

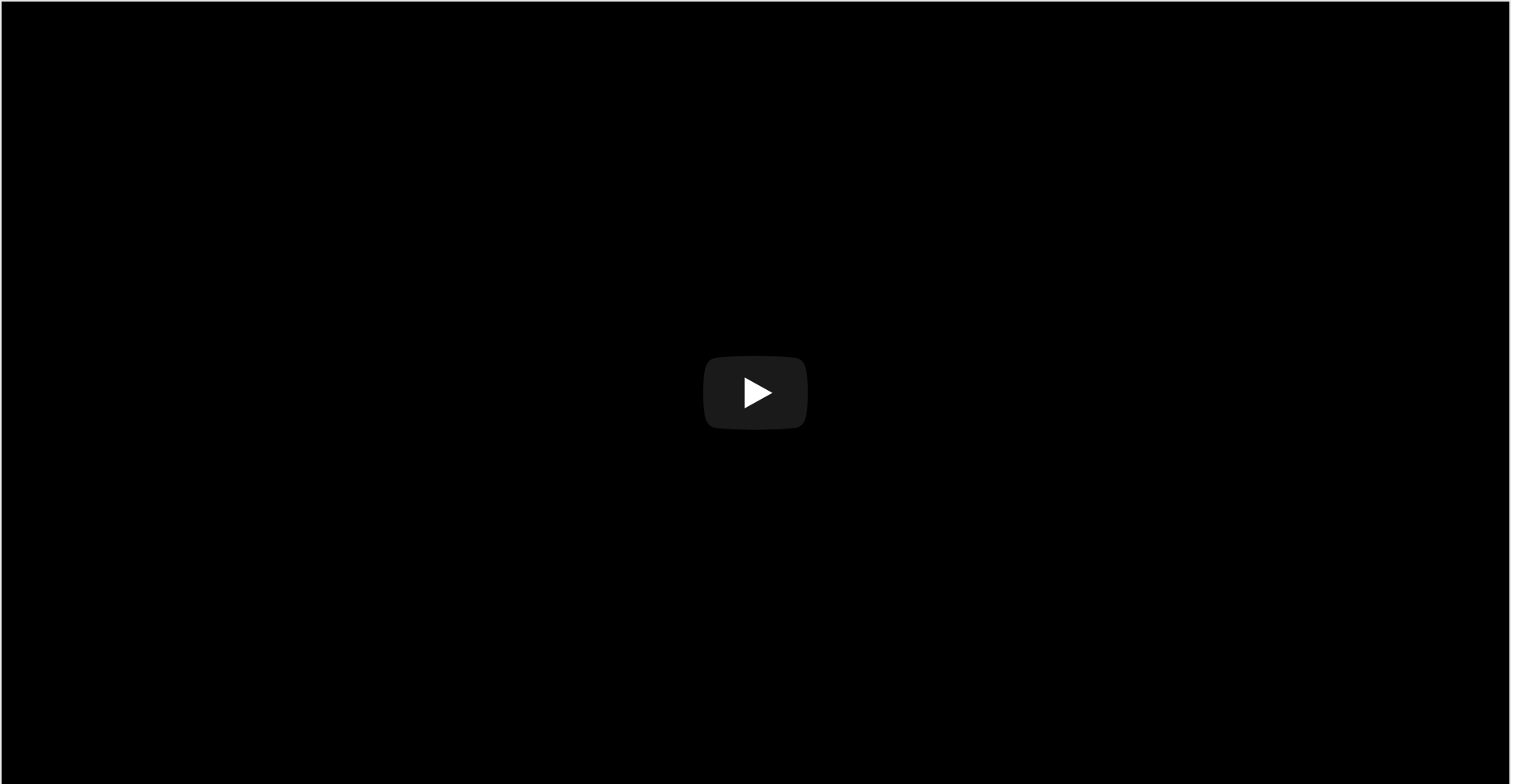
PSYCH 260/BBH 203

Introduction to the course

Rick O. Gilmore

2022-01-10 08:58:40

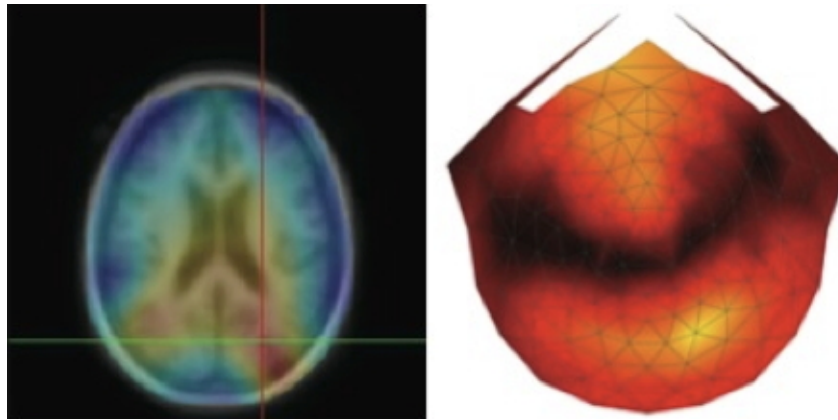
Prelude



<https://www.youtube.com/embed/JB7jSFeVz1U>

PSYCH 260/BBH 203

Neurological Bases of Human Behavior



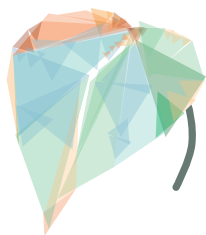
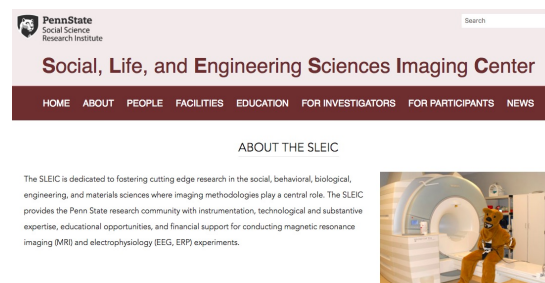
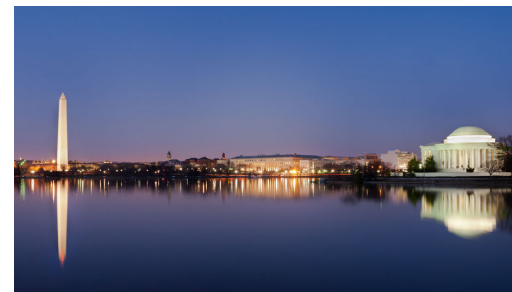
TA & Instructor

Iris Zhao, B.A.

Graduate Student in Developmental Psychology

Rick O. Gilmore, Ph.D.

Professor of Psychology



Databrary

What is this course about?

- What is behavior?
- How is human behavior similar to/different from other animals?
- What are the *neurological* bases (of human behavior)?
- What other bases are there?
- How do the neurological bases of human behavior affect your life?

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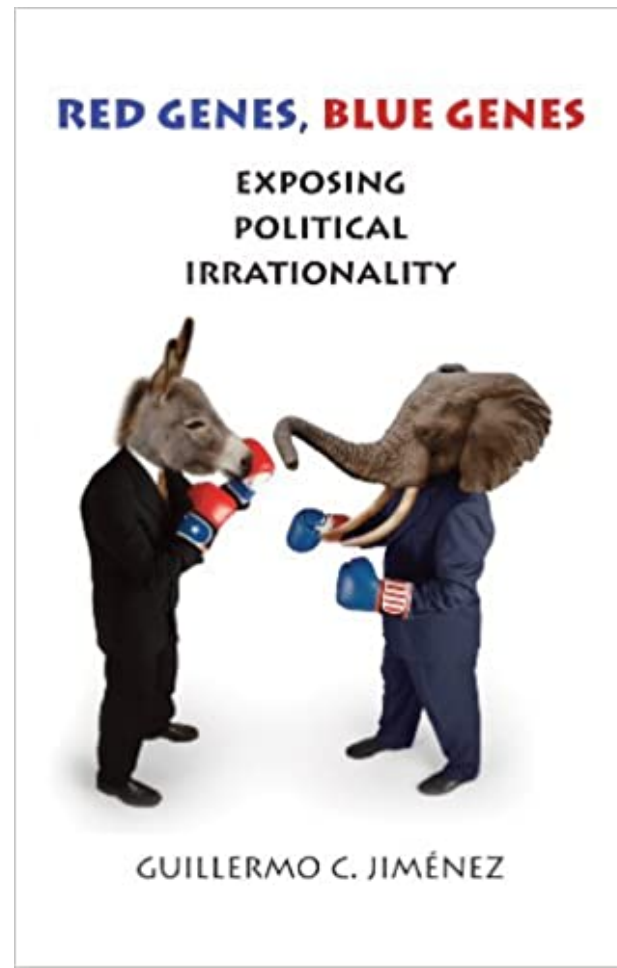
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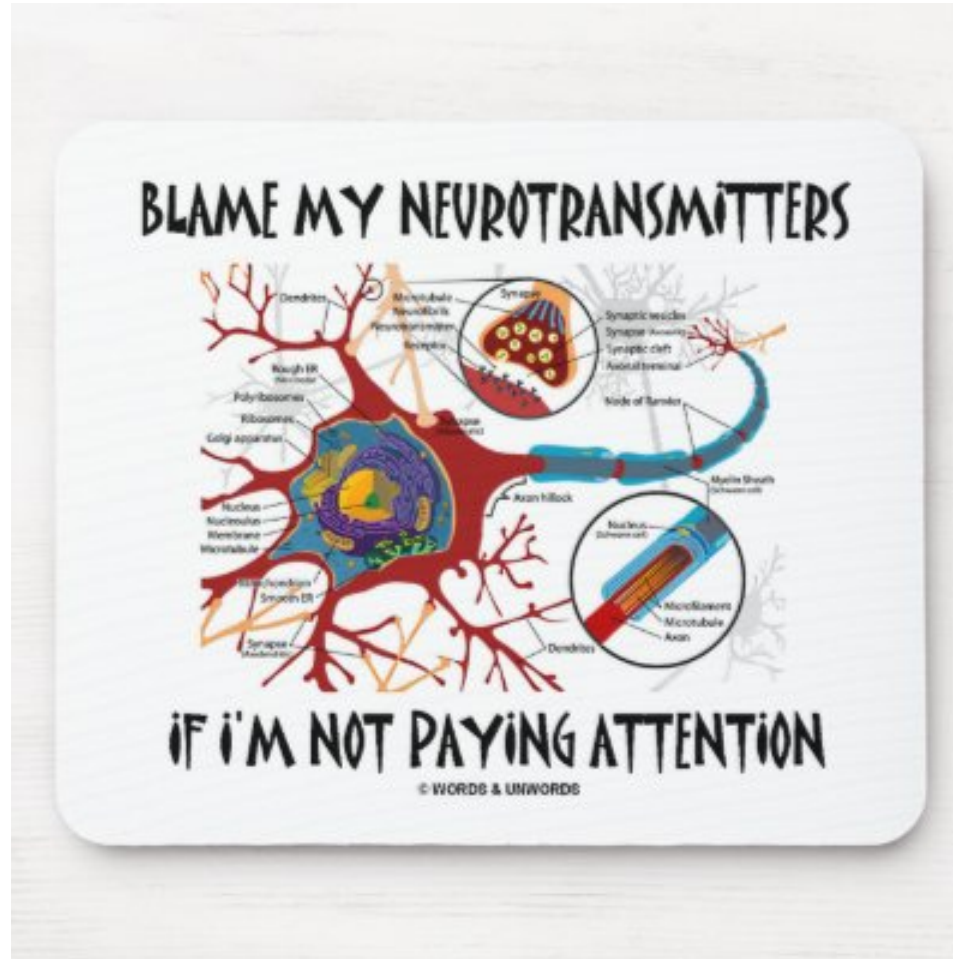
- Why does taking/drinking X make me feel Y?
- My grandmother has Alzheimer's disease. What's happening to her brain?
- Carrie Fisher had bipolar disorder. What's that about?
- Why is sleep so important for brain health?
- My mom says my frontal cortex isn't fully mature. Is she right?
- Is it safe for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

This course is about...

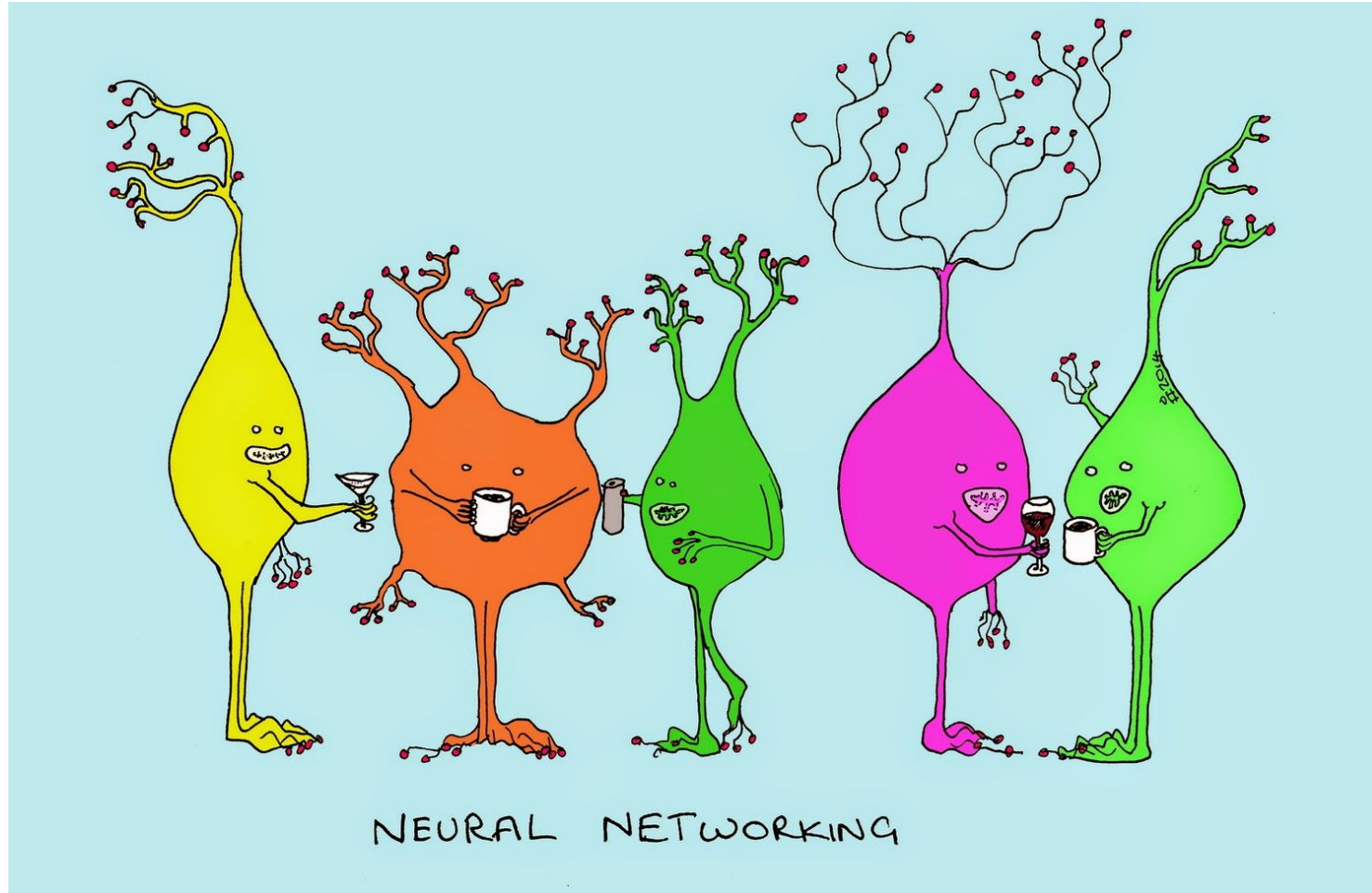
Genes



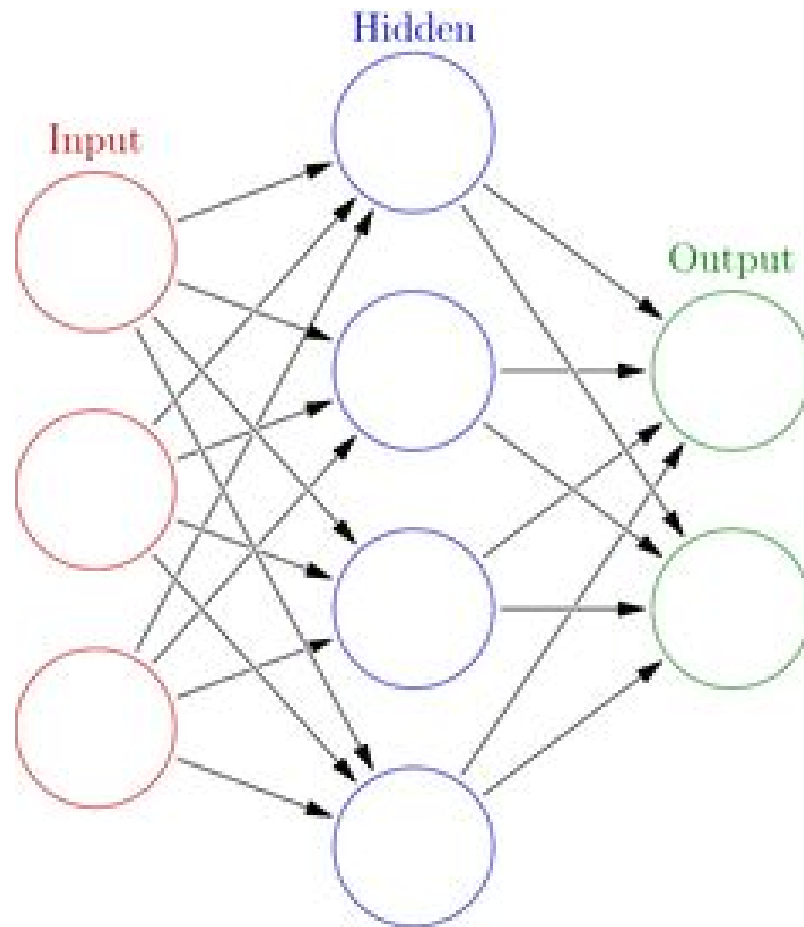
Neurotransmitters



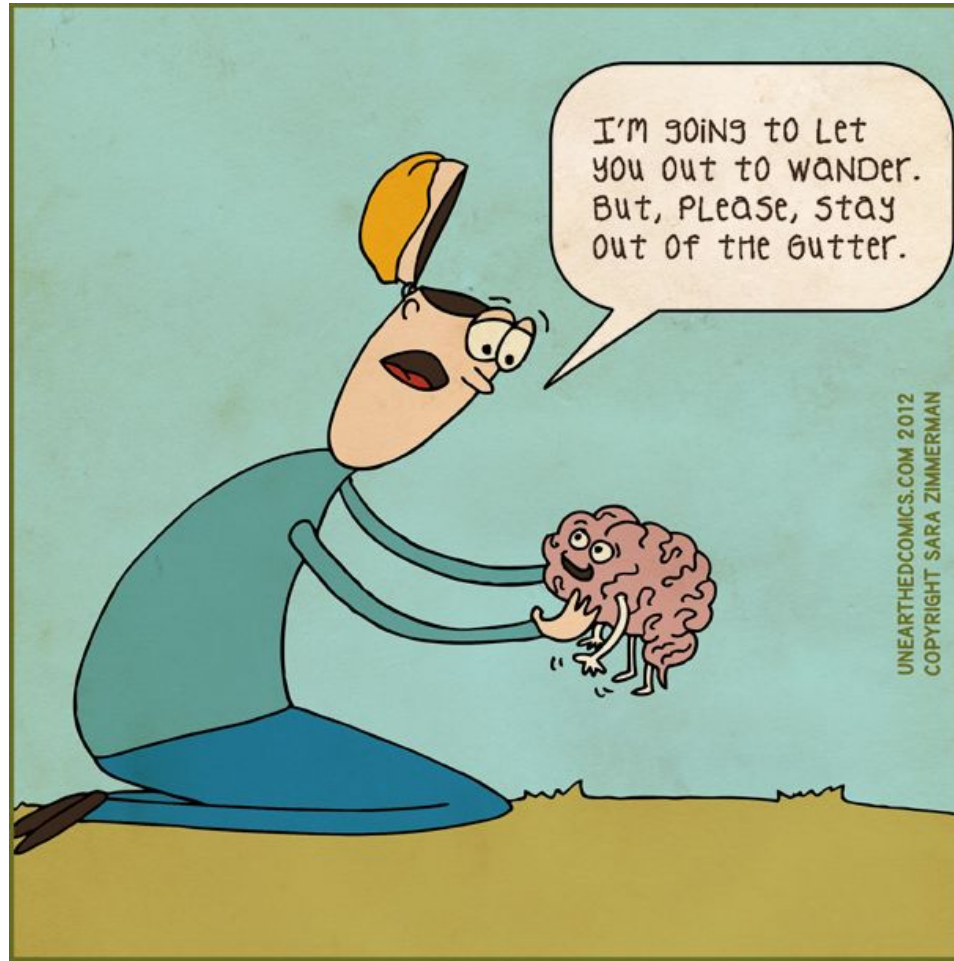
Neurons



Networks

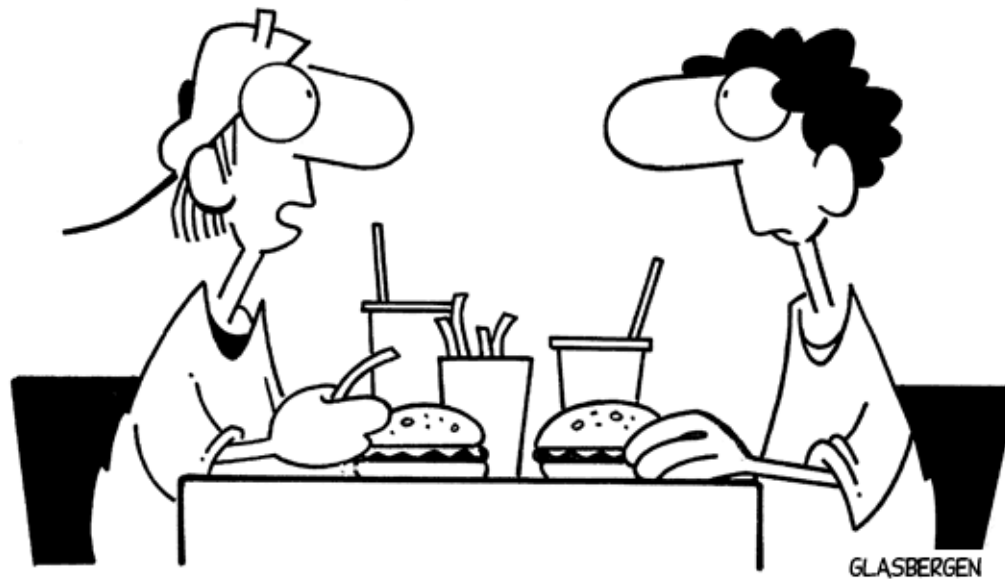


Brains



Behavior

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www.glasbergen.com



**"I forgot to make a back-up copy of my brain,
so everything I learned last semester was lost."**

Today's topics

- Introduction to the course
- A bit about systems

Course overview



<http://psu-psychology.github.io/psych-260-2022-spring/>

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?

What is science?

What is science?

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

Gilmore on science vs. other ways of thinking

- Science is a *way of thinking* and a *set of behaviors*
- Science *describes*, tries to *predict*
- Science alone not well-suited to *prescribing* (recommending) or *proscribing* (prohibiting)
 - little to say about what is good, just, right, moral, etc.
 - (Although systematic descriptions of phenomena can be used to make pre/proscriptive claims...)

- Science rests on **evidence and logic**
 - **NOT on authorities** (e.g., people whose stature is largely or solely based on their position or economic status)
 - However, some scientific claims (and scientists) are more credible and authoritative than others.

- Science respects tradition
 - but questions and tests it repeatedly...
- Science should be reproducible
 - others can get the same answer

- Science
 - has led to huge advances in human health and prosperity over the last several centuries
 - will be essential for maintaining and extending those advances in the future
 -

Example: Rapid development and deployment of multiple, effective, and safe vaccines for SARS-CoV-2 that sharply reduce severe illness and death.

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

Examples

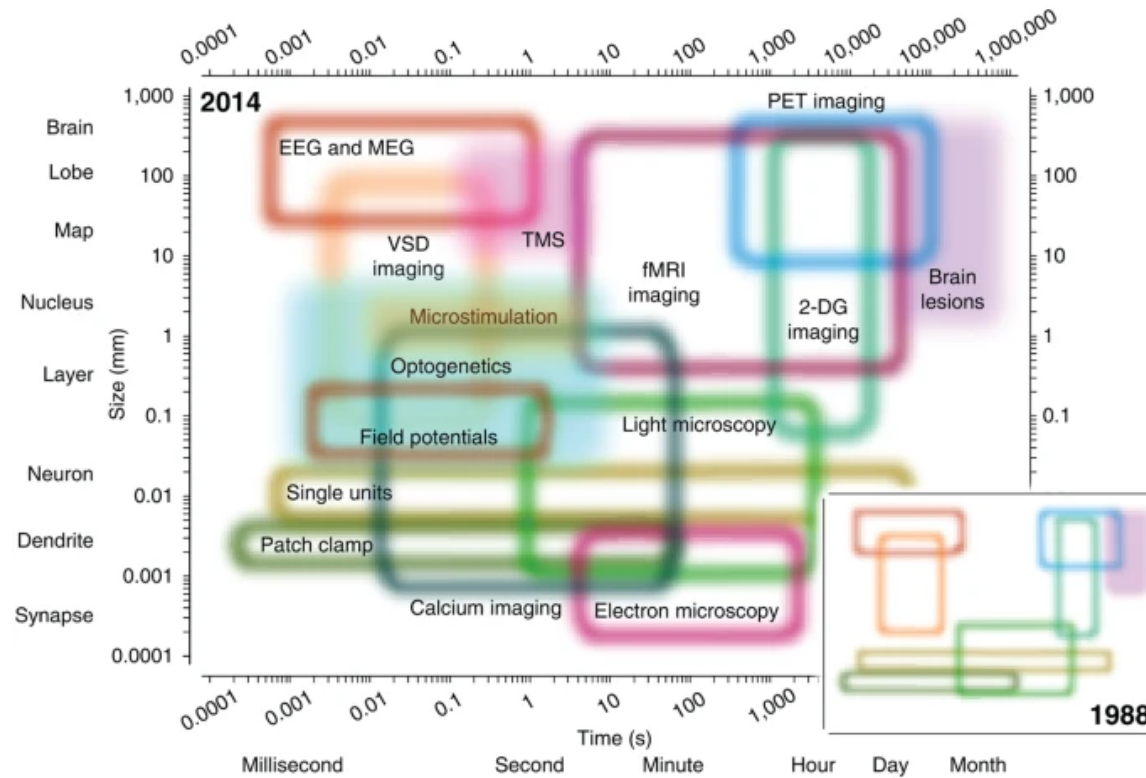
- “Coronavirus gets its name because of its crown-like shape.”
- “Coronavirus appears to have originated in non-human animals in China.”
- “Viruses reproduce (and cause illness) by forcing host organisms to create massive quantities of the virus that then spread to others.”

Differences among sciences

- Phenomena of interest (studying what)
- Methods or tools (studying it how)
- Levels of analysis
 - Spatial scale (nanometers $10^{-9}m$ to light-years $10^{15}m$)
 - Temporal scale (milliseconds $10^{-3}s$ to millenia 10^3s)

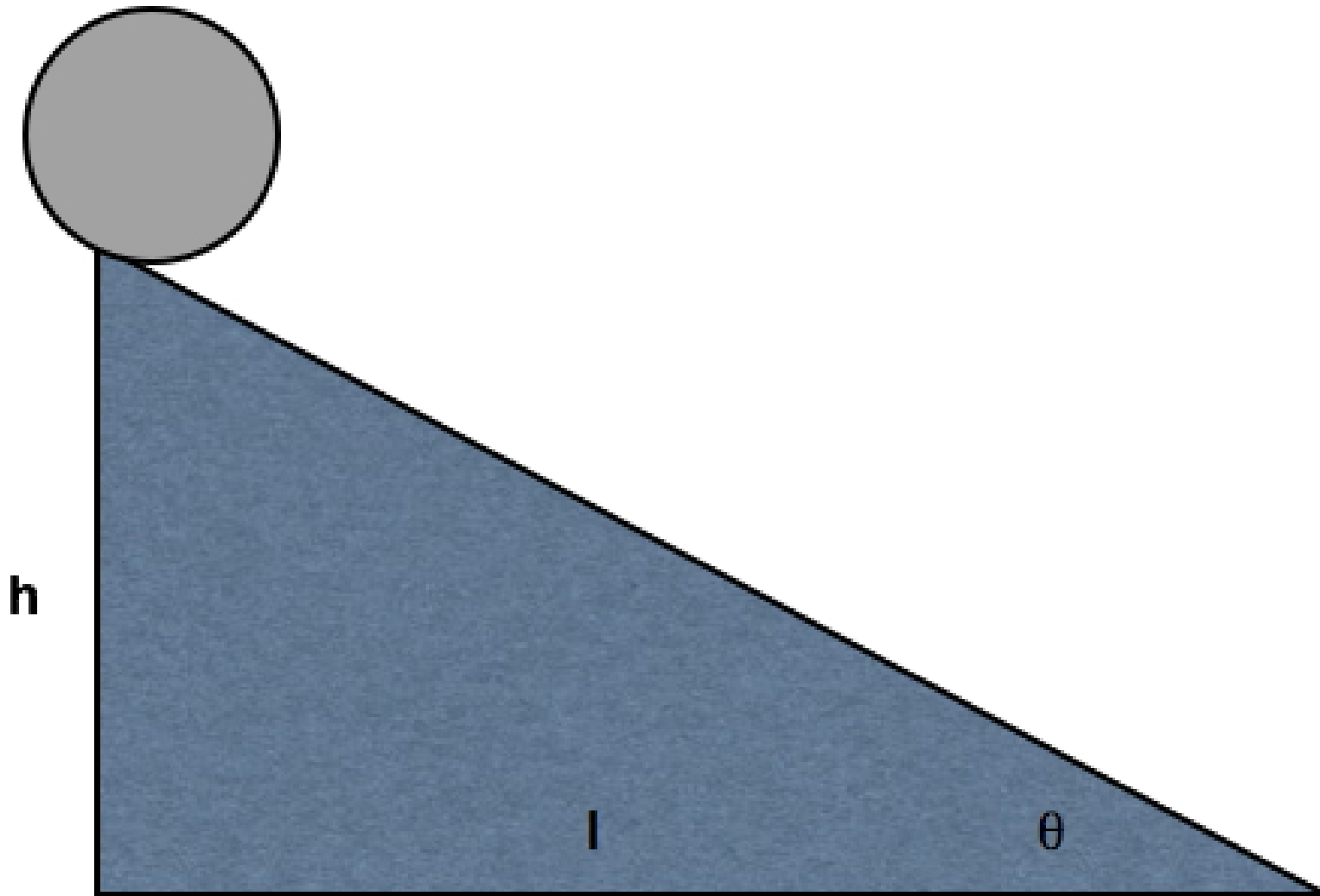
What is neuroscience?

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

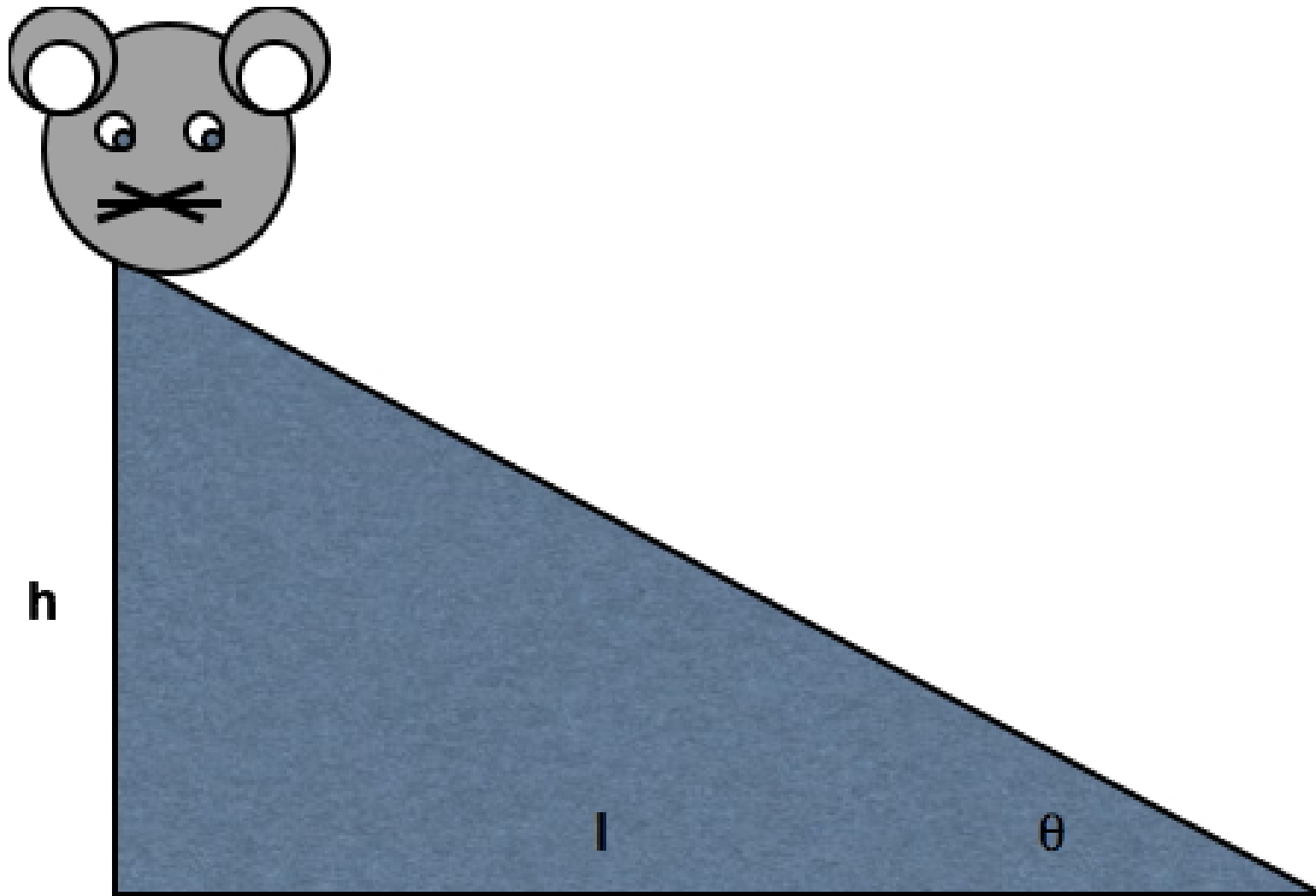


Sejnowski 2014

Why neuroscience is harder than physics



Why neuroscience is harder than physics



A bit about systems



"YOU CAN'T FIGHT THE SYSTEM IN NEW-SEASON SMART CASUAL."

A bit about systems

- Neuroscience studies the nervous system...
- But 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.*

Systems you know...

- Think of a system you know something about
- What makes it a system?

Non-biological examples

- Solar system
- Climate system
- Economic system
- Internet

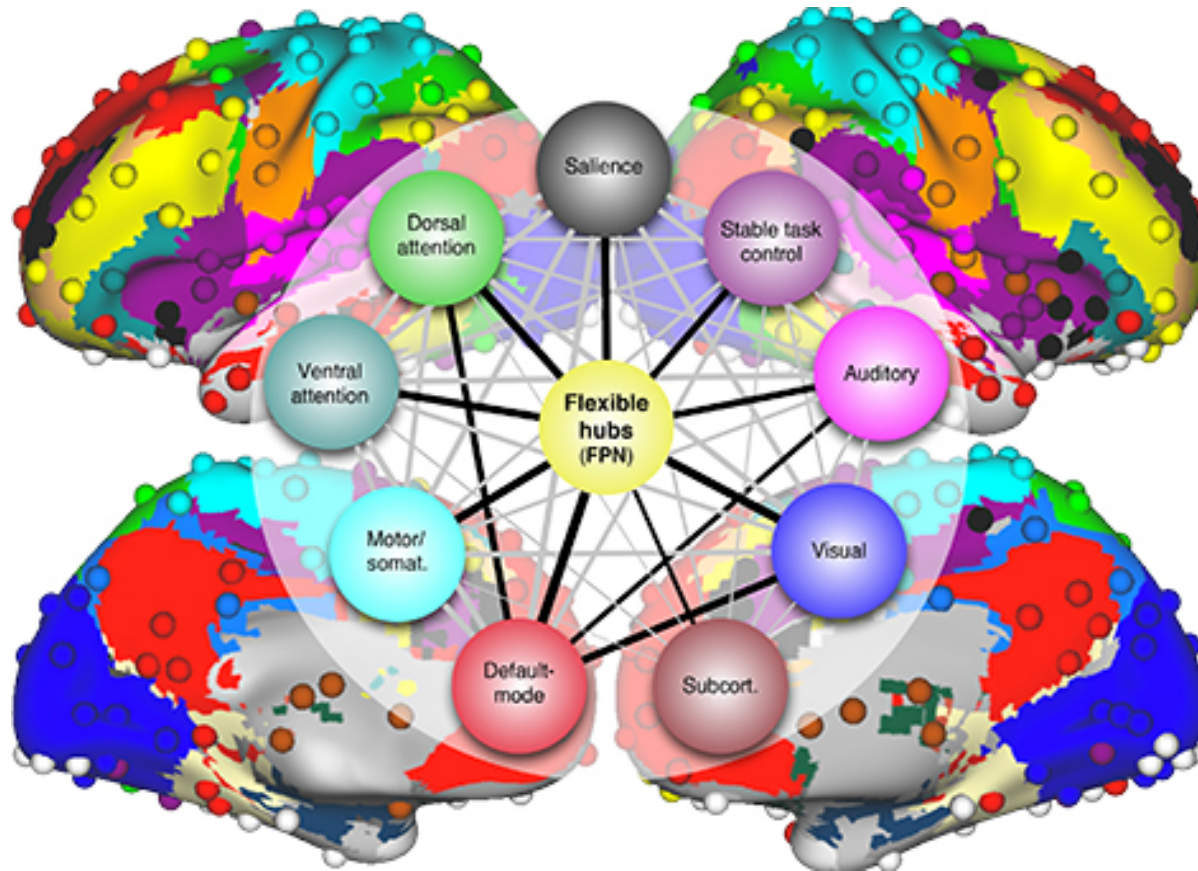
Systems have

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

Systems...

- “Behave” or change state across time
- May 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)
- Naturally occurring systems not “designed” like human-engineered ones
- What information is being processed? What is being controlled?

Next time...

- History of neuroscience
- Methods of neuroscience