

	<p>ICS 464 11/27/06</p> <p>Introduction to Cognitive Science</p>
	<p>1 Next</p>

	<p>Announcements</p>
	<p>Monday – Presentations Christopher Chong Hyuck</p> <p>Wednesday - Presentations Erik Simon</p> <p>Homework12 due – Cogent Discuss Cogent</p>
	<p>2 Next</p>

	<p>Presentations</p>
	<p>3</p>

	<p>Cognitive Modeling</p>
	<ul style="list-style-type: none">■ Usually . . . high-level cognitive processes involved in thinking, reasoning and planning. (top-down)■ Cognitive modeling developed from work on Artificial Intelligence in the 1960s.■ Topics of AI included game playing, mathematical reasoning, language understanding, and problem solving.
	<p>4</p>

	<ul style="list-style-type: none">■ Intelligence as symbol manipulation■ Computational models from this era were concerned with how symbol manipulation could give rise to intelligent behavior.
	5

	<ul style="list-style-type: none">■ Connectionist modeling became popular in the 1980s■ Many high level cognitive processes appear to share representational and processing requirements.
	6

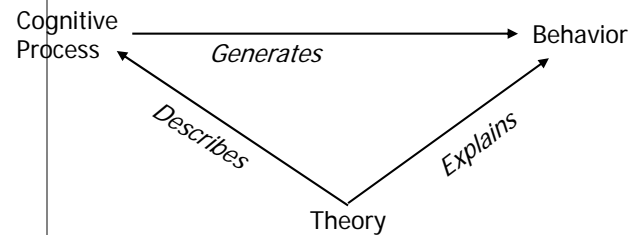
	AI vs NI
	<ul style="list-style-type: none">■ Artificial Intelligent<ul style="list-style-type: none">– Produce intelligent behavior■ Natural Intelligence<ul style="list-style-type: none">– Produce intelligent behavior giving high priority psychological and physiological plausibility.
	7

	What is Modeling?
	<ul style="list-style-type: none">■ A model in any field, whether it be engineering, architecture, molecular biology, or cognitive science, is a <u>representation of something that may be used in place of the real thing.</u>■ In cognitive science the thing is that being modeled is a cognitive process.
	8

What Makes a Good Model?

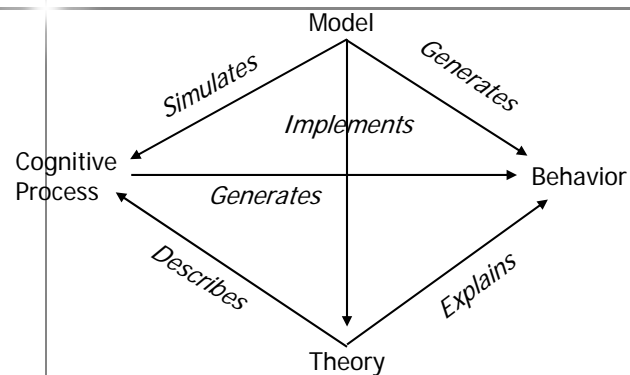
- "A good model has two critical properties:
 1. It is complete, to the extent that the model does not abstract out aspects of the original that have an important influence on the properties or behavior of the original (e.g., a model of fluid flow in a pipe should not ignore friction between the pipe wall and the fluid); and
 2. It is faithful, to the extent that the abstraction process does not introduce component properties or relationships that are not features of the original (e.g., a model building made out of children's clay might suggest that a real building is malleable)" (Cooper 2002)

9

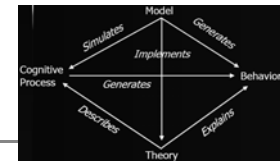


10

Modeling

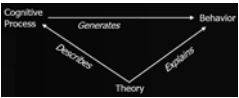


11



- A model generates behavior
- Implements a theory
- Simulates a cognitive process
- Modeling within cognitive science follows this basic approach, with simulation being the principal method of studying a model's characteristics.

12

	<h2 style="text-align: center;">Benefits of Cognitive Modeling</h2>
	<ul style="list-style-type: none"> ■ Psychological theories posit interacting processes or components that share many or all of these properties. ■ Psychological theories are thus often highly complex. ■ Simulation provides an effective means of determining the consequences or predictions of such interacting processing systems. ■ Modeling forces theoretical precision and computational completeness before implementation. <div style="text-align: center;">  </div>

	<ul style="list-style-type: none"> ■ Cognitive modeling allows a detailed analysis of posited processes and subprocesses. ■ Once normal cognitive function is achieved by the model, an analysis of damage to subprocesses can be compared neuropsychological patterns of behavior for both predictive and validation purposes.

	<h2 style="text-align: center;">Objections to Cognitive Modeling</h2>
	<ul style="list-style-type: none"> ■ Cognitive models should be related to both theory and data. ■ Assumptions about representation and processing may be very difficult to justify. <ul style="list-style-type: none"> – The intervening process, between input and output, is currently not directly observable. – Specification of detail may go beyond the state of our science.