COG250H1: Introduction to Cognitive Science **Fall 2018**

Lecture 2: Introduction + Categorization (Part 1)

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Note: *LaTeX template courtesy of UC Berkeley EECS dept.*

2.1 An Overview of Cognitive Science (CogSci)

2.1.1 Background / Motivation

Purpose: Set the stage for providing visions of cognitive sceince, introduce sub disciplines, briefly describe key events in cognitive science.

- Artificial Intelligence
- Cognitive Psychology
- Philosophy of Mind
- Cultural Anthropology
- Neuroscience
- Semiotics and Linguistics

Topic involving cognitive science:

- AlphaGo
- Computer Vision
- High Frequency Trading
- Literacy + Grammar

In cognitive science, the problem of the mind is being approached from multiple angles. A **metaphor** that you will often see in cognitive science is that the brain is a machine. The fundamental belief is that if science can figure out how to design and construct a mind, then science can figure out how the mind works. This is one of the reasons why the study of artificial intellgience and machine learning, is so intimately connected to the study of the mind. This approach is characterized by employing **Design Thinking** to create models of the mind.

There are, however, problems with this approach. Many machine learning systems these days are very black box. That is, although we understand the basic principles of how these systems work, they are not fully yet understood.

2.1.2 Theoretical Constucts and Plausibility

A theoretical construct (a.k.a hypothetical construct) is description of an ideal object (an idea) that is not directly observable. Theoretical constructs are judged on how accurately they describe the object. A theoretical concept is strong if and only if it is: multi apt, is supported by converging evidence, is elegantly formulated.

More Writing Points: Explain Multi Aptnes, Describe the connection between aptness and metphor

2.1.3 What is CogSci?

We don't know what makes us think.

The one thing we can't account for in our scientific explanations is how we produce scientific explanations.

CogSci seeks to develop a common language for describing **cognitive phenomena** that can be understood through multiple disciplines.

There are three 'visions' for cognitive science:

1. Generic Nominalism (Very High Level)
    - In its weakest vision, cognitive science is the sum of the following fields as the pertain to the study of the mind: psychology, artificial intelligence, linguistics, neuroscience, anthropology, and philosophy.
    - Under this vision the only requirement for doing cognitive science is to do something related to the study of the mind. Thus the fields mentioned are referred to as the cognitive sciences.
    - The term generic nominalism has two components. Generic corresponds to genre.. Nominalism corresponds to name.
    - This vision is generally not accepted in third generation cognitive science
2. Interdisciplinary Ecclecticsm (Still High Level)
    - A stonger definition than generic nominalism, not the strongest
    - Under this vision, different disciplines
    - This approach is characterized by drawing from CogSci's sub disciplines to analyze the mind. Instead of holding to a single paradigm or framework of thought, IE seeks to integrate knowledge from all the sub disciplines to gain insight into the mind.
    - Analogy: Interfaith dialgoue. Suppose that buddhists, catholics, muslisms and other people fof different faith are invited to a cocktail party.
    - This model, however, is very unstable. Typically this model either devolves into generic nominalism or evolves into synoptic integration.
3. Synoptic Integration (Lowest level)
    - The strongest definition of CogSci.
    - If you are able to communicate back and forth between the involved cognitive science disciplines, you reach perfect integration.
    - CogSci, under this model, is a unique discipline. Doing CogSci is deliberate.

2.2 Naturalistic Imperative

Core Ideas: Humans have innate desire to learn about natural world, Philosophers are trained thinkers and are skilled in navigating the abstract,

The Naturalistic Imperative is a term coined by John Vervaeke. One of the goals of science is to 'naturalize' our understanding of the universe. There is an innate human desire to bring our minds in line with all the scientific disciplines.

It comprises of three parts. Analysis, Formalization, and Mechanization. To understand the naturalistic imperative it is useful to look at previous scientific revolutions:

Philosophers are trained in the abstract.

2.2.1 Analyze

Timeline 1. Presocratics (Thales of Miletus) 2. Socrates, Plato and Aristotle 3. The Enlightenment

2.2.1.1 The Presocratics (469 B.C - 4 B.C)

https://www.youtube.com/watch?v=ZkMAx04jDx0Video A

Main idea: The Presocratics ushered in the philosophic and scientific mindset that would dramatically alter the course of western civilization. The concept of rational thought and logos was originated by presocratic thinkers.

In general, Ancient greek philosophers form the intellectual and cultural foundations of western civilization. If one wants to understand western civilization one must understand the works of Socrates, Plato and Aristotle.

Talking points: Introduction to the Presocratics: (1) Presocratic philosophers (0) Why study them?

(i) They are the intellectual and cultural foundations of western civilization If one wants to understand western civilization one must understand Plato and Aristotle.. If one is to understand Plato and Aristotle, one would benefit from understanding the pre socratics. (ii) Presocratics birthed rational thought... It is here that the logos came about... The fact that rational thought came from here (1) Not actually philosophers, wouldn't call themselves philosophers either.. A better way to describe these group of ople would be thinkers (2) End of Presocratic era: The nature of philosophy changed from studying nature to .. Socrates stopped focusing on metaphysical questions, becuase he felt that studying those questions had no impact on his life. Instead, he started turned his attention to practical morality and political thought. (2) Thales

Thales Not much left on him We know three things

2.2.2 Formalize

2.2.3 Mechanize