

Day 1

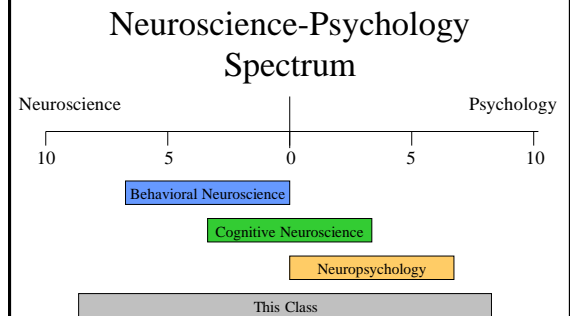
Intro to the Field

Outline

- Why are we here?
- Subfields
- Approaches
- History
- Terminology

Why Are We Here?

- Behavior and cognition (psychology) are the result of biology
- Neuroscience-Psychology Spectrum
 - What is “Neuroscience”?
 - What is “Psychology”?



Approaches

- Anatomy
- Physiology
- Chemistry/pharmacology
- Pathology

History

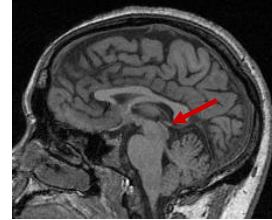
- Early scientists and philosophers made connections between psychology and anatomy
 - Heart-memory (“I know it by heart”)
 - Heart-emotion (“I love you with all my heart”)
 - Head-thought (“My head hurts from thinking”)
 - Head-sanity (“Let me get my head on straight”)

History

- Greeks proposed 4 humors (black bile, yellow bile, blood, phlegm)
 - Revived by physicians in Middle Ages
 - Relative composition defines personality (melancholic, choleric, sanguine, phlegmatic)
 - Matches up to four seasons, four elements
 - <http://ancienthistory.about.com/library/weekly/aa020299.htm>

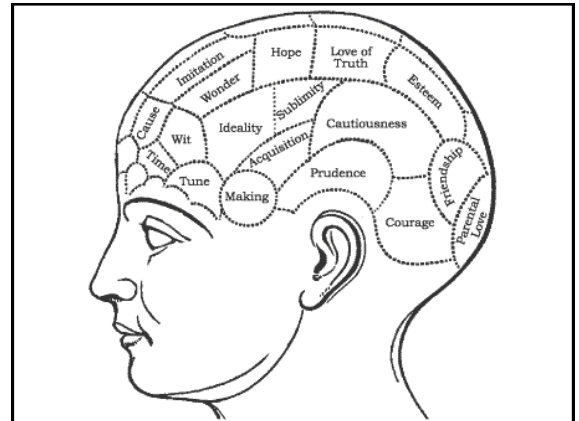
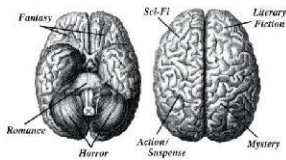
Cartesian Neuroscience

- Rene Descartes – “I think therefore I am”
- Pineal gland as the junction between the body and soul



Segregation of Function

- Phrenology – bumps on head correspond to personality
 - Franz Gall (1790's) major proponent
 - Widely refuted and discounted



Segregation of Function

- Paul Broca (1861) did post-mortem studies of aphasia patients who experienced TBI
 - “Tan”
 - Found overlapping damage
 - Evidence for regional specificity

Comparative Anatomy

- Korbinian Brodmann (1900's) classified cortical neurons by cytoarchitecture
 - Several areas overlap with functional areas (V1)

Current Hypotheses

- Observable output is the result of interactions among many brain regions (not usually single cells or regions)
 - Examples: Bull w/ caudate stimulator
- These regions may (or may not) form functionally distinct “structures”
- Behavior is complex, but predictable (within a range) based on neural activity

Keep in Mind

- The focus of the first quarter of the class is to provide you with concepts, terminology, and resources that will be used throughout the class
- PLEASE look back to these initial lectures often

Nature vs. Nurture

- All psychological processes are the result of biology
- Some are innate (walking)
- Some are learned (math)
- Some are innately learned (language)

Nature vs. Nurture

Nature

Nurture

Pinel Says

- “It is nonsensical to try to understand interactions between two factors by asking how much each factor contributes”
- Example: When listening to music, it is impossible to say what part is due to the instrument and what part is due to the musician.
- Thoughts?

What is a gene?

- Something that...
- Examples: eye color, NMDA channels, acetylcholinesterase, skin color?, hair color?

Genetic Diversity

- Differences in genes → differences in gene expression → differences in:
 - Health
 - Attractiveness
 - Brain structure and function
 - Personality

Darwinian Evolution

- **Survival of the fittest** – ultimate goal is to have as many kids as possible who have as many kids as possible ...
- **Components:**
 - Survival (food, shelter, etc.)
 - Mating (attracting, copulation, etc.)
 - Raising (teaching, protecting, etc.)

Behavioral Evolution

- What types of behaviors would you expect to evolve?

Environment

- What constitutes the “environment” or “nurture” side?

Gene-Environment Interactions

- Maze-dull and maze-bright rats
 - Artificial evolution
 - What is “fitness” in this case?
- Demonstrated that behavior could be “bred”, therefore based on genetics rather than experience
 - Duh
 - Cross-fostering control
- However, only those rats who had “dull” genes AND impoverished environment made more errors

Interactions

- **Active** – individual seeks out environments that accommodate her nature
- **Evocative** – individual creates an environment based on his nature
- **Passive** – parents provide an environment that accommodates their nature, which they likely passed on