Symbolic Systems and Its Cognate Disciplines

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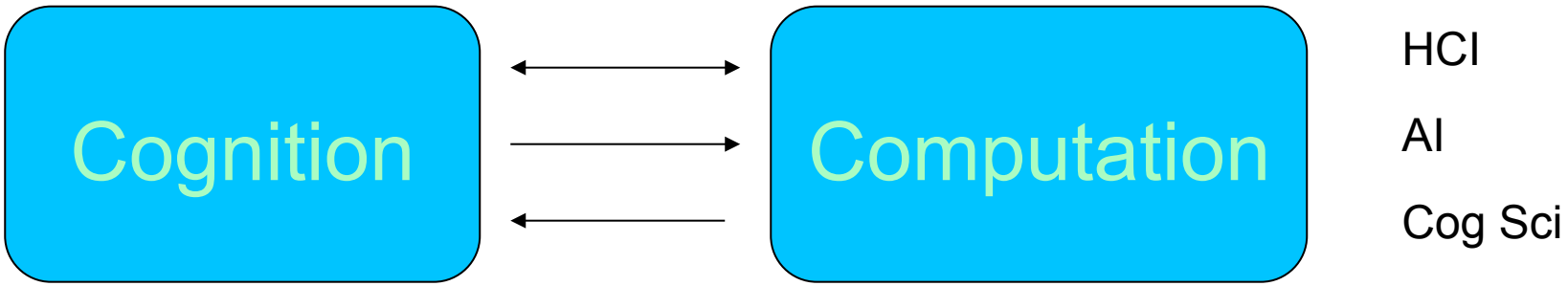
Symsys 130

April 1, 2013

What is Sym Sys about?



Some theoretical questions

Can computers think?

Is language innate?

Are humans rational?

Is information technology prosocial?

Is the brain symbolic?

Does language shape thought?

Do animals use language?

Some practical questions

How can you design a voice interface that will work well for people?

How can you design an ontology for events in a calendar program?

How can you design an experiment to see whether an interface change will improve usability?

How can you design a computational model that will predict human responses on a task?

How can you design a program that will correctly parse a sentence?

How can you design software that will enhance democracy?

Core methods and their markers

Philosophical – definitions, claims, arguments, analysis

Formal – definitions, axioms, theorems, proofs, syntax, semantics, models

Computational – data structures, algorithms, programs, frameworks, complexity

Observational – independent and dependent variables, qualitative and quantitative measures, hypotheses, data, analysis

Experimental – conditions, subjects, hypotheses, data, analysis

Characteristics of the Symbolic Systems Program

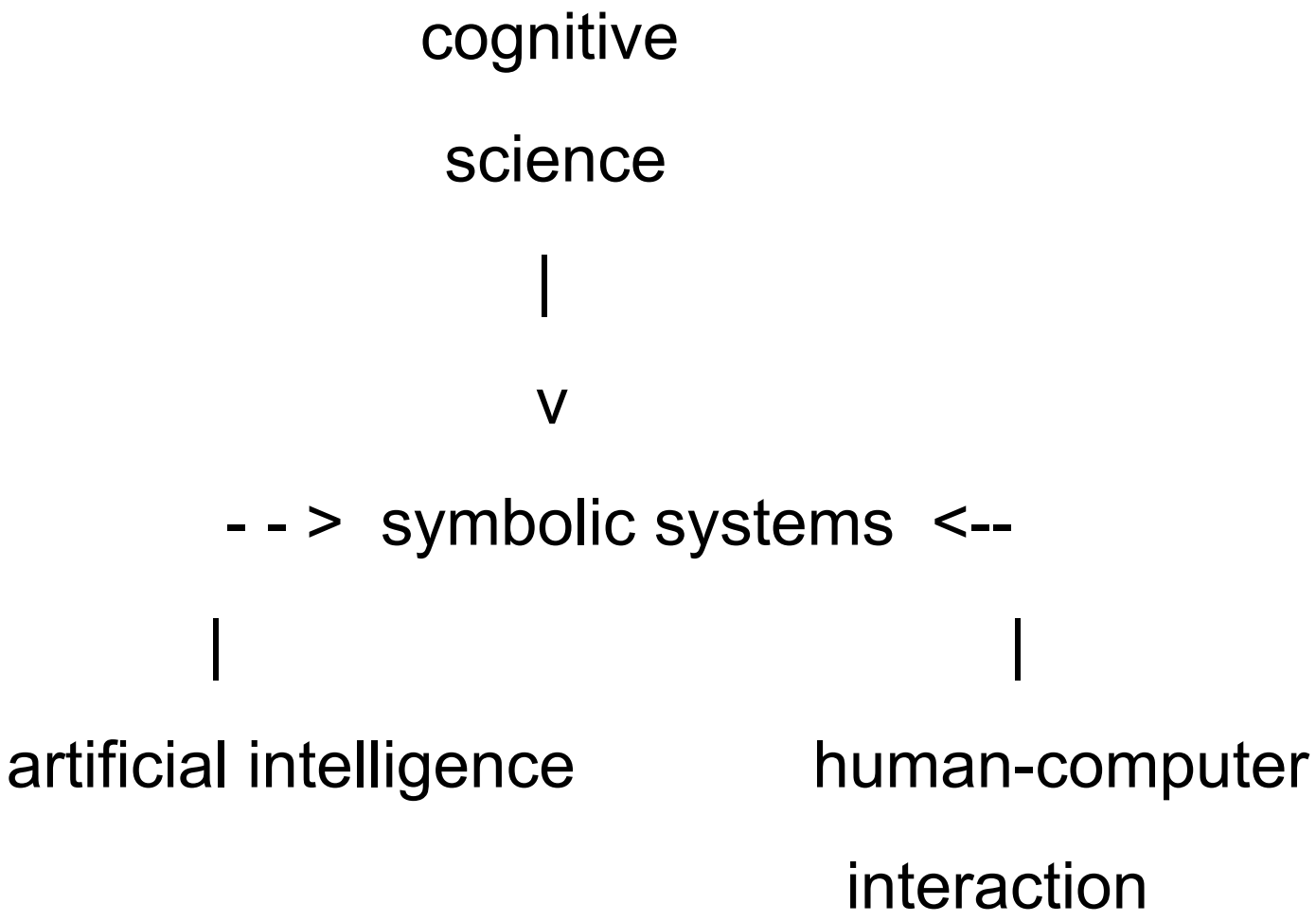
Interdisciplinarity

Problem/question-based, not methods-based

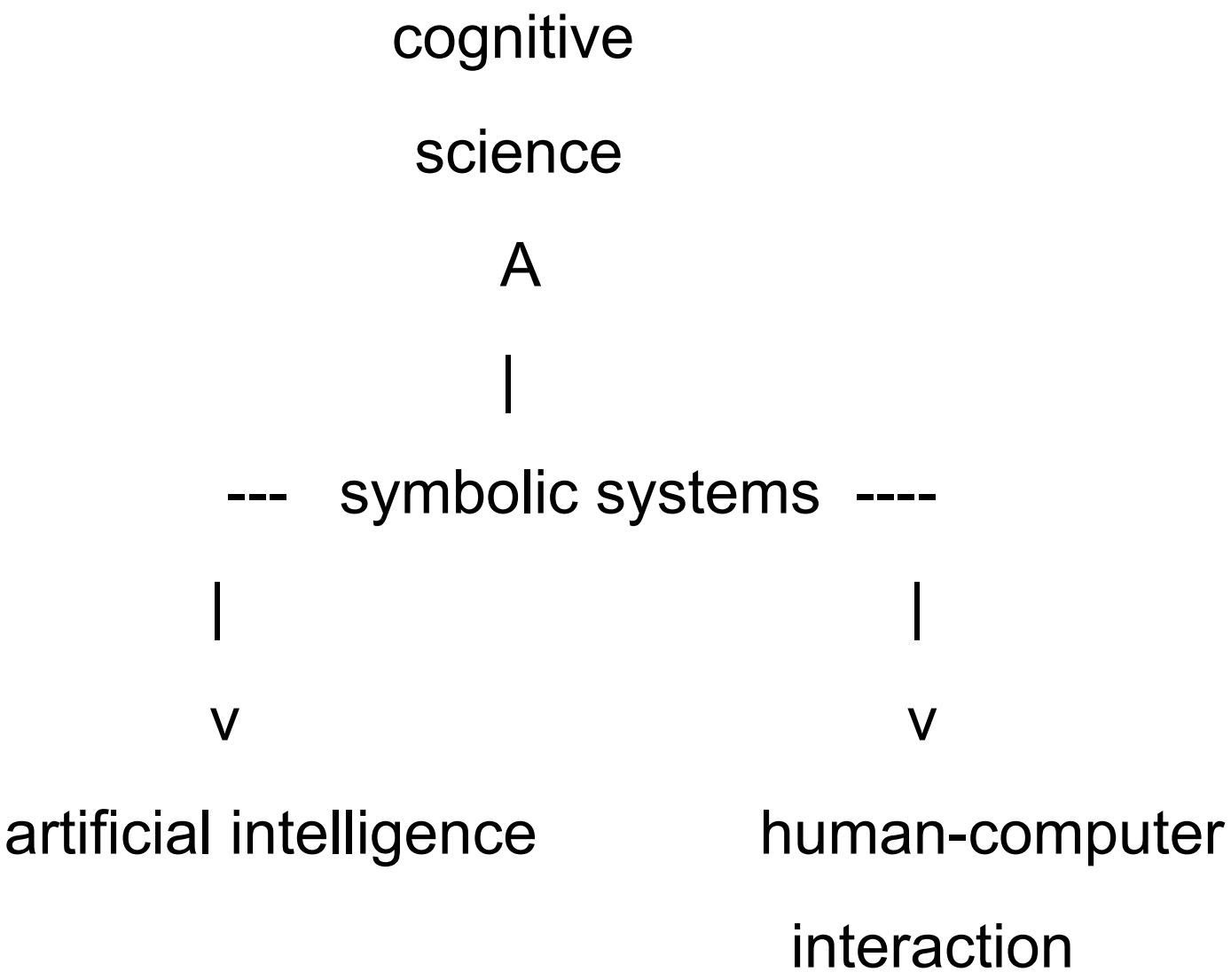
Application-oriented

- computation<->cognition
- theory to practice

The Sym Sys trajectory
1980s



The Sym Sys trajectory 2010s



What is a symbolic system?

formal logic?

language?

Turing machine?

computer program?

person?

mind?

brain?

society?

Other related fields

Informatics and Information Science

Applied Cognition

Computational Linguistics and Natural Language Processing

Computational Neuroscience

Behavioral Economics and Neuroeconomics

Computational Social Science and Social Computing

About the course…

What is the most cited academic paper of all time?

Lowry, OH; Rosebrough, NJ; Farr, AL; Randall, RJ (1951). "Protein measurement with the Folin phenol reagent". *Journal of Biological Chemistry* **193** (1): 265–75

>245,000 Google Scholar citations]

Why?

What is this course about?

Research methods

A *process* course

“Research thinking”

Examples of Research Thinking

Ex 1. Inferring from Data

Albert Einstein

Institute of Advanced Studies, Princeton
Physics
No verified email

Citation indices

	All	Since 2008
Citations	69937	21678
h-index	97	58
i10-index	336	181

Ex 2. Approaching an Empirical Question

“There was a recent UC study showing that approximately 1/3 of all downtown San Francisco traffic is from vehicles circling looking for a parking place.” [7x7SF, 11/4/2011]

How could this be discovered?

Ex 3. Designing a Sound Process

In the “Symbol of the Year” vote for 2013, anyone could change their vote up until the deadline. All votes were posted and visible as soon as they were received and tabulated.

Q: Does this system give an advantage to someone who votes at the end?

A theorem?

Claim: There can't be a generic advantage to voting at the end.

Proof by contradiction. Imagine there were such an advantage. Then everyone would wait until the end. But then everyone would be voting at the same time. Therefore there can't be an advantage to voting at the end.

Ex 4. Inferring from Behavior

Practical advice

Get to know faculty – find an advisor

Do some research and/or independent study

Plan ahead

Don't take too many courses

Read your SSP email

Go to the forum, other lectures, and dinners

Attend SSP social events

View courses and lectures as being about skill development

Practical advice (continued)

Practice reading and listening – learning is a skill!

Think of yourself as the young version of whatever you want to become

Talk to people about what you are studying

Watch to see what excites you

Don't get too caught up in how much you like instructors

Learn time management