

Shifting of Body Weight Sensory Influence on Central Pattern Generators Through 'Ground-Down' Reference

By Ron Hruska

Rhythmic transfer of body weight from side-to-side when we move forward, or during quiet stance, implies that the underlying motor control mechanism must be involved in changing stable body balance or equilibrium from one position to another, as we simultaneously gesture, breathe, talk, chew, or listen. Movement is achieved by a “multi-level control system”, as pointed out by Scarlat K. et al, in their paper on *Referent Control of Side-to-Side Body-Weight Transfer During Standing Stepping in Adults, Neuroscience 551 (2024)*.

Rhythmical muscle activation is accomplished secondarily, by the central pattern generator, or CPGs, interacting with environmental forces and affected by proprioceptive and vestibular reflexes and vision. (Feldman, A.G. et al. *Changes in the referent body location and configuration may underlie human gait, as confirmed by findings of multi-muscle activity minimizations and phase resetting. Exp. Brain Res 2011.*)

It is also known that we have neurons located in the hippocampus that are called ‘place cells’ that are activated when the body reaches a certain location in the environment by how the body is deflected, which would include proprioceptive, vision, and ground reference. (Ekstrom, A. et. al. *Cellular networks underlying human spatial navigation. Nature 425, 2003*)

Often, I find that most people, who refer to ‘grounding’, are using this word to represent the need to “feel the ground”, or “sense the ground”, or “locate the ground”, and focus on the ‘ground’ that the leg is going on to or down on, not the leg that is leaving the ground that is going down or away from the body; as weight is being transferred to the ‘grounding side’. This is a cortical, spinal reflex, and hippocampus misnomer, in my opinion. We feel alive, when our legs are lifting, even slightly, and alternating, when upright.

We develop patterns of upright composure around our body’s actual upright sense of alignment that is controlled by the way we match our shifting from ‘side-to-side sense’ for minimal muscle activity required for controlled equilibrium at the moment of weight transfer away from the side that our sense of support is dampened, dropped or disused.

An example of this limited ‘side-to-side sense’ is when the right arm is used for finding the ground-sense under the right leg. One will usually lean to the right. The right shoulder drops and lists to the left as the right leg is lifted, or as the left arm is brought forward, as the ‘sense of center’ remains to the right of L1-L2. Essentially, the left arm, over time, helps “ground” the right leg.

The word “grounding” does not describe this issue of over-reference and referent control neurology, nor the rhythmic interlimb interaction dilemma, nor the hippocampal neuronal network that has been established. And by trying to “ground” someone on the other side, only enhances the intensity of focusing on the word “grounding” or ‘ground-up’ versus the word “lifting” or ‘ground-down’.

Grounding is a word that is used for making direct physical contact with the Earth’s surface, such as walking barefoot on grass or sand, with the aim of benefiting from the Earth’s natural electrical charge.

Some call this 'earthing'. It is often referred to as a psychological way of coping with intense emotions by focusing on the present moment.

Our present moments depend on control and subconscious side-to-side transfer of body weight through neural shifting away from surfaces that are lowering. It is only then that our rhythmical, reflexive, referent control of our body, in an ever-changing environment, will resume acceptable alignment for gravitational benefit.

Many of us need to sense this acceptable transfer of body weight by neutralizing the over-sense of the surface that is lateral to our spine. This hemi-sense of ground force needs to be dampened by lowering, the ground surface on the over-sensed or over dependent side as the under sensed side is raised. This neurologically can't be accomplished by only shifting someone over to the side they can not adequately rhythmically sense for retraining purposes.

Here are my favorite PRI techniques designed for shifting of body weight/mass for single leg spatial integrative 'ground-up' sense of physical and cortical control through 'ground-down' referents:

- 1) Standing Supported Right Knee Flexion with Weighted Left Proximal Hamstring
- 2) Standing Supported Passive Left AF IR with Right Trunk Rotation
- 3) Standing Supported Left Posterior Outlet Inhibition
- 4) Standing Supported Right Knee Flexion with Weighted Left Hamstring and Right Trunk Rotation
- 5) Single Leg Left Hip Approximation
- 6) Standing Supported Right Glute Max with Left Hip Approximation and Left FA IR
- 7) Standing Supported Right Knee Flexion with Left Hip Approximation
- 8) Standing Supported Left Knee Flexion with Right Psoas and Iliacus, Right Trunk Rotation and Right FA ER
- 9) Standing Supported Resisted Right AF ER with Right Glute Max
- 10) Standing Supported Right Knee Flexion with Left Hip Extension
- 11) Standing Supported Left AF IR with Passive Right FA Abduction
- 12) Standing Supported Left AF IR with Right FA Abduction
- 13) Standing Supported Right Anterior Outlet Inhibition
- 14) Right Lateral Walking
- 15) Heel Stair Descents
- 16) Standing Left AF IR with Resisted Left Arm Pull Down and Right FA Abduction
- 17) Step Around, Step Over, Reciprocal Step Through
- 18) Retro Walking
- 19) Retro Stairs
- 20) Retro Stair with Resisted Right Glute Max
- 21) Single Leg Stance with Contralateral Glute Max
- 22) Propulsive Stair Ascension
- 23) Propulsive Stair Descension