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Prelude

PSYCH 260.003

Neurological Bases of Human Behavior

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What is this course about?

- What is behavior?
- What distinguishes human behavior?
- What are neurological bases?
- What other bases are there?
- How do the neurological bases of human behavior affect your life?

- Why does taking/drinking X make me feel Y?
- My grandmother has Alzheimer's disease. What's happening to her brain?
- Carrie Fisher had bipolar disorder. What's that about?
- Why is sleep so important for brain health?
- My mom says my brain isn't fully mature. Is she right?
- Is it safe for high school athletes to play football (or soccer, hockey, etc.)?

This course is about...

Genes

Neurotransmitters

Neurons

Networks

Brains

Behavior

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http://www.nature.com/news/human-brain-mapped-in-unprecedented-detail-1.20285

Today's topics

- Course overview
- Why is biology essential for the science of behavior?
- A bit about systems

Course overview

- Course website:
  - http://psu-psychology.gitbub.io/psych-260-spring-2017/

Keys for success

- Study the figures.
- Study regularly – don't cram.
- Come to class.
- Participate!

Why is biology essential for the science of behavior?

- What is science?
- What distinguishes sciences?
- What is neuroscience?
- Why is neuroscience harder than physics?
- Why is it more fun?

What is science?

- Science

What is science?

- Body of facts or truths.
- Process of acquiring knowledge
- Systematic study
- Observation, experiment, description
- Strives for objectivity
- Aims at reliable, reproducible, general, systematic, universal laws

Gilmore on science vs. other ways of thinking

- Science is a way of thinking
- Science *describes*, but not well-suited to *proscribing*
- Science has little to say about what is good, just, right, moral, etc.
- Science rests on evidence and logic NOT on authorities
- Science respects tradition, but questions and tests it

Gilmore on science vs. other ways of thinking

- Science (and allied fields)
  - has led to huge advances in human health and prosperity.
  - will be essential for maintaining and extending those advances in the future

Similarities between sciences

- What are the different kinds of X?
  - Form, e.g., anatomy
- How does X work?
  - Function, e.g., physiology
- Where did X come from?
  - Origins, e.g., development/evolution

Differences among sciences

- Phenomena of interest
- Methods or tools
- Levels of analysis
  - Spatial scale (nanometers to light-years)
  - Temporal scale (milliseconds to millenia)

What is neuroscience?

- The study of the nervous system
  - And the behavior it makes possible
- Questions
  - What are the parts of the nervous system?
  - How do the parts work? What do they do?
  - Where did they come from?

Why neuroscience is harder than physics

Why neuroscience is more fun than physics

A bit about systems

A bit about systems

- What are systems?

Related ideas

- Wikipedia on systems theory
- Wikipedia on systems thinking
- Wikipedia on cybernetics
  - *Science concerned with the study of systems of any nature which are capable of receiving, storing and processing information so as to use it for control.*

Non-biological examples

- Solar system
- Climate system
- Economic system
- Internet

Systems have

- Components
- Interactions
- Forces/influences
- Boundaries
- Inputs/outputs/processes

Systems. . .

- "Behave" or change state across time
- Return to starting state
- Appear to be regulated, controlled, influenced by feedback loops

May be thought of as networks

Why is studying systems so hard?

- Single parts -> multiple functions
- Single functions -> multiple parts
- Change structure/function over time (learning, development)
- Biological systems not "designed" like human-engineered ones
- What information is being processed? What is being controlled?

Next time...

- History of neuroscience