HUMAN OCCLUSAL GEOLOCATION CONCEPTS

by Ron Hruska

Patterned positional biased sense is reinforced by reflexive micro tapping of, or limited micro tapping of, mandibular buccal surfaces of premolar and molar buccal cusps to maxillary lingual surfaces of premolar and molar buccal cusps, and by contact of, or limited contact of lateral malleolus cartilage on the lateral talus facet cartilage.

Our respect, relevance, reciprocity and responsibility for upright earth support and guidance are all indigenous or connected to the surface-to-surface geologic sense from the ground, and surface-to-surface neurologic sense from the neurology associated with geolocation sense from the teeth. *(See below discussion related to geological and geolocation sense.)*

Oscillatory, or minimum reciprocal, movement provided by moving the mandible or jaw out to a side, widens or opens the maxillary hemi-cavity or arch secondary to buccal cusp to buccal cusp interference. Moving the mandible or jaw to the other side, also widens the oral cavity on the other side while the buccal cusps leave each other on the opposite side, thus decreasing the space of the maxillary hemi-cavity or arch on this side where occlusal interference is diminished. This oscillating reciprocal activity goes on perpetually throughout the day.

Oscillatory, or minimum reciprocal, movement provided by moving the toes up (ankle pronation) widens or spreads the lateral malleolus or fibula from the lateral talus, while movement from pointing the toes down (ankle supination) decreases contact and diminishes interference from the lateral malleolus and narrows the dimension between the lateral fibula and lateral talus. This reciprocal dimension of the talus and fibular joint is usually alternating with the dimension of the other joint of the body during forward locomotor movement, that happens countless times throughout the day.

Both surface to surface contact and compression oscillation of teeth to teeth, and talus to fibula, provide the sense required for self-regulation and self-positioning in the present as well as the direction and safety for cortical patterned and driven self-placement tomorrow.

The process of identifying the real-world physical location of self exists in all natives, endemics, and aboriginals. Our upright state of sense, stance and security reflects our global positioning system's growth and adaptation of this process. Our orientation of our body to our body, and our internal world to our external world, begins with our global positioning system, or the hippocampus and the entorhinal cortex. They are responsible for the 'grid cells' tracking location, that calculate distance and navigate space. We are more than likely unconscious of this activity, until we become mindful of each one of their potential relatable challenges.

Thus, self-regulation underlying upright cortical and structural behavior, as related to location, orientation and position, is a specific, technical process that determines a human's precise real-world, internal and external coordinates. Coordinates that reflect individual patterning of cortical ground biased, oscillatory, and supportive sense, and cognitive designed biased, conscious or unconscious, sense that is associated with reciprocal sense of tapping, to maintain satisfactory positional stability.

<u>Grid Cells</u>

The biological system that generates our internal code for positioning are grid cells located in the entorhinal cortex and the hippocampus. They are the first areas of the brain that are damaged in people who have been diagnosed with Alzheimer's disease.

Grid cells calculate distance and direction purely by tracking physical body movements which allow us to successfully navigate, even in complete darkness.

Collectively, grid cells have been found to wrap around themselves mathematically to form a torus or doughnut shape, which provides a seamless mental map without disruption. *(Edvard Moser and May-Britt Moser, Kavli Institute for Systems Neuroscience, Norway. They were awarded the 2014 Nobel Prize for mapping the internal positioning system of humans.)*

The two areas of the body that feed the entorhinal cortex and hippocampus are the feet and the teeth.

There are thousands of <u>foot</u> mechanoreceptors that relay continuous feedback about pressure, vibration and movement. These signals tell the brain how fast one is moving, and how much distance one has covered through cortical "path integration". Self-motion and associated proprioceptive signals update grid cells as the body forward using feet.

The lower tip of the fibula forms an outer bone incline of the ankle called the lateral malleolus. Together with the tibia, and its lower bone surface, creates a socket called the ankle mortise joint that houses the talus bone of the foot. The ligaments around the mortise joint lets the brain map the precise angle of the ankle joint. The Pacinian and Ruffini corpuscles in the mortise joint ligaments have neural pathways that provide the entorhinal cortex and hippocampus feedback which prevents ankles from becoming over stretched when on uneven ground. This protection assists the brain's internal mapping of the ground one is moving over and on.

The <u>teeth</u> also have soft tissue that "feel" position, force and contact of teeth that use special pathways to feed the entorhinal cortex and hippocampus. This tissue or periodontal ligament acts like a highly sophisticated sensory organ.

The teeth are not fused directly to the alveolar bone of the upper and lower jaw. They are suspended inside their individual sockets, much like the mortise bone that houses the talus.

Both the periodontal ligament of the tooth and the mortise joint ligament of the foot provide shock-absorbing forces that are sensed by densely packed mechanoreceptors, that detect very small compressive and stretch forces. They instantly send data to the entorhinal cortex and hippocampus grid cells regarding the direction, speed and magnitude of the force being applied to each individual tooth, and each individual foot.

When moving through a specific environment, food or above ground space or contents, local tactile cues such as tooth biting, chewing, tapping, or grinding, and foot striking, tipping, touching, or compressing are all forms of neurologic geolocation internal mapping and grounding using light or heavy sense of each, depending on the activity and need. The real-world space around the body and head is anchoring the body's movement to the immediate surroundings, via the grid cell maps.

The Trigeminal Pathway

The feet and mortise joint direct both the body's position and direction when upright. Thus, they have a tremendous impact on the orientation of the head on the neck and the neck under the head. In either situation, the position of the neck and head influences cranial, mandibular, and occlusal or teeth position.

Therefore, feet are just as responsible for the position and tactile data your teeth provide to the brain stem, via the trigeminal nerve, because of the symbiotic direct influence on occlusal and podal patterns of orientation and orthopedic function. This one-to-one relationship and interconnective data sense is passed along the largest cranial nerve in the body, the trigeminal nerve.

Together the brain integrates signals from the furthest points (the feet and teeth) to build a seamless map of the surrounding environment that regulates the movement within it through information coming to and going from the mesencephalic trigeminal nucleus.

This region manages the muscle spindle hard wire control of head, neck and mandible movement and creates an instantaneous feedback loop for location, direction and placement of most body segments that are responsible for upright management of safe, biased or unbiased patterned movement.

Geolocation versus Geologic Sensation

Geolocation sensors pinpoint a device or object's physical location on Earth (via GPS, Wi-Fi, or cellular networks) for tracking and navigation. Humans have geolocation sensors that pinpoint the physical location of the mandible with respect to the cranium, or maxillae, called the mesencephalic nucleus of the trigeminal nerve. Unlike almost all other primary sensory neurons whose cell bodies sit in peripheral ganglia, this trigeminal nucleus is the only central nervous system location housing primary afferent cell bodies.

- It receives unconscious proprioceptive sensory information regarding the position and movement of the jaw, face, and teeth.
- It regulates chewing forces, coordinates oromotor reflexes (like the jaw-jerk reflex), and prevents damage from excessive biting.
- It not only helps modulate mandibular muscle force but provides the brain to sense size, thickness, and texture of food solely by how far apart the teeth are held.
- It is located in the midbrain and upper pons, positioned laterally along the periaqueductal gray matter.

The teeth and feet serve as neurological anchors for body orientation and head and neck alignment. Every time the molars come together, they signal to the cerebellum where the skull sits relative to the spine. If a person has a malocclusion or is missing a tooth, the ‘position’ data from the mesencephalic trigeminal nucleus and the sphenopalatine ganglion becomes distorted. (The sphenopalatine ganglion is heavily linked to the maxillary division of the trigeminal nerve which is the primary nerve involved in headaches and facial pain disorders.)

This brain distortion may contribute to pelvic, thoracic, cervical and cranial torsional biased position, functional behavior and pain patterns. It contributes to the brain relying on periodontal, temporo-mandibular joints, cervical facet and occipital-atlantal (OA) reception and guidance.

Geologic sensors, on the other hand measure the Earth’s physical properties and subsurface activity (such as seismic tremors and rock stress) to study the planet’s structure and behavior. Humans have foot plantar proprioceptors that measure the Earth’s physical ground properties and surface activity for the brainstem and brain to format structural reactive behavior.

With the cerebellar input from the mandibular ‘geolocation sensors’, and the cerebellar input from the foot’s ‘geologic sensors’, upright management of the body’s mass and form, to gravitational influence and challenge is adjusted by the inter communication between dental occlusion and podal occlusion.