

Insights into Integrative Spine Rehabilitation

Kellen Goertzen, DPT, SCS



SYMPOSIUM

Disclosures

- I have no disclosures or financial benefit from any of the content shared today.

Learning Objectives

- Participants will be able to outline impacts of binocular vs monovision on orthopedic movement patterns.
- Participants will be able to describe impacts of stomatognathic system on cervical, vestibular and visual systems.
- Participants will be able to describe the use of respiration for management of spine position and mechanical stress.
- Participants will demonstrate understanding of neuromotor screening for orthopedic movement of left or right sided dominance.

Patient s/p L3-L5 Decompression Arthrodesis

- No history of traumatic back injury
- Chronic history of intermittent back pain
- Radicular S/S resolved with surgery
- L Hip pain/ FAI symptoms
- Corrective lenses for nearsightedness
- Hx of Orthodontia- palate expansion, braces in adolescence
- **Primary Complaint of Axial Lumbar Spine Pain**



How Did We End Up Here?



- L3-5 Fusion
Intraoperative
Fluoroscopic Image
- **Is the breakdown of adjacent segments unavoidable?**

Interoceptive Exteroceptive Sense Interface

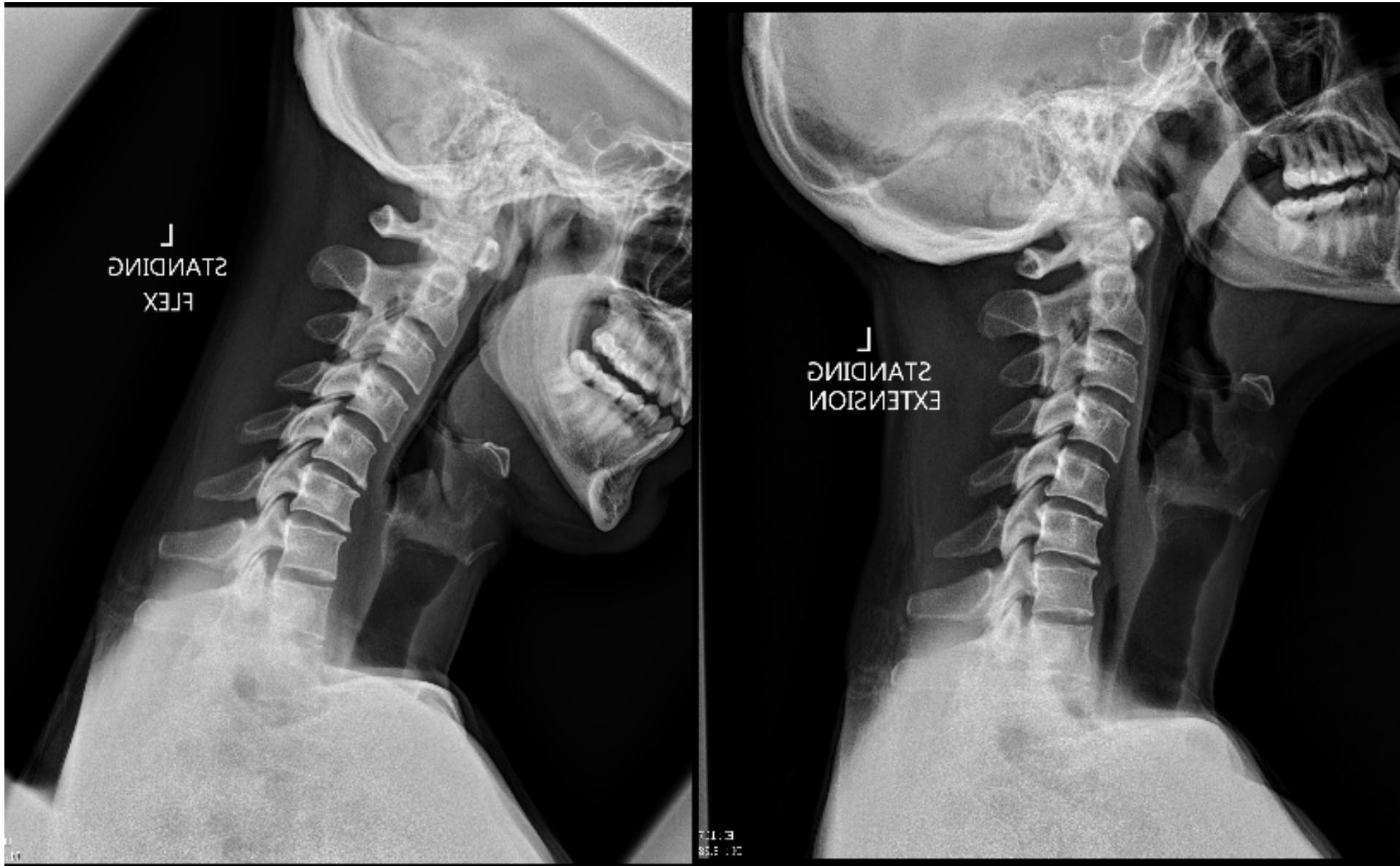
- Regulation of Vision **“Space”**
- Somatosensory Awareness **“Ground”**
 - Feet, Occiput(OA joint), Occlusion
- Regulation of Vestibular system, Vestibulo-Ocular Reflex(VOR), Cervical Ocular Reflex (COR)
“Gravity”







Example in 23 y.o.



Example in 35 y.o.

Three Months Post-Op - Start of Therapy



What Does Our Brain Want?

- **Interoception**- Sense of the “Self”
- **Exteroception**- Sense of external “Threats” or “Fulfillments”
- Air-Airway, blood gas regulation
- Water/Food
- Movements to Combat “Threats” meet above needs
- Social Fulfillment/Security within our “Tribe”

The Body and Brain as a Computer

- **Hardware-** Anatomy, Surgical Intervention, Glasses/Contacts, Orthotics, Dentistry
- **Software-** Movement Patterns, “Programs,” “Short Cuts,” “Algorithms”

Program Shortcuts on the Desktop

- Vision- “Space”
 - Binocular Vision
 - Peripheral Vision
 - Eye Dominance
- Feet/Teeth- “Ground”
 - Heels, Arches, Great Toes, **Molars**
- Neck- OA “Gravity” aka Acceleration
 - COR, VOR, “Horizon” Management, Accommodation
- Stance/Swing
- Inhale/Exhale

Algorithms and Processing

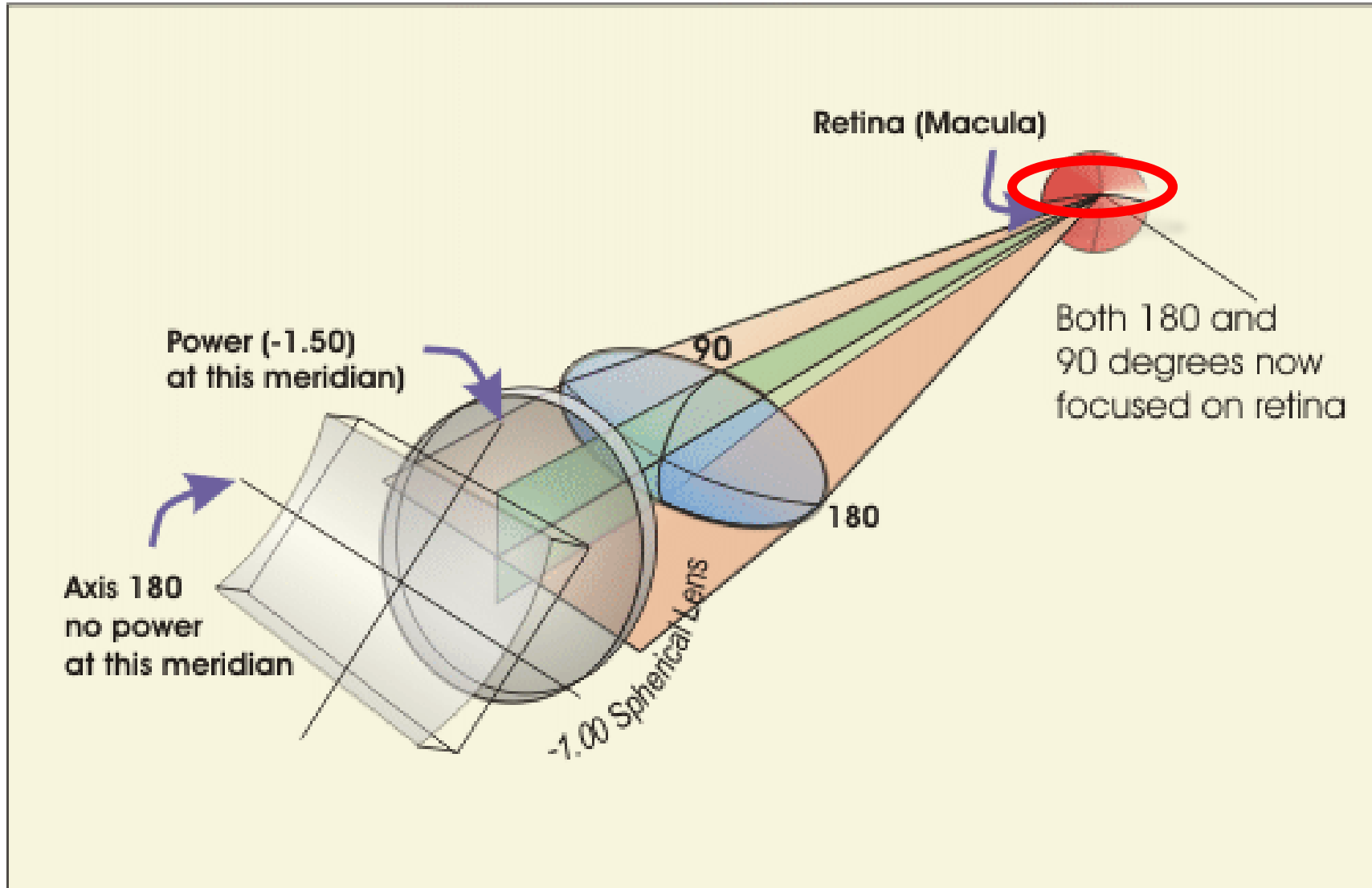
- Up/Down regulation of Sensors.
- Multiple or Single Competing or Complimenting Programs
- Bandwidth/Processing Power
- Loss of Sensors, Short Cuts, Algorithms, or Programs



Interoceptive Exteroceptive Interplay

- Regulation of Vision “Space”
- Somatosensory Awareness “Ground”
 - Feet, Occiput(OA joint), Occlusion
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“Gravity”

Vision! Exteroception!



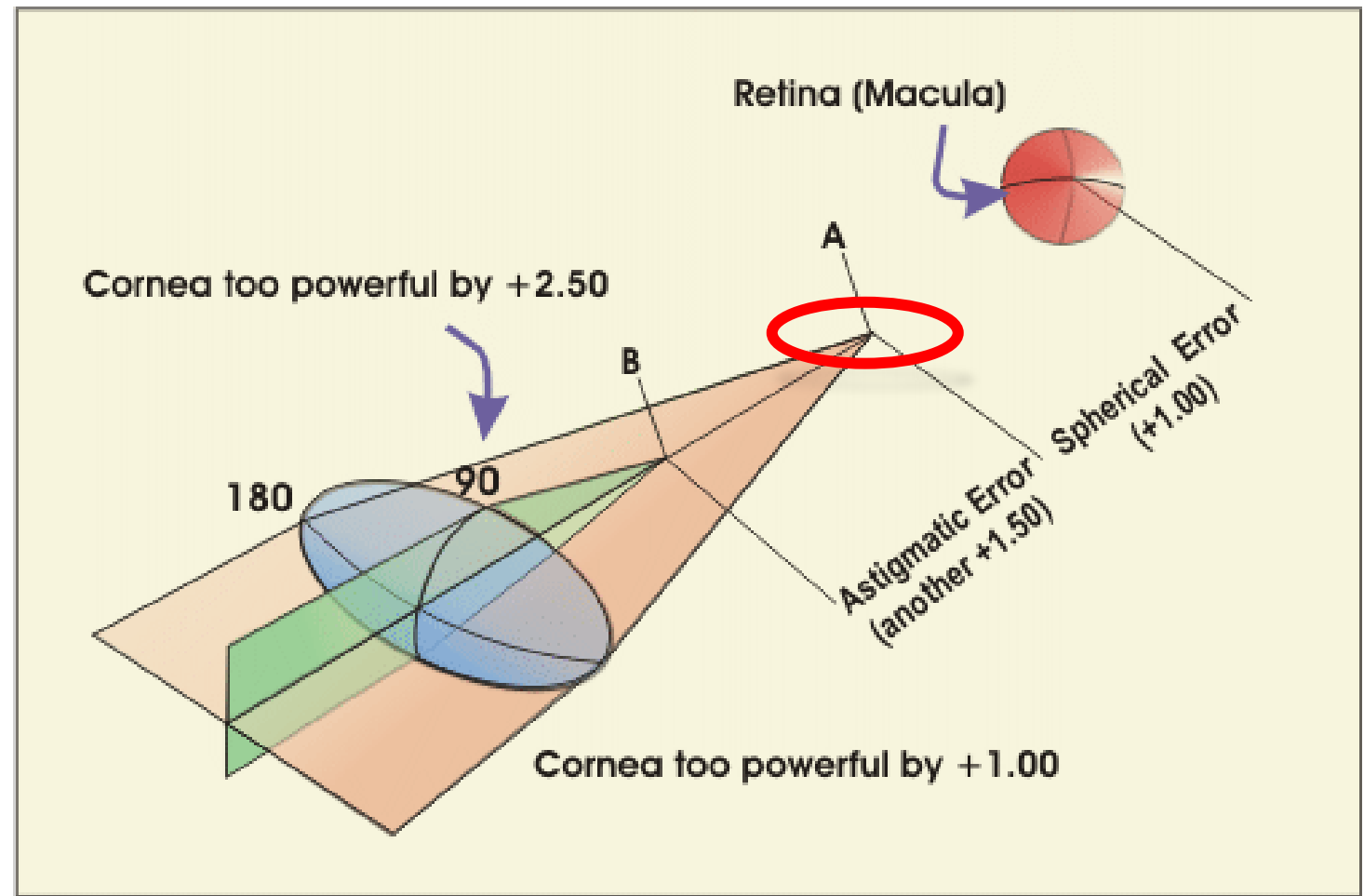
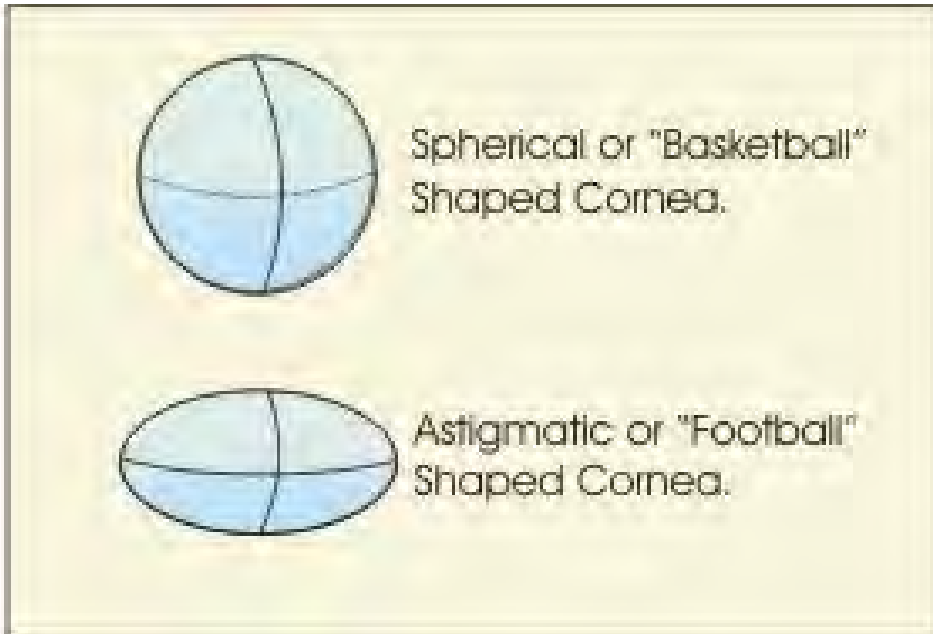
Space
Movement
Acuity

Correcting Acuity

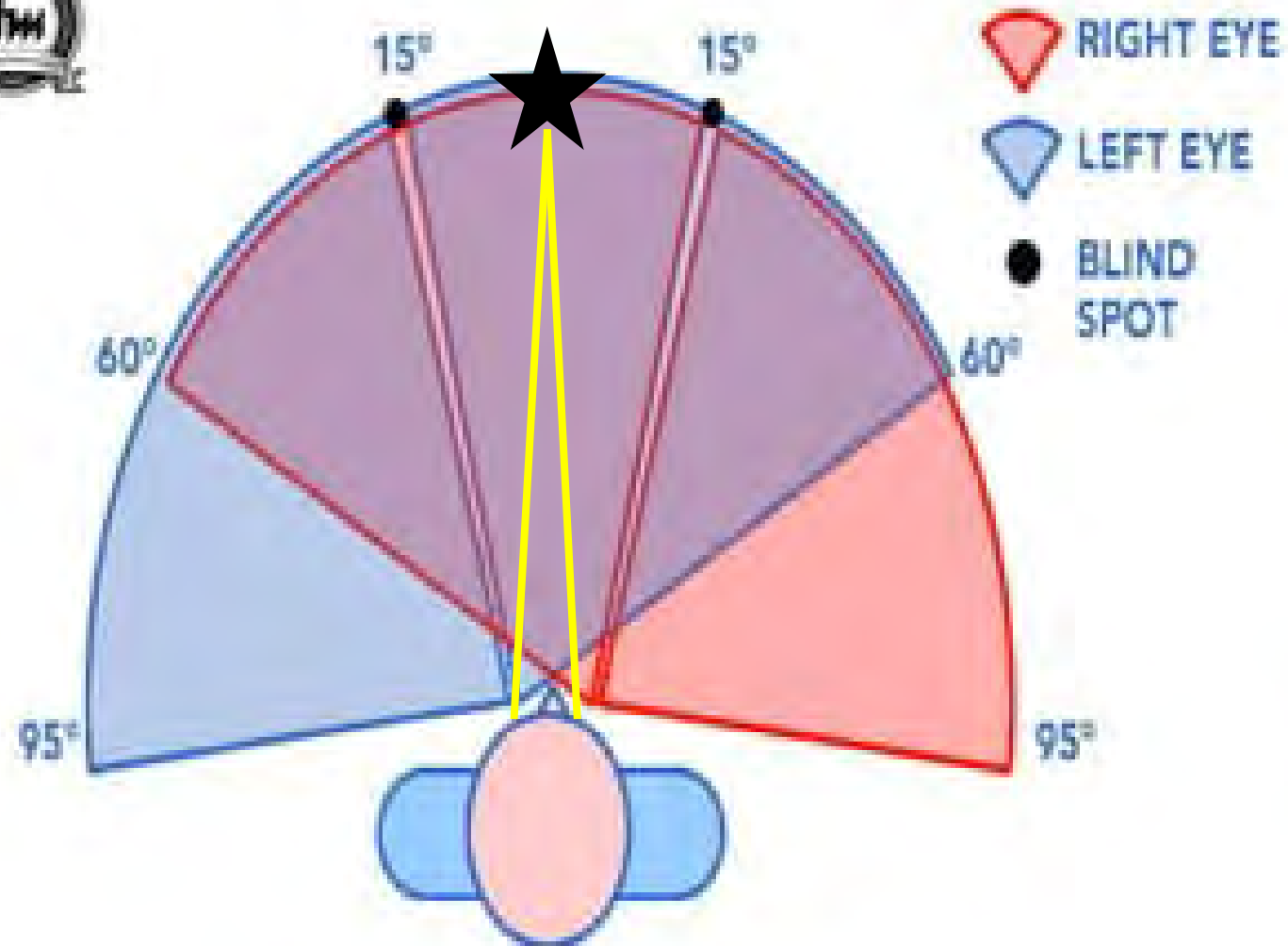
- Our world in “HD” vision

Distortion of “Reality”

- Space Compression/Expansion
- Image Shift
- Movement Distortion



Focal and Peripheral Vision



Focal

- Narrow
- Targeted
- Clarity
- Centralized

Peripheral

- Wide Angle
- Spatial Orientated
- Minimal Clarity/Acuity

Multifocal Contact Lenses

D lens

Distance vision

Spherical central zone

Intermediate vision

Progressive zone

Near vision

Spherical zone

Lens edge

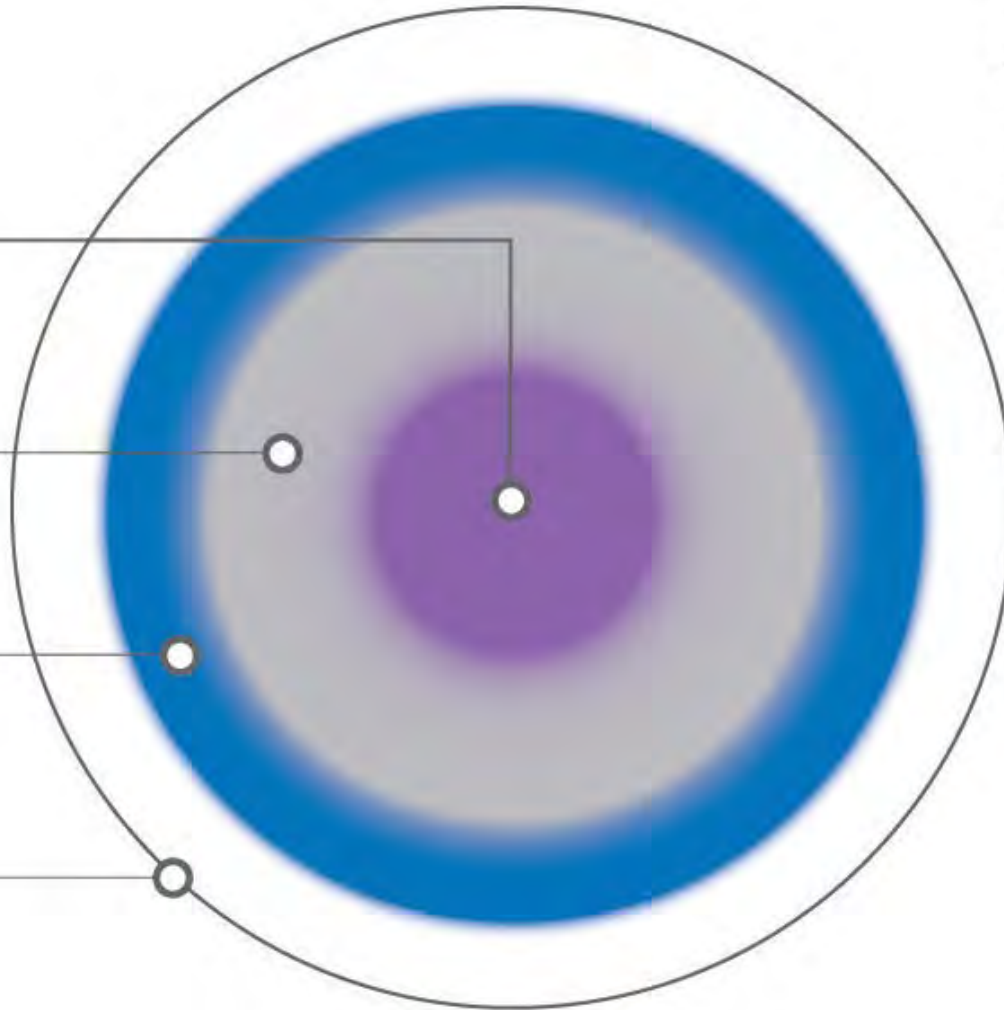


Image: CooperVision

Testing The Visual System

- Augment Their Reality
- Cover an Eye
- Take off Their Lenses

Measuring Visual Impacts

- Straight leg raise
- Adduction Drop/Modified Ober's test
- Glenohumeral Internal Rotation
- Glenohumeral Horizontal Abduction
- Cervical Rotation (at CT junction)
- Cervical Side bending (at C4/5)
- OA Lateral Flexion
- Subjectively how do they feel upon standing- "lightheaded," "off balance," "tipsy"

Interoceptive Sense

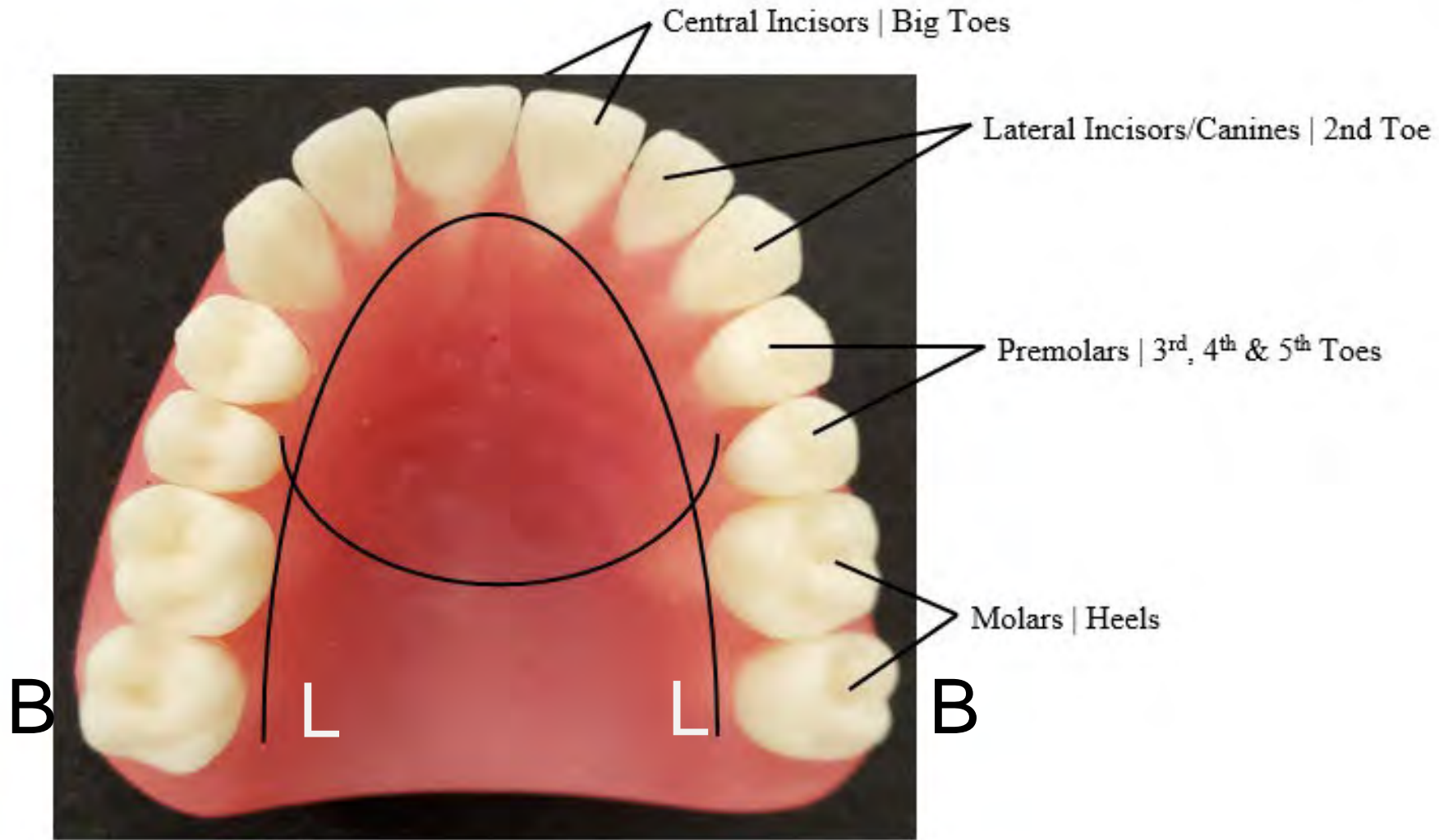
- Joint Position
- Vestibular System
- Muscle Spindles/Golgi Tendon Organs
- Dental Occlusion
- Tongue Position

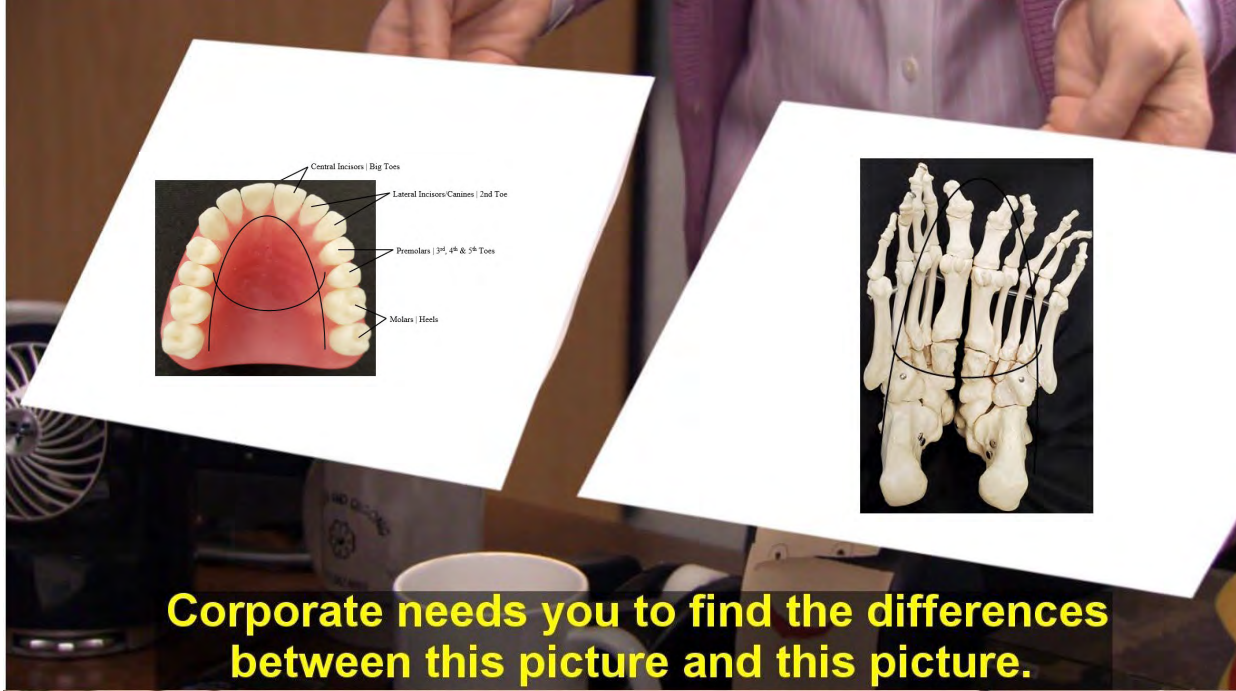
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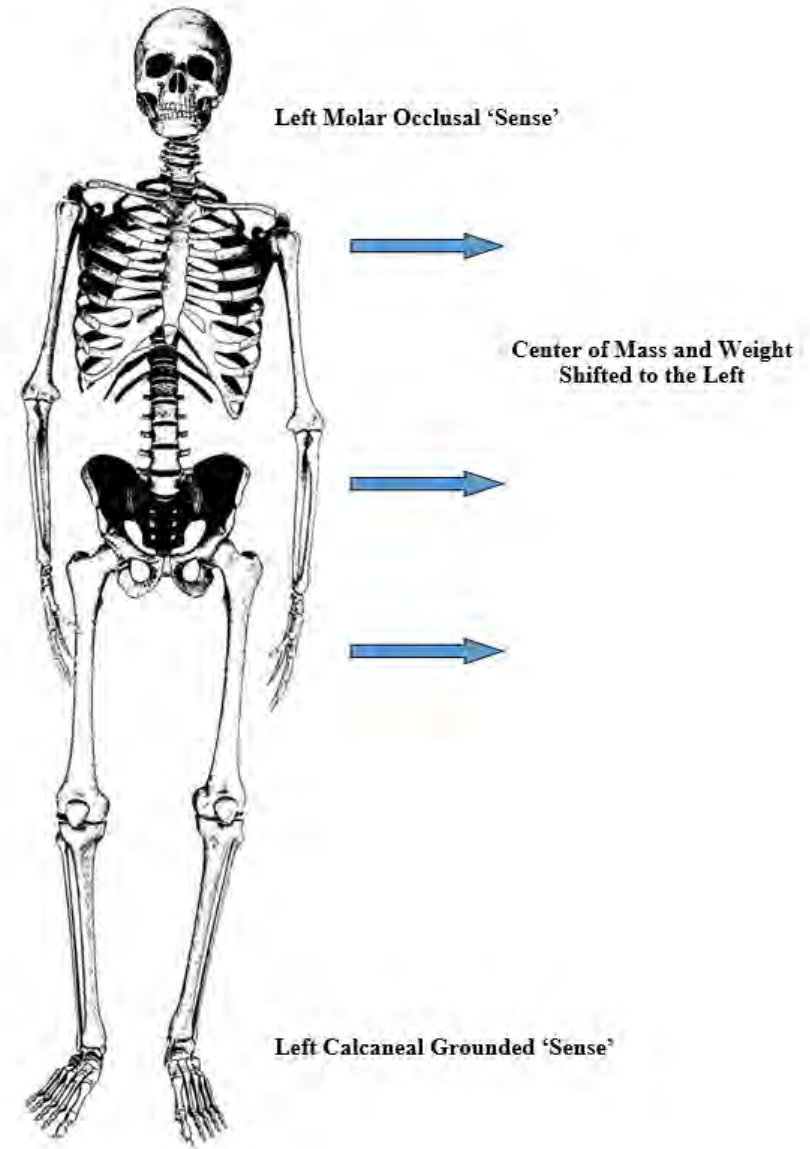
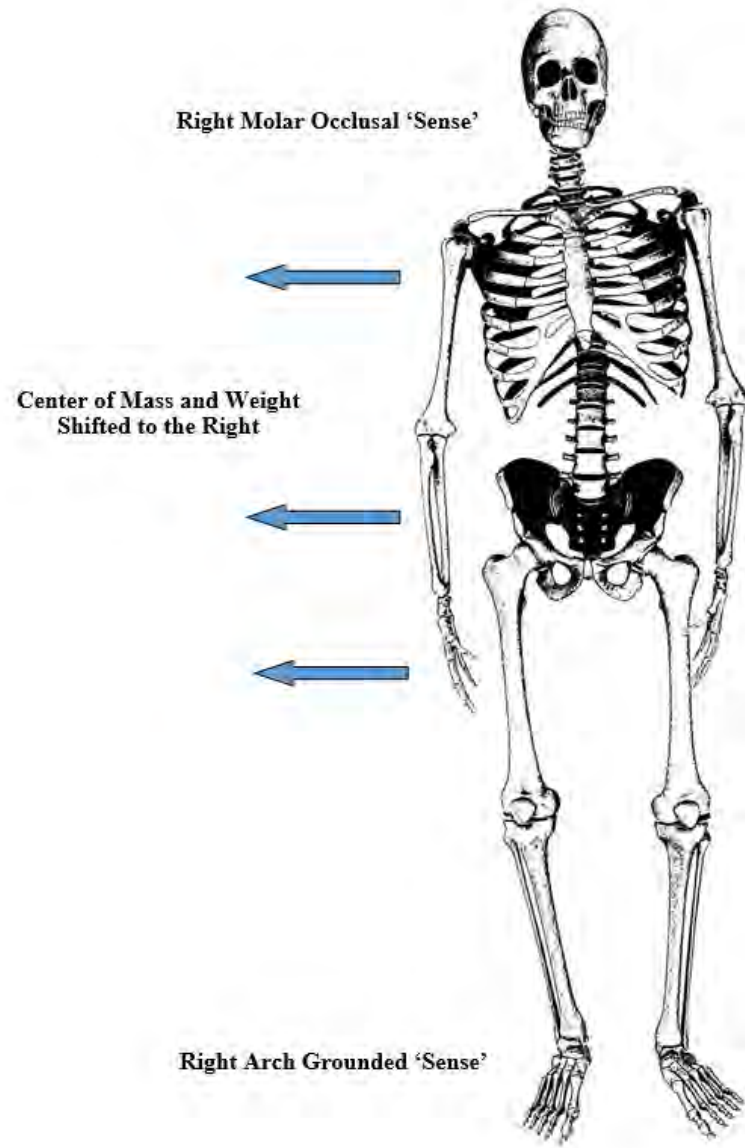
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Corporate needs you to find the differences between this picture and this picture.





A Different Perspective of the Ground



Figures 21a & 21b: Uniform contacts on cuspids and all posterior teeth in static occlusion in the maxilla and mandible.

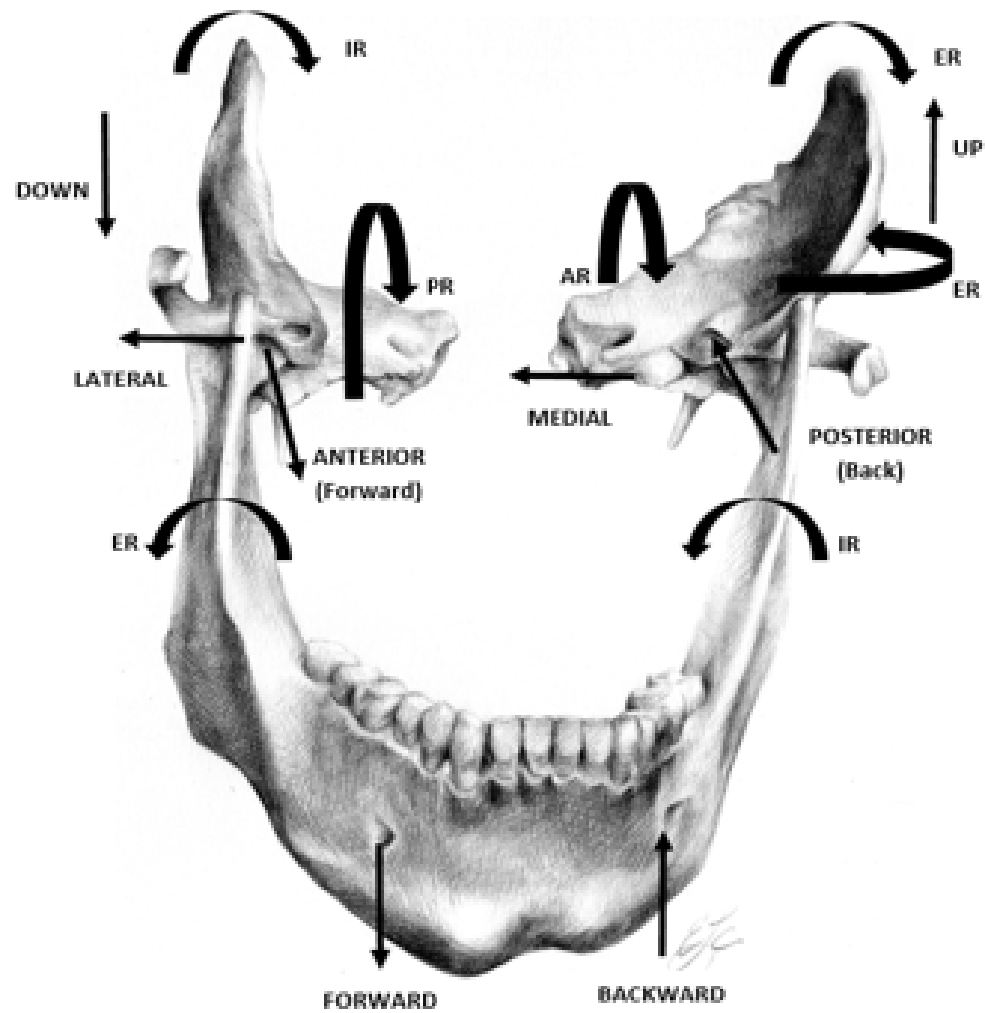


Illustration by Elizabeth Noble for the Postural Restoration Institute®.

Loss of **Freedom** to Shift, Turn, Engage??

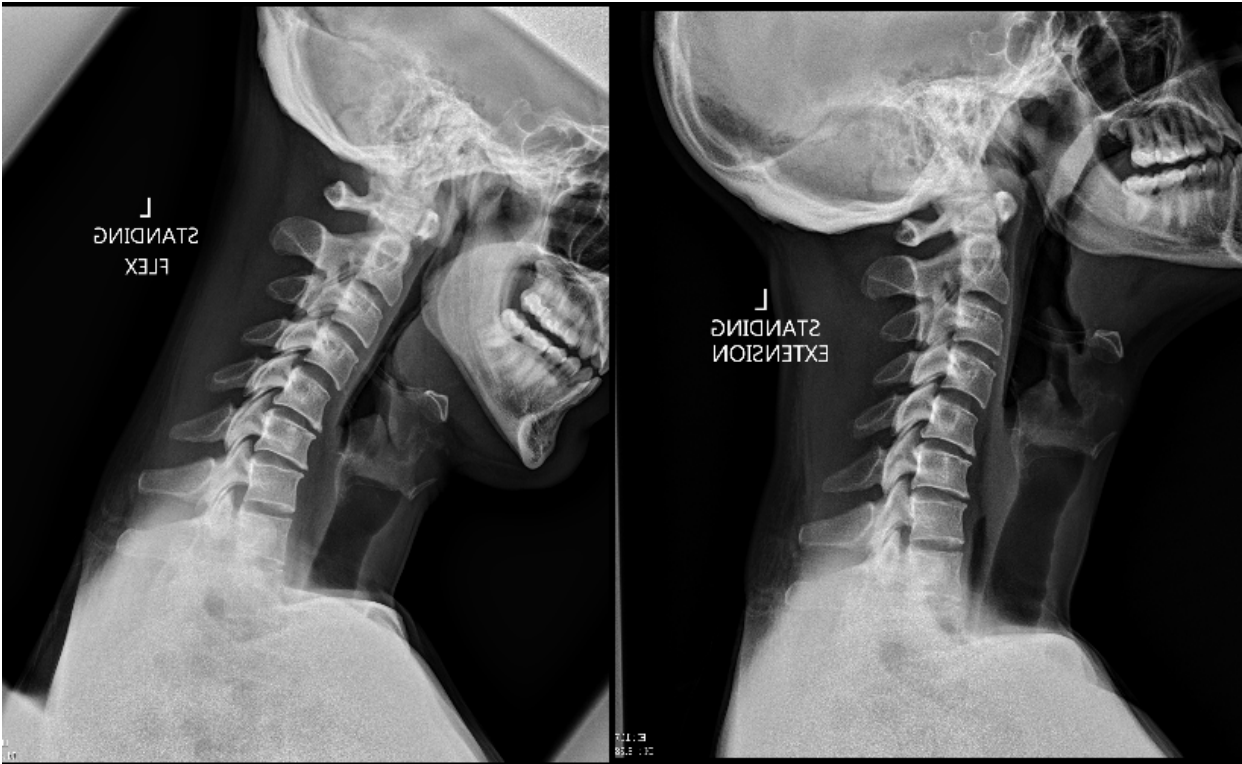
Those with unilateral cross-bite were more likely to have an oblique shoulder, oblique pelvis, functional leg length differences, and scoliosis, than children with dental symmetry.

Korbmacher et al, (Associations between orthopaedic disturbances and unilateral crossbite in children with asymmetry of the upper cervical spine. Eur J Orthod. 2007; 29:100-4.)

“There are over 200 muscle spindles per gram of muscle in the suboccipital region, compared to only 16 muscles spindles per gram in the 1st lumbrical of the hand.”

(Treleaven J. Sensorimotor disturbances in neck disorders affecting postural stability, head and eye movement control. Manual Therapy. 2008, 13:2-11.)

Anterior Open Bite- Heel Pain? Lordosis?



Open Posterior Bite- Lightheaded? Tight Gastrocs? Hyper Lordotic?



Can also occur secondary to tooth loss

Cross Bites – Unable to turn/shift?



Posterior Cross Bite Tied Down to One Side?



Asymmetrical Driven Pattern

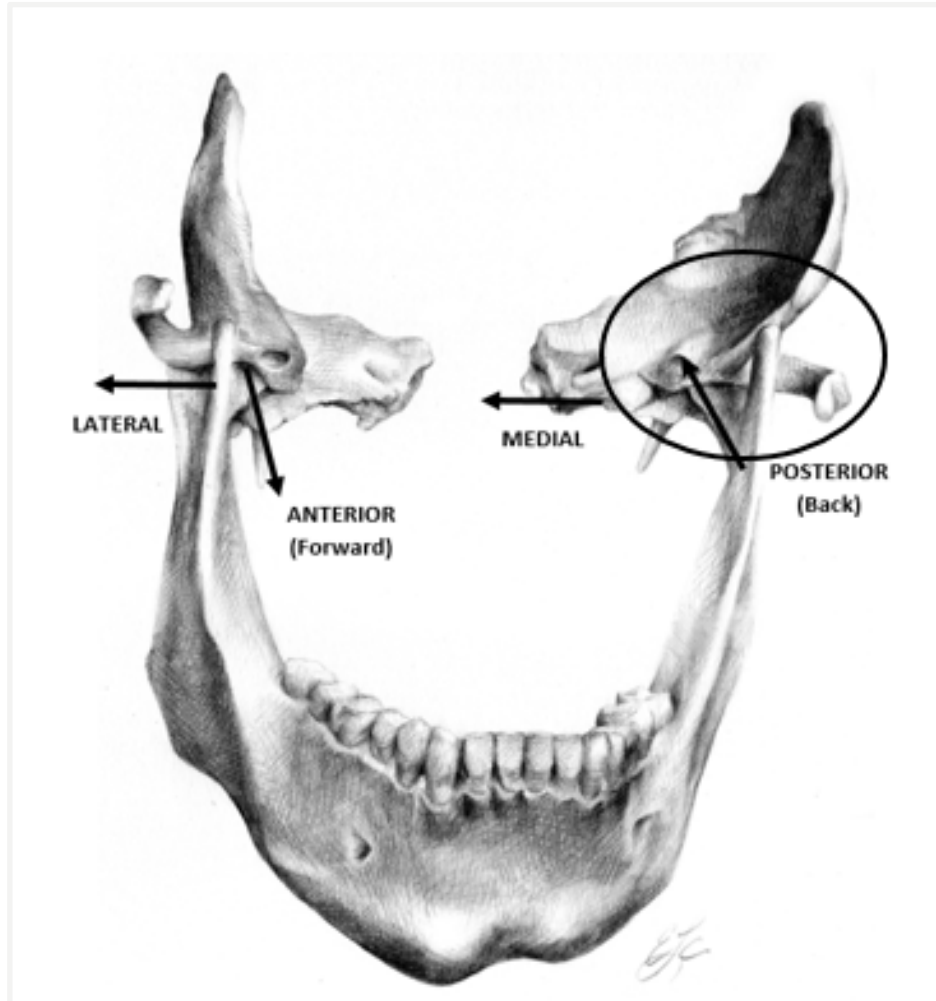
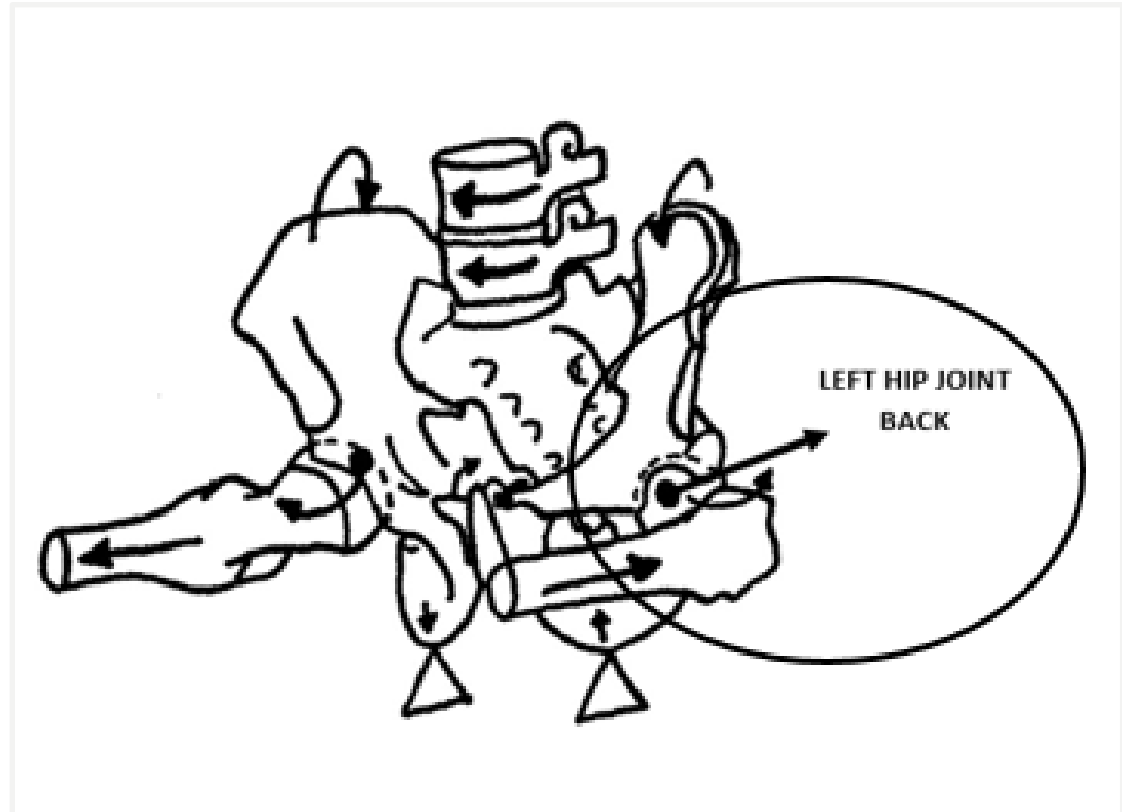


Illustration by Elizabeth Noble for the Postural Restoration Institute®.



Testing the Stomatognathic System

- Visually Examine Occlusion
- Move Their “Ground” aka Mandible
- Give Their Mandible “Freedom”

M000-Mandibular Occipital Occlusal Orthotic



MMOO-Mandibular Molar Occlusal Orthotic



How Do We Measure Effect of Occlusion?

- Straight leg raise
- Adduction Drop/Modified Ober's test
- Glenohumeral Internal Rotation
- Glenohumeral Horizontal Abduction
- Cervical Rotation (CT junction)
- Cervical Side bending (at C4/5)
- OA Lateral Flexion

Treatment = Balance

Interoceptive/Exteroceptive Senses

- Balanced Occlusion Sense
- Balanced Cervical Spine- OA Sense
- Balanced Ocular Muscle Tone
- Balanced Sense of “Ground” Under Feet, Maxilla, Occiput
- Balanced Vestibular “Orientation,” COR, VOR Sense

These Are Your Shortcuts
to...



In Summary

- Regulation of Vision “Space”
- Somatosensory Awareness “Ground”
 - Feet, Occiput(OA joint), Occlusion
- Regulation of Vestibular system, VOR, COR
“Gravity”

The Body and Brain as a Computer

- “Short Cuts” Deleted by Unaddressed PMH
- Algorithms Reduced to the Remaining “Programs”
- Freedom of Movement Variability is Lost

Hardware Degrades as Software Fails

Our Case... It's Back!



- Take Vision Hx
- Take Dental Hx
- Make a Variable
- Test as Needed:
 - Cover an eye
 - Take off glasses
 - Bite on tongue depressor

Questions?



Thank You
Questions?