

PHIL/PSYCH 256
INTRODUCTION TO
COGNITIVE SCIENCE
Week 4: Concepts
PLEASE TURN OFF AND PUT AWAY ALL
ELECTRONIC DEVICES



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Concepts

Concept = mental representation of a class of objects or events. Schemas, frames.

Usually there is a corresponding word.

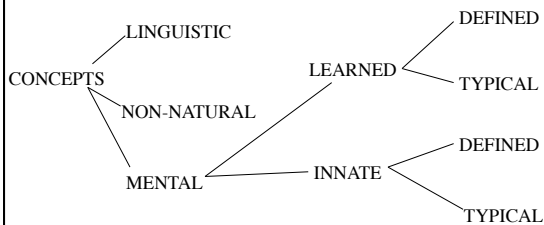
Rules are made out of concepts.

But concepts have associated rules.

Examples: What are some concepts that describe what you did last weekend?

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Theories of Concepts



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Concepts: Computational Power

- Problem solving
 - concepts as prototypes: representation of typical conditions
 - inheritance based on hierarchies
 - matching + completion
 - spreading activation
 - schema-based abduction

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Concepts: Computational Power

- Learning
 - definition
 - learning from examples
 - conceptual combination
- Language
 - mental lexicon, e.g. WordNet
 - cognitive grammar: syntax tied to semantics

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Discussion Question

- What is the nature of your everyday concepts? Are they definable?



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Concepts: Psychological power

Prototype experiments (Rosch)

- Context important: exemplars, multimodal representations (Barsalou)
- Concepts as theoretical (Medin)



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Concepts

- Neurological: specific deficits, e.g. living things, fruits & vegetables, musical instruments
- Practical:
 - AI systems. Ontology, semantic Web
 - Education: conceptual change

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Medin

- The classical view of concepts based on defining features is unacceptable because of failure to specify defining features, goodness of example effects, and unclear cases.
- Prototype theories have also had empirical problems, with respect to context dependency, artificial categories, and ease of learning.
- Concepts are organized by theories, not just by similarity.
- Similarity involves interdependent features and higher-order relations.

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Key Points

- The traditional view of concepts has definable using necessary and sufficient conditions is not compatible with psychological evidence.
- Concepts have characteristics of prototypes (schemas), exemplars, and causal explanations.
- Neural models can combine all these characteristics.

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