The concept of "concepts" in cognitive science
aka
CONCEPTS

Professor: Jacob Feldman

Website: https://rutgers.instructure.com/courses/65262

Readings: Available on Canvas in Modules

Don't know concept SOMETHING HAPPENS Knows concept!

What is the difference between a mind that doesn't know a concept and one that does?

"What is a concept, that the brain may know it, and the brain, that it may know a concept?"
[Apologies to Warren McCulloch]

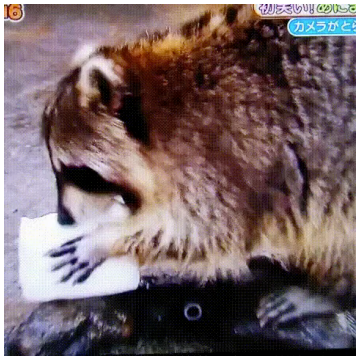
Cat

The object concept:

= The idea that objects have continued existence and properties over time

Mountain Lion

Dog



Raccoon

Baboon

Orangutan

Human

Questions for the course

- What is a concept?
- Where do concepts come from?
- How do you learn new concepts?
- Can computers learn concepts?
- What happens in the brain when we learn a concept?
- How do we know all of this?

Answers…?

- A concept is a class of things in the world, that the mind has access to
- A concept is a mental representation that refers to a class of things in the world
- A concept is a pattern of neural activity
- A concept is an extrapolation from data that can be computed by an algorithm

A brief history of cognitive science

- Cognitive science arose in its modern form arose about 1960 due to a confluence of converging historical developments
- Psychologists rebelled against the Behaviorist (stimulus-response) idea that internal mental processes are off limits
- Linguists argued that the complexity and productivity of human language could not be explained by stimulus-response reinforcement.
- Neuroscientists began to appreciate the information-processing qualities of neural circuitry
- —> All of which was crystalized by the introduction of computers, and especially early attempts at Artificial Intelligence, which provided a model of how internal information processing might work.

Concepts in cognitive science

- Concepts have been studied from many different perspectives, including: philosophy, psychology, neuroscience, and computer science
- Cognitive Science attempts to unify and interrelate all these approaches
- Debate about these issues is surprisingly contentious; the community is a long way from agreeing on the answers to basic questions

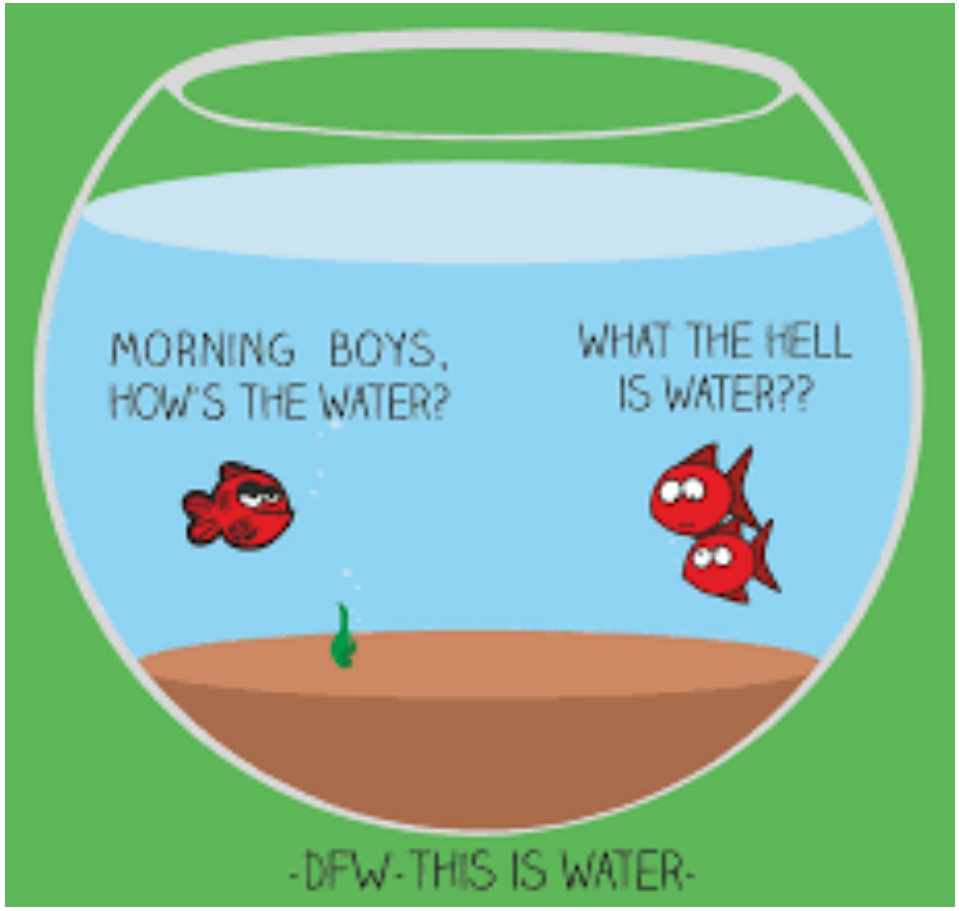
Elements of this course

- The lectures. Please attend if at all possible!
- The readings are available in Modules on Canvas. Read them before class!
- Reading responses (one paragraph per reading) are due weekly by Tuesdays at noon (20% of grade)
- There will be three short papers, due Oct. 6, Nov. 3, and Dec. 1 (20% of grade each)
- (There is no midterm)
- There will be a final exam (Tuesday Dec. 15, 12-3pm) (20% of grade)

This is water

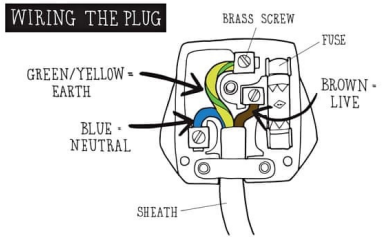
There are these two young fish swimming along and they happen to meet an older fish swimming the other way, who nods at them and says “Morning, boys. How’s the water?” And the two young fish swim on and for a bit, and then eventually one of them looks over at the other and goes “What the hell is water?”

- David Foster Wallace, 2005



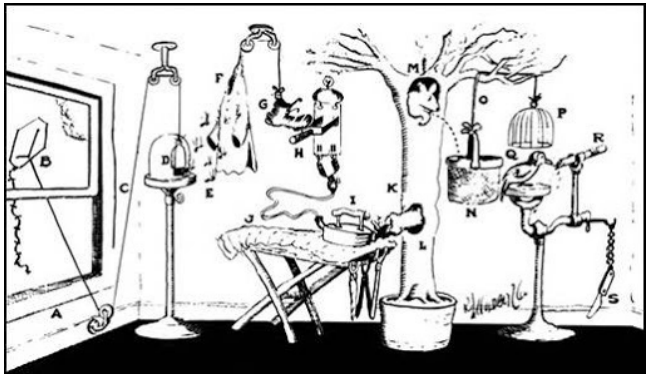
Levels of education

Training



How to make a widget

Education



How the machine that the widget is part of works

Higher education

- Why do we have machines like this?
- What other kinds of machines could we have, and why don't we have them?
- How did it come to be this way?

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