Parietal Lobe Function
(Kolb & Whishaw, 2009, pp. 376 ff, et al.)

Comprised of

- Cortex between frontal and occipital lobes: postcentral gyrus, superior parietal lobule, parietal operculum, supramarginal gyrus, angular gyrus

Connections

- Area PE (Brodmann's 5): somatosensory & to supplementary motor: guiding movement by providing info about limb position. Sends to primary motor (4) and supplementary motor/premotor (6 & 8) areas.
- Area PF (Brodmann 7b): Input from primary somatosensory (1-2-3) as well as motor & premotor.
- Area PG (Brodmann 7b & visual): "parieto-temporal-occipital crossroads": controlling spatially guided behavior with respect to visual and tactile information
- Posterior parietal: Connections to frontal (esp. 46). Again, control of spatially guided behavior.
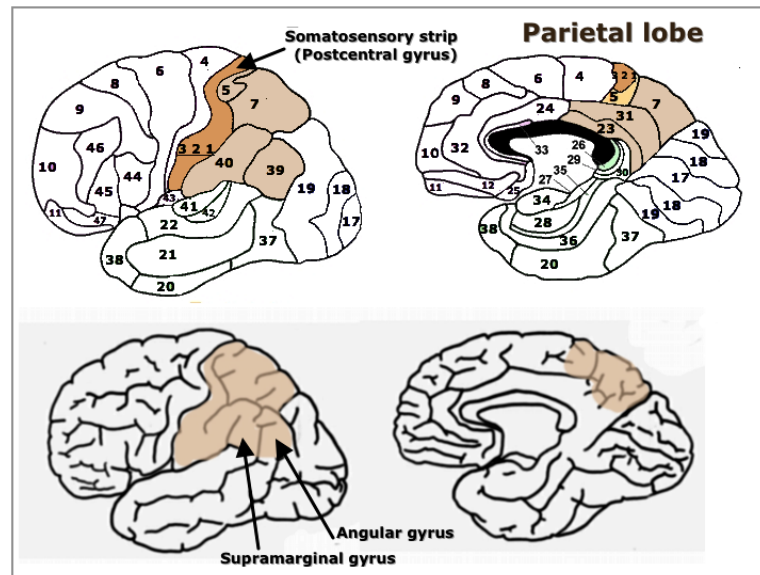
Theory of Parietal-Lobe Functioning

Anterior: Somatosensory & perceptual processing

Posterior: Integrate sensory input from somatic and visual regions

Example: eating at a restaurant with friends. Need to deal with all the objects in the "eating" environment (cutlery, napkin, plates, glasses of wine or water, etc.). Need to be able to use these objects and eat with them. Need to attend to some objects (e.g., your own food, your own fork & knife and not others'). So, you have to attend to some objects while ignoring many others. Meanwhile, you are engaged in conversation with those around you.

Is there a map of the world you are then in? Can't be just a singular one. Multiple (tied to [1] behavioral needs and [2] simple to abstract).

Uses of Spatial Information

Object Recognition

- Viewer-centered: where in regard to my body (eyes, hands, etc.)
- Object-centered = properties of objects (temporal)

Guidance of Movement

- Eye-based: move eyes to gain information: directing & detecting motion
- Limb-based: position of shoulders & hips
- Sensorimotor Transformation: continuously updated and modified "map" which relates objects in the world with the movements of our body parts.
- Spatial navigation: maps and route knowledge to maneuver within environment

Complexity of Spatial Information

- Viewer-centered complexity: Right vs. Left
- Visualize and manipulate mental images in mind

Other Aspects

- Arithmetical operations (*acalculia*)
- Language: spatial organization of phrases? My son's wife, my wife's son
- Organizing **sequences** of movements
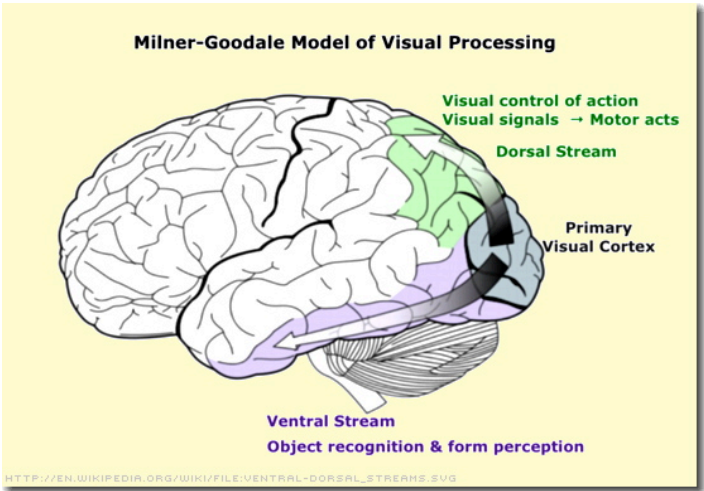
Milner-Goodale Model ("Two-Streams Model")

- "Vision began not as a system for perceiving the world, but as a system for the distal control of movement" (Goodale, 2011, p. 1567)

Factor	Ventral System	Dorsal System
Function	Recognition/identification	Visually guided behavior
Sensitivity	High spatial frequencies - Details	High temporal frequencies - Motion
Memory	Long-term stored representations	Only very short-term storage
Speed	Relatively slow	Relatively fast
Consciousness	Typically high	Typically low
Frame of reference	Object-centered (allocentric)	Viewer-centered (egocentric)
Visual input	Mainly foveal or parafoveal	Across whole retina
Monocular vision	Generally reasonable small effects	Often large effects, e.g., motion parallax

Based on Norman (2002) & http://en.wikipedia.org/wiki/Two-streams_hypothesis

References

Goodale, M. A. (2011). Transforming vision into action. *Visual Research, 51*(13), 1567-1587. https://doi.org/10.1016/j.visres.2010.07.027

Kolb, B. and Whishaw, I.Q. (2009) *Fundamentals of human neuropsychology* (6th ed.). New York, NY: Worth.