens in the adductor line, while the extended leg abducts and releases in the front of the hip.

The embodied arabesque is an icon of structural integration, in that so much of the ease and power of gravity orientation and movement brain stability is concisely expressed.

Arabesque is illustrated and discussed in an article about contralateral gait and coordinative structure (Frank, 2003), as well as in the book *How Life Moves* (McHose & Frank, 2006).

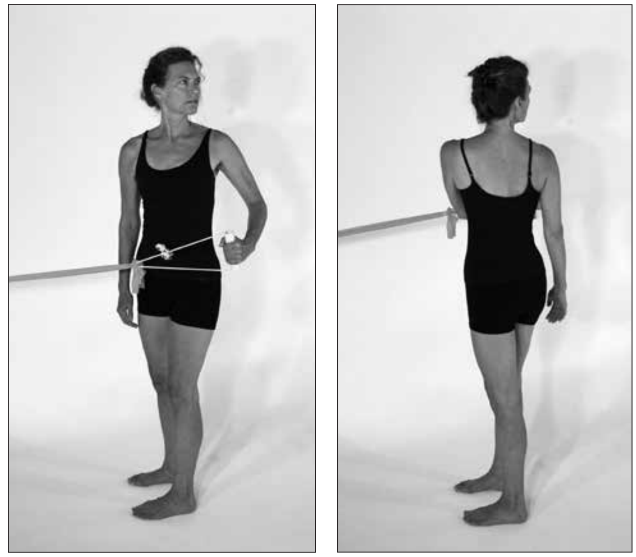
Figures 8-13. Flight of the Eagle movement sequence involves coordinative challenges that express the goals of the structural integration series. Stability derives from orientation with hands, feet, and directionality originating at the hands and feet, ends of spine, and ischial tuberosities. The spine learns segmental stabilization as a perceptual event.

Flight of the Eagle

The flight of the eagle is a multi-part series of movements that recapitulate Rolf's entire ten series, in perception and coordination (see Figures 8-13). Upper and lower girdle stabilizations reinforce each other. Segmental movement of spine is supported by hands and feet, and vectors of directionality. The learning process for flight of the eagle can be challenging, because the skills are often totally new. The form of the movement is deceptively simple; that is, it looks simple, but our bodies are often confused as we try to imitate it. The work has many tangible benefits, however, including the kind of stability for hip and trunk flexion that "psoas work" is meant to achieve.

The basic instructions for doing flight of the eagle are lengthy and aren't reproduced here since they are already well documented. For a detailed description

Figures 14 and 15. Shot put combines orientation to directionality and to ground. Trunk rotation arouses natural stability responses. Delivery of throw arouses shoulder stability.



Figures 16 and 17. Pulling rope, like shot put, arouses trunk rotation stability response as well as shoulder stability responses.

of how to do flight of the eagle refer to the section in *How Life Moves* (McHose & Frank, 2006), or the article in the Resources in Movement archive (Frank 2005). There is also a YouTube video showing Caryn McHose doing this exercise (see Resources).

Shot Put and Pulling Rope

Shot put (see Figures 14 and 15) and pulling rope (see Figures 16 and 17) are both examples of rotary torso exercises that arouse the body's urgency to stabilize from hands and feet. The elastic band (or cable attached by pulley to a weight) is used to provide resistance. Both exercises begin with establishing sensory aliveness in the hands and feet and by registering floor contact along inner and outer arches of the feet. Floor contact along both arches is critical while doing the exercise. In shot put, the front foot is most likely to lose contact during trunk rotation. In rope pull, the abductor line to the cuboid bone and floor and the adductor line to the navicular bone and floor need to lengthen alternately with rotation from one side to the other.

Shot put evokes the movements for throwing a heavy metal ball called a shot. It is also analogous to other ancient human activities: throwing a spear, scything grass, throwing a ball or a punch. The band or cable comes from the side and one stands facing it. Front foot attempts to maintain contact and back foot pivots on to toes as the hand accelerates the band with a twist of the trunk.

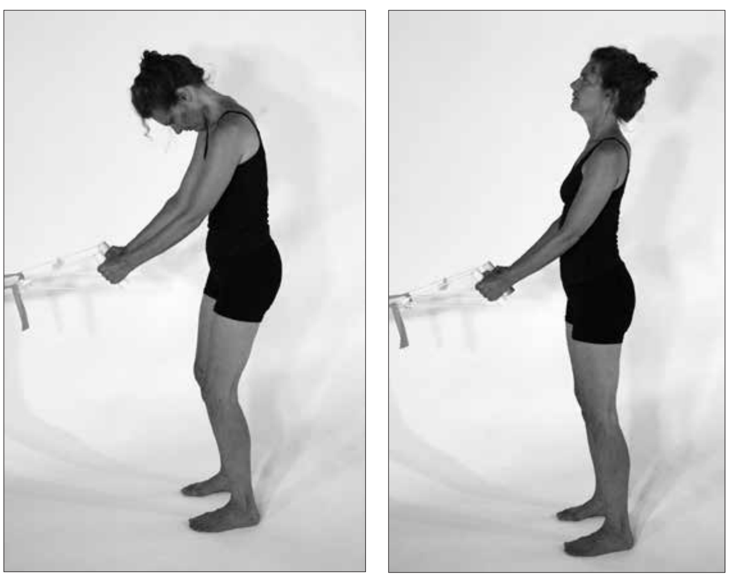
Pulling rope is similar, but the band or cable is in front. The feet stay planted and the twist alternates to one side and the other. This can be done standing or sitting down.

Segmental Rolling the Spine with Resistant Band

Seated or standing, this exercise is a self-care version of structural integration seated backwork. A handle attached to band or cable is held with both hands. The client is instructed to start folded over and then slowly roll up the spine one segment at a time with continuous and sustained foot contact on the floor and soft abdomen (see Figures 18-24).

Spinal Wave Movement

Beginning with segmental "rolling" up and down the spine in bent knee supine, one explores segmental undulation in sagittal, and then lateral, and transverse planes. Wave motion in three dimensions is a signature of Continuum movement inquiry, among others. Wave motion belongs in psoas discussion because it is a metric of stability to gain differentiated sequential movement of spinal segments. Wave motion alone does not insure stability upright in gravity and meeting life demands, but, combined with other exercises, it plays a helpful role.



Figures 18-24. Seated and standing segmental roll of spine recapitulates aspects of Rolf's classic seated backwork in which hands and feet support sequential movement of spine.

Structural Integration's Model and the Background to Healthy Psoas Function

Rolf provoked discussion of psoas function through development of the structural integration series, and through demonstrations, lectures, and writings passed down as her legacy. The work has stood the test of time. Posture changes. Bodies integrate. As of this writing, eighteen schools of structural integration are recognized by IASI as legitimate places to train in the work sourced from Ida Rolf.

Theory has held up less well. Fascia has become an established concept in modern culture, partly due to Rolf. Fascial research has, in part, been propelled by the field of structural integration. The research is brilliant and exciting. There are important questions to answer about the mechanical and biomechanical nature of fascia in the human body.

As of 2013, however, fascial research falls short of corroborating Rolf's gel-to-sol model, fascial plasticity, or the idea of fascia as the arbiter of postural habit. Fascia, nonetheless, plays an important role in posture and is an important part of the motor control system. The neuroscience community has ushered in an era in which the brain's sensory and motor maps show provable plasticity. Fascia functions, most probably, as an excellent communication channel through which practitioners can revive or modify brain maps (Frank, 2009).

Psoas work benefits from this change in thinking. Structural integration's contribution to people's everyday lives benefits as well. Models of coordinative change give SI a better shot at its rightful niche amidst the plethora of somatic therapies. Fascial differentiation, combined with perceptual and coordinative challenges is, and always has been, an effective and impressive package. When we spell this out as a system event, to clients and students, the process is less mysterious and more believable.

The psoas muscle will continue to have special status for body therapists. Why? We like to have something to point to, something dramatic that is good or bad, something to compare. It's harder to point to "system coordination." It's not a "thing." "Show me the movement brain" you might say. And we can't do so. That's the point. It's safely out of our hands.

Our confusion in body coordination mirrors our confusion in ontology. We want to look at the body mechanically and in terms of fixing identified parts, but the body is more complex than a collection of parts. Parts models fail to answer the question: Why does stability fail? Normal stability means that, mysteriously, primary stabilizers initiate first, most of the time, without having to think about it. Failed stability is less mysterious, but not well solved when we look for a failed part.

We can point to timing failure in muscles such as the multifidi or the transversus abdominis. That's worth learning, but we don't revive primary stability unless we listen to, and speak with, the movement brain to find out which messages it has heard and which messages it is starved for. The movement brain listens through channels of sense perception and speaks in the language of sensation and movement. The client's movement brain senses practitioner presence and resonance. The practitioner's movement brain senses the client's perceptive field and coordinative preparation. Familiarity with, and attention to, movement brain messaging helps structural integrators find success in reviving integrated function.

Resources

Flight of the Eagle video: http://www.youtube.com/watch?v=lbRxgIOQ2wE

Resources in Movement: www.resourcesinmovement.com

Resources in Movement article archive: www.resourcesinmovement.com/archive.htm

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