

# 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
  - 21<sup>st</sup> Century: Experimental Philosophy
- Mind-Body Problem
- Representation and Computation

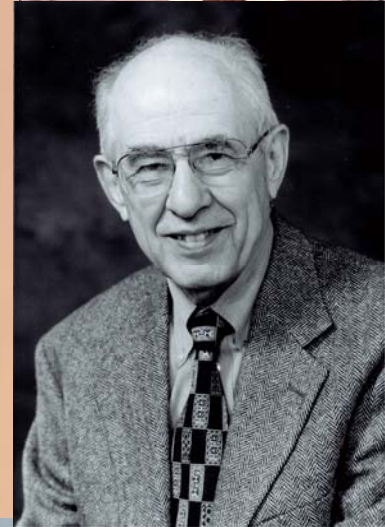
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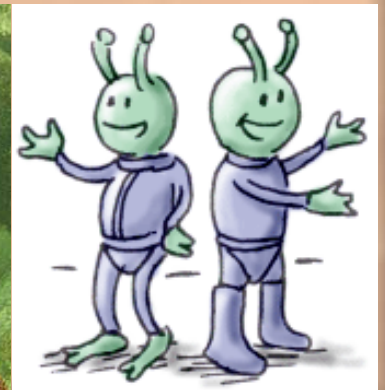
# The Mind-Body Problem

- 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



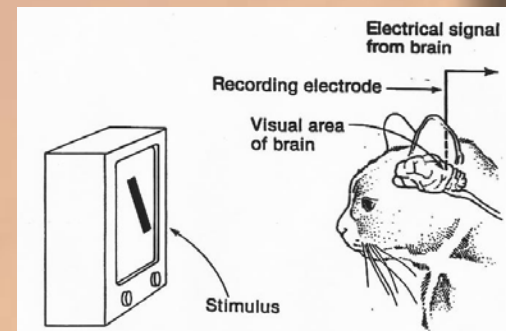
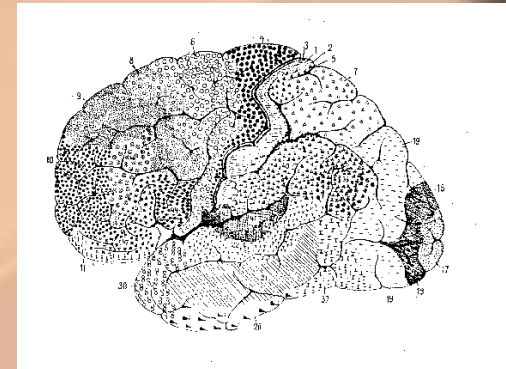
# Try Relating Money to Physics

- 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

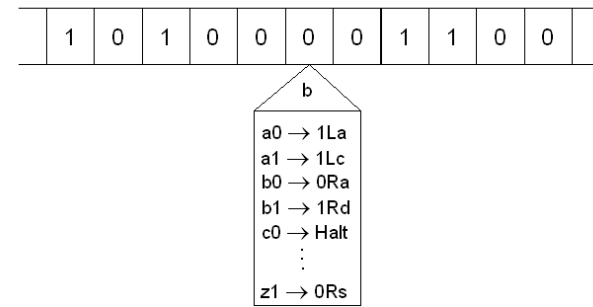


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# Representation (and Computation)



- 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?

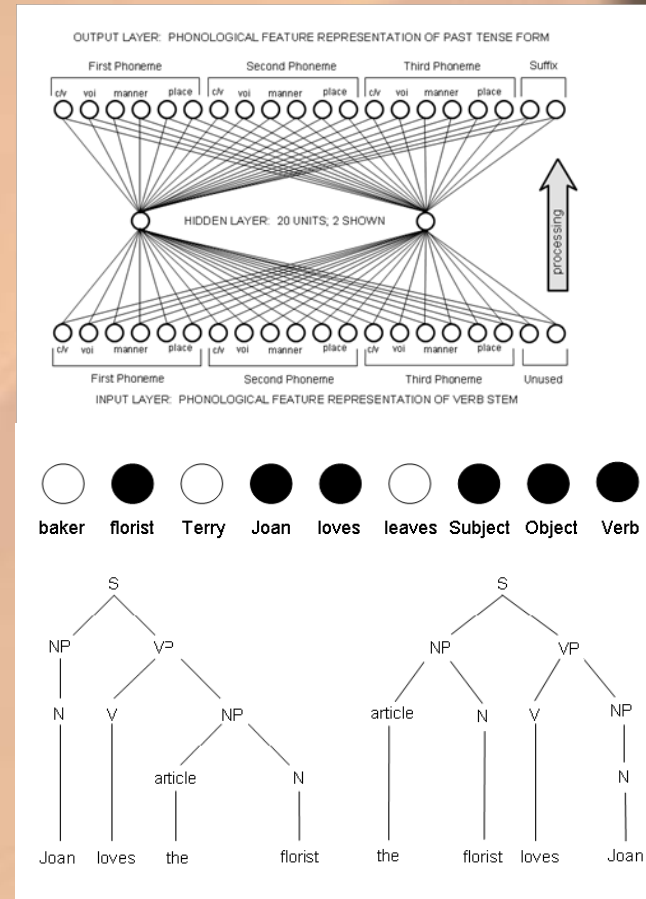


# Representational Vehicles: Language of Thought

- 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



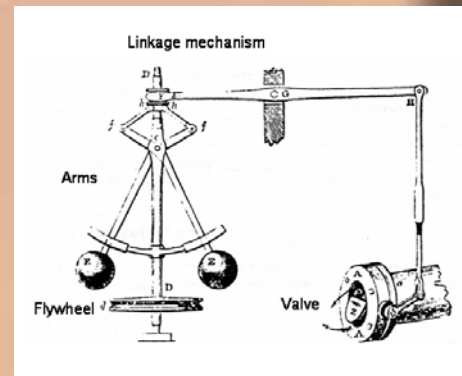
# Representational Content

- 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

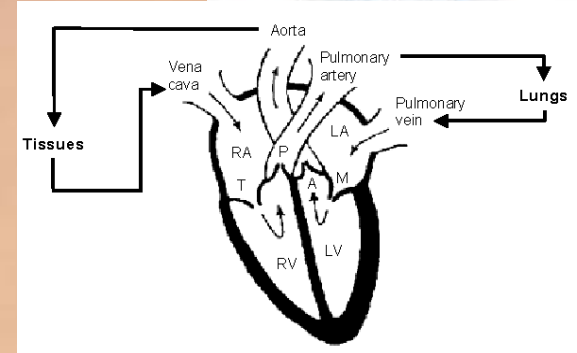
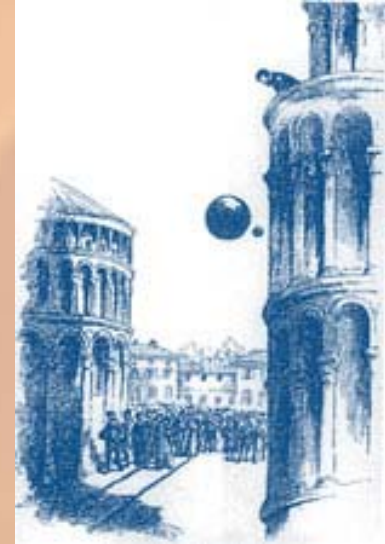


# Philosophy of Science

- 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

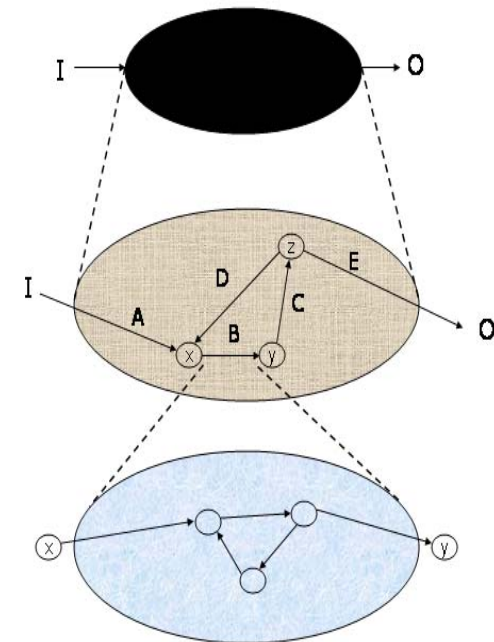
# Explanation

- 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?

