Lecture 2

Read chapter 2, especially pages 38–59

Introduction and Orienting

- The brain is organized at multiple scales
    - Neurons
    - Columns and Layers
    - Maps
    - Areas
- Numbers in the brain (rough estimates!)
    - # of neurons in adult brain = $8x10^{10}$ (80 billion)
    - # of neurons in adult cerebral cortex = $1.8x10^{10}$
    - # of synapses on typical cortical neuron = $6x10^{3}$
    - # of cortical columns = $1x10^{5}$
    - Average loss of cortical neurons = 1/second
    - Total surface area of cerebral cortex = $2.5x10^{3}$ cm^{3}
    - Thickness of cerebral cortex = 1.5–4mm
    - # of cortical areas = 400 (???)
- Brain size varies with body size
- The neuraxis of the human brain
    - Front = Anterior or Rostral

    - Back = Posterior or Caudal
    - Up = Dorsal
    - Down = Ventral
- Planes of transection for the human brain
    - Horizontal: up-down
    - Sagittal: left-right
    - Coronal: front-back

Cortical anatomy and brain flattening

- Cerebral cortex versus cerebrum
    - **Cerebral Cortex**: The outermost later of gray matter making up the superficial aspect of the cerebrum
    - **Grey matter**: cell bodies
    - **White matter**: axons -> connects everything together
        - Several long tracts
        - Short tracts
        - Long projection fibers
- Korbinian Brodmann's map (52 areas)
- Dedicated sensory and motor areas & systems
    - Gustatory
    - Motor: Frontal cortex (near central sulcus)
    - Somatosensory: Parietal cortex (near central sulcus)
    - Olfactory
    - Auditory: Superior aspect of the temporal lobe (near the Sylvian fissue)

    - Visual: Occipital lobe
        - Primary visual cortex (V1)
        - Receives visual input from the Thalamus

Cortical areas involved in “higher cognition”

- Dorsolateral prefrontal cortex
- Orbitofrontal cortex
- Ventrolateral prefrontal cortex

An interactive brain viewer

http://gallantlab.org/brainviewer/sulcigyri/

Auditory cortex