PHIL/PSYCH 256 INTRODUCTION TO COGNITIVE SCIENCE

PLEASE TURN OFF AND PUT AWAY ALL ELECTRONIC DEVICES!

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Survey: Yes, No, ?

1. People only use 10% of their brains.
2. The brains of 18-year olds are fully developed.
3. People grow new brain cells every day.
4. Computers can read people's minds.
5. Emotions help people to be rational.
6. Dreams indicate your deepest wishes.
7. Robot cars can drive well on their own.
8. People have free will.

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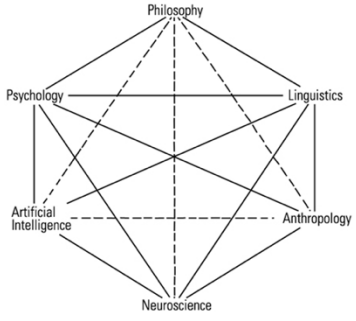
What is Cognitive Science?

- Inter-disciplinary study of mind and intelligence.
- Theoretical
- Experimental
- Applied



Mental Representations

- Rules
- Concepts
- Images
- Cases
- Emotions
- Neural

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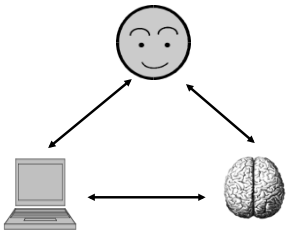
Cognitive Science Analogies



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Aims of Cognitive Science

- Theoretical: explain how thinking works.
- Applied:
  - Robotics
  - Education
  - Design
  - Management
  - Mental illness

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Discussion Questions

- What are the main misunderstandings about the nature of mind and intelligence?
- How can philosophy, psychology, neuroscience, linguistics, computer science, and/or anthropology overcome such misunderstandings?

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Key Points

- Cognitive science is the interdisciplinary study of mind and intelligence, both theoretical and applied.
- Cognitive science uses the 3-way analogy between minds, computers, and brains to understand the processing of mental representations.

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Central Hypothesis of Cognitive Science

- Thinking = representations + procedures
- Representation: structure or activity that stands for something
- Procedure: series of actions that accomplish something

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Fundamental Analogy

- Thinking = representations + procedures
- Apply procedures to representations to produce thinking.
- Computation = data structures + algorithms

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History of Cognitive Science

- Prehistory: Plato, Aristotle, Hume, etc.
- 1870s: Experimental psychology: Wundt, James, etc.
- 1950s: artificial intelligence, cognitive psychology, Chomsky linguistics
- 1970s: Cognitive Science Society, journal
- 1990s-current: rise of cognitive neuroscience

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Methods of Cognitive Science

- Theorizing: descriptive and normative
- Psychological experiments
- Neurological experiments
- Computational modeling
- Linguistic data and theory
- Ethnography

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Evaluating Theories of Representation

1. Representational power
2. Computational power
   - Problem solving
     - Planning
     - Decision
     - Explanation
   - Learning
   - Language
3. Psychological plausibility
4. Neurological plausibility
5. Practical applicability
   - Education
   - Design
   - Management
   - Intelligent systems
   - Mental illness

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Key Points

- Thinking is like computing in that it applies procedures to mental representations.
- Cognitive science uses multiple theoretical and experimental methods to investigate minds.

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Main Points in Simon Reading

- Programs that simulate cognitive processes explain intelligent behaviour by performing the tasks whose performance they explain.
- Neurophysiological explanation is compatible with computational explanation, but operates at a different level.
- At the neural level, cognitive processes are parallel, but at the symbolic level, the brain behaves like a serial system.
- The human mind is an adaptive system, learning to improve its performance in accomplishing its goals.

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