Crown 85: Visual Perception:
A Window to Brain and Behavior

Lecture 2 Essential: Anatomy of the Brain

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Crown 85 Winter 2016
Visual Perception: A Window to Brain and Behavior
Lecture 2 - Neuroanatomy

Reading:  
- Brain Basics (very basic !!)
- Cold Spring Harbor (= appropriate !!)
- Healthline (appropriate)
- University of Texas Medical School (very advanced !!)

Looking:  
- Basic Parts of the Brain - Part 1 - 3D Anatomy Tutorial (anatomyzone)

Enjoy:  
- Friendly Guide to Human Brain Atlases (history)

http://www.healthline.com/human-body-maps/brain
brainstem

a. Brainstem
   i. reticular formation
   ii. medulla oblongata
   iii. pons
   iv. midbrain (substantia nigra, including superior colliculi)

http://www.csus.edu/indiv/w/wickelgren/psych001/brain3.gif

Midbrainsuperiorcolliculus.png. Licensed under CC BY-SA 3.0 via Commons - https://commons.wikimedia.org/wiki/File:Midbrainsuperiorcolliculus.png#/media/File:Midbrainsuperiorcolliculus.png

brainstem

a. Brainstem
   i. reticular formation
   controls general level of wakefulness including sleep vs awake transition; injury may cause coma
   ii. medulla oblongata
   controls autonomic functions: respiration, heart rate, blood pressure, digestion, sneezing, swallowing [and ‘reverse’ swallowing]
   iii. pons
   bridge or relay center; implicated in control of breathing sleep cycles
   iv. midbrain (substantia nigra, including superior colliculi)
   source of dopaminergic neurons that then play important roles in motor planning [viz Parkinson’s disease], emotion, reward seeking [pleasure], addiction
   part of old brain or ‘tectum’ in invertebrates; in humans contains control for eye movements; Edinger–Westphal nucleus [near ocular motor nucleus] controls pupil constriction and focusing of lens (accommodation) of the eye
The cerebellum coordinates voluntary movements such as posture, balance, coordination, and speech, resulting in smooth and balanced muscular activity. It is also important for learning motor behaviors.

Diencephalon

- thalamus (including lateral geniculate nuclei)
- hypothalamus
- pineal gland
## Diencephalon

c. Diencephalon
   i. thalamus *(including lateral geniculate nuclei)*
      - relay station for fibers coming into brain from sensory organs such as those for vision, audition, touch (but not olfaction). lateral geniculate nucleus (LGN) gets input from the eyes via the optic nerve and sends information to visual cortex
   ii. hypothalamus
      - controls homeostasis, which is to maintain the body’s status quo system-wide; links the nervous system to the endocrine system producing hormones that govern physiologic functions such as temperature regulation, thirst, hunger, sleep, mood, sex drive.
   iii. pineal gland
      - produces melatonin, which helps maintain circadian rhythm and regulate reproductive hormones; the pineal gland was once known as the “third eye.”; newly discovered retinal “melanopsin” containing ganglion cells project to pineal gland

## hippo

d. “very generally” the basal ganglia and the limbic stem
   i. hippocampus
   ii. amygdala

http://www.strengthofawarrior.org/ptsd-and-the-brain

http://www.wisegeek.com/what-is-the-relationship-between-the-amygdala-and-hippocampus.htm#

**CROWN 85: Visual Perception: A Window to Brain and Behavior  
Lecture 2 summary**

### hippocampus and amygdala function

d. “very generally” the basal ganglia and the limbic stem
   
i. hippocampus
   
   long term memory and navigation

   ii. amygdala
   
   fear and preservation responses

### cerebral hemispheres

a. Cerebral Hemispheres
   
   ✔ i. cerebral cortex = gray matter
   
   ✔ ii. connections among cortical regions = white matter
   
   ✔ iii. gyri and sulci

   gyri (gyrus)=ridges, hills, sulci (sulcus)= furrows, valleys

   iv. frontal lobe
   
   v. parietal lobe
   
   vi. temporal lobe
   
   vii. occipital lobe

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