Philosophy in Cognitive Science: 1979-2008

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Questions

• Where are the philosophers?

• What in the world do philosophers do?

• What have they/could they contribute to cognitive science?
Points of Contact with Cognitive Science

• Philosophy of Mind: What are mental states/processes and how do they work?
  – Application of philosophical tools (e.g., thought experiments) to foundational issues about mental states/processes

• Philosophy of Science: How does/should science work?
  – Cognitive sciences provide the subject matter
  – But may provide reciprocal guidance to science

• Possible third? Cognitive/experimental philosophy: application of methods/results in cognitive science to philosophical problems (cf. neurophilosophy)
Philosophy of Mind

What are mental states/processes and how do they work?

• Strategies of Inquiry with Uptake in Cognitive Science
  – 1970s Onwards: Thought experiments
    • Putnam’s Twinearth
    • Searle’s Chinese Room
  – 21st Century: Experimental Philosophy
• Mind-Body Problem
• Representation and Computation
Philosophy of Mind

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- **Mind-Body Problem**
- Representation and Computation
The Mind-Body Problem

- The Identity Theory: Mental states (processes) are identical with brain states (processes)
- Functionalism: Mental states are defined by their relations to other mental states
  - May be realized by brain states but are not identical with them
- Qualia Dualism: The qualitative character of conscious experiences is ontologically independent of anything physical/functional
- Reviving the Identity Theory
Objections to the Identity Theory

• Correlation Objection:
  – Evidence for Identity Theory can never go beyond mere correlation between mental states and brain states

• Multiple Realizability Objection:
  – Hilary Putnam argued that the brain states corresponding to mental states such as pain or hunger vary widely across actual (and possible) species
Try Relating Money to Physics

- Diversity of things that count as money
  - Strings of wampum
  - A signed check
  - A French 100 franc note
  - A US silver dollar
  - A wire transfer by computer
  - Bits in a computer
  - Etc.

- These various instances of money are not likely to have anything physical in common

- And even a disjunction of actual realizers is insufficient, since new things might come to count as money in the future
Reviving the Identity Theory

- Rethinking the Multiple-Realization Claim
  - Is pain (hunger, etc.) the same in us as in other species? And the same in each of us?
  - Neuroscience is fundamentally comparative
  - Map mind and brain at the same grain
- Rethinking the Mere Correlation Claim
  - Identity a discovery heuristic, not a conclusion from evidence
    - Evaluated by how productive the research is
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Representation (and Computation)

• Representational Vehicles:
  What sorts of things can serve as representations?
  • Propositions, spatial layouts, etc.
  • These are the entities that are manipulated in computations

• Representational Contents:
  What is the relation between vehicles and what they represent?
Representational Vehicles: Language of Thought

- Language is the exemplar of a representational system
  - Can be operated on by inference rules
- Learning requires hypothesis testing
  - Must first represent hypothesis in order to test it
- Language of thought must be innate
  - Before one could acquire other representational systems, one must possess a representational system of equal representational power
Representational Vehicles: Connectionism Wars

• Connectionism has emphasized non-syntactically structured distributed representations

• Fodor & Pylyshyn’s response
  – Thought, like language, is productive and systematic
  – Units in networks lack the compositional structure to explain productivity and systematicity
  – Classical (linguistic) representations alone possess a compositional syntax that can explain thought
Representational Content

• Information theoretic approaches
  – Loosely inspired by Shannon
  – Effect carries information about its cause

• Asymmetric dependence
  – Privilege causal relation to intended referent

• Teleological approaches—emphasize function
  – Natural selection (Darwinian)
  – Autonomous systems (self-maintaining systems far from equilibrium)
Anti-Representationalism

• Dynamical Systems Theory
  – Representations are the wrong explanatory tool (too static)
  – Alt: Relating variables across time, often utilizing differential equations

• Embodied and Situated Cognition
  – Brains are coupled to their bodies and environments, arguably without internally representing either
Philosophy of Science

• How does/should science work?
  – Cognitive sciences has served as the raw material for inquiries by such philosophers as Dennett, Thagard, Nersessian, the Churchlands
  – Reciprocally, philosophy of science provides guidance to the cognitive sciences, for example:
    • Accounts of explanation
    • Understanding interdisciplinary relations
Explanation

• Approaches to Explanation
  – Nomological Approach
    • Laws carry the explanatory burden
    • Explanation involves derivation from laws
  – Mechanistic Approach
    • Parts and operations are organized to realize a phenomenon
      – Importance of diagrams and diagrammatic reasoning
      – Mechanisms are particulars; generalization via schematization and conservation of mechanisms
Interdisciplinary Relations

• Nomological Accounts: Theory Reduction
  – Laws/theories of higher-level sciences are derived from those of lower-level sciences
  • Anti-reductionists cite multiple realizability
• Mechanistic Accounts: Inherently multi-level, hence interdisciplinary
  – Turn to a lower-level science to explain how a mechanism works
  – Turn to higher-level sciences to identify the conditions under which the mechanism operates and engages its environment
Philosophy in Cognitive Science?