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

Lecture 3: Categorization II (Classical Theory, and Prototype Theory)

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3.1 section name

Science is the process of viewing the familiar in terms of the unfamiliar. Because of this science may violate our intuition about the world. That does not mean that intuition does not have a role in science. It does. The point is that intuition is not necessary condition for the validity of a scientific theory.

What is a category? - Coding of Experience: Means we don't have to classify everything as a radical individual

A group of things that belong together.

Key Idea: Everytime you hear "All x are y" be very critical of it.

You can treat everything in your environment as an instance of a type. However, there is problems with this

However, things have an infinte amount of feature complexity that can form categories in our world.

Categorical Problems: Uniqueness of a chair violating your categorical assumption

Main Ideas: - Tversky's formula for similarity - Salience

Some people play with the idea that categories are innate and that humans discover them as they mature.

3.2 Classical Theory

Motivation: Smith: Categorization is running on some feature of the world. Categorization is in some sense a bottom up process.

Response: Categorization is rather a top down process. It is more plausible that we use concepts to categorize objects. We are imposing a concept into cateogries.

Aristotle championed the classical theory of concepts.

Somehow we are using concepts to do categorization.

Theory: The classical theory is organized around the idea that all instances of a category share a common of properties.

Evidence:

Criticisms: 1. Wittgenstein on the game

Related Ideas: Problem of Universals, Substance Theory, Object Oriented Programming, Aristotle on Essence,

3.2.1 Prototpye Theory

3.2.2 Geometric Notion - Tversky's Formula

$$Sim(I, J) = af(I, J) + bf(I, J) + cf(I, J)$$

where:

f is a function that measures the salience of each set of features.

a, b, and c are parameters that determine the relative contribution of the three feature sets.

Problems: Falls prey to homuncular fallacy

Salience: Underlies prototype theory. Saliency differes among cultures and individuals bu universals/prototypes in prototype theory require generalizablity. Cannot formalize Tversky's formula because of salience function.

Theory:

Evidence:

Criticsms: