Psychology 354
Final Review

Exam format
Exam tips
Course Themes in Review

Exam Format

- Same format as midterm
- 10 definitions (choose from 12)
  - 3 marks each
    - 2 marks define the term
    - 1 mark say why term is interesting
  - Don't use point form!
- 1 essay (choose from 3)
  - 35 marks
  - 3-4 pages
  - Don't use point form
- Sample exam is on the website

Exam Tips

- Be more advanced than in midterm!
- Don't name drop
  - Don't name a term, and assume that by naming it I will think that you know what it means
- Don't fish
  - Don't regurgitate the whole course
  - Keep your answer focused
- Try to surprise me
  - Go beyond what I've told you to get full marks on the essay

Theme 1: Three Schools

- Key theme of course was that there are three different schools of thought in modern cognitive science
  - Know their properties
  - Know their relations to one another
  - Know their relative advantages and disadvantages

Classical Cognitive Science

	Classical Cognitive Science
Core Ideas	• Mind as a physical symbol system • Mind as digital computer • Mind as planner • Mind as creator and manipulator of models of the world • Mind as sense-think-act processing
Preferred Formalism	Symbolic logic
Tacit Assumption	Nativism, naïve realism
Type of Processing	Symbol manipulation
Prototypical Architecture	Production system (Newell, 1973)
Prototypical Domain	• Language • Problem solving
Philosophical Roots	• Hobbes • Descartes • Leibniz • Craik
Some Key Modern Theorists	• Chomsky • Dennett • Fodor • Pylyshyn
Some Pioneering Works	• *Plans And The Structure Of Behavior* (Miller, Galanter, & Pribram, 1960) • *Aspects Of The Theory Of Syntax* (Chomsky, 1965) • *Human Problem Solving* (Newell & Simon, 1972)

Connectionist Cognitive Science

	Connectionist Cognitive Science
Core Ideas	• **Mind as information processor, but not as a digital computer** • **Mind as a parallel computer** • **Mind as pattern recognizer** • **Mind as a statistical engine** • **Mind as biologically plausible mechanism**
Preferred Formalism	Nonlinear optimization
Tacit Assumption	Empiricism
Type of Processing	Pattern recognition
Prototypical Architecture	Multi-layer perceptron (Rumelhart, Hinton, & Williams, 1986)
Prototypical Domain	• Discrimination learning • Perceptual categorization
Philosophical Roots	• Aristotle • Locke • Hume • James
Some Key Modern Theorists	• J.A. Anderson • Hinton • Kohonen • McClelland
Some Pioneering Works	• *Principles Of Neurodynamics* (Rosenblatt, 1962) • *Parallel Models Of Associative Memory* (Hinton & Anderson, 1981) • *Parallel Distributed Processing* (McClelland & Rumelhart, 1986; Rumelhart & McClelland, 1986b)

Embodied Cognitive Science

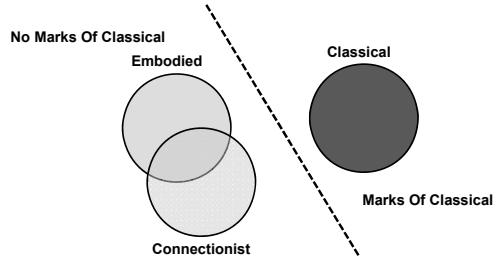
	Embodied Cognitive Science
Core Ideas	• **Mind as controller of action** • **Mind emerging from situation and embodiment, or being-in-the-world** • **Mind as extending beyond skull into world** • **Mind as sense-act processing**
Preferred Formalism	Dynamical systems theory
Tacit Assumption	Embodied interaction
Type of Processing	Acting on the world
Prototypical Architecture	Behavior-based robot (Brooks, 1989)
Prototypical Domain	• Locomotion • Social interaction
Philosophical Roots	• Vico • Dewey • Heidegger • Merleau-Ponty
Some Key Modern Theorists	• Brooks • Clark • Noë • Wilson
Some Pioneering Works	• *Cognition And Reality* (Neisser, 1976) • *The Ecological Approach To Visual Perception* (Gibson, 1979) • *Understanding Computers And Cognition* (Winograd & Flores, 1987)

Theme 2: Unification?

- **A second main theme running through the course is the potential for a unified cognitive science**
  - **Given what we know about the three schools, to what extent are they complementary or similar?**
  - **Is there a need for the three schools to be united?**
  - **Is there a possibility for such unification?**

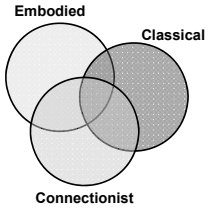
If Classical Marks Exist…

- **… then classical theories are qualitatively different than alternatives, which may or may not share features that distinguish them from one another**



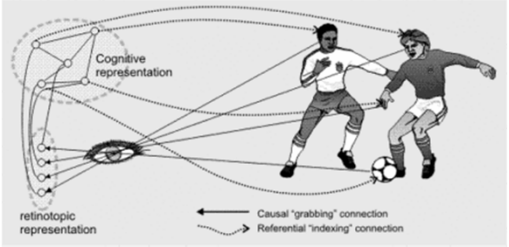
If Classical Marks Do Not Exist…

- **… then classical theories share characteristics with other cognitive theories, raising the possibility of theories with hybrid characteristics**



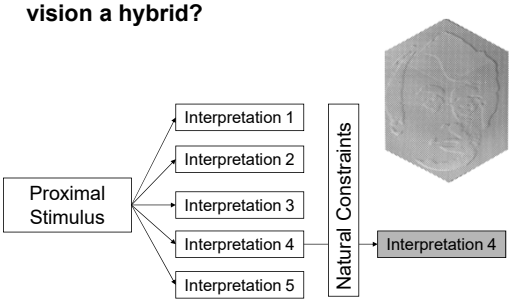
A Hybrid Theory?

- **Pylyshyn's FINST theory: hybrid or not?**



Another Hybrid?

- **Is Marr's natural computation theory of vision a hybrid?**



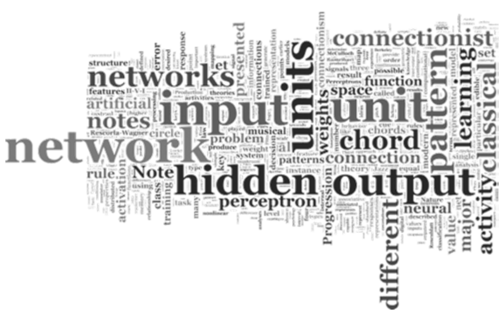
Theme 3: Technical Language

- You have been exposed to many technical terms used in cognitive science
  – Know what they mean
  – Know why they are important
  – Use them wisely

Classical Terms

Word cloud created from Chapter 3

Connectionist Terms



Word cloud created from Chapter 4

Embodied Terms

Word cloud created from Chapter 5

A Unified Vocabulary?

Word cloud created from Chapters 3, 4 and 5 combined

The Cognitive Sciences

	Classical Cognitive Science	Connectionist Cognitive Science	Embodied Cognitive Science
Core Ideas	• Mind as a physical symbol system • Mind as digital computer • Mind as planner • Mind as creator and manipulator of models of the world • Mind as sense-think-act processing	• Mind as information processor, but not as a digital computer • Mind as a parallel computer • Mind as pattern recognizer • Mind as a statistical engine • Mind as biologically plausible mechanism	• Mind as controller of action • Mind emerging from situation and embodiment, or being-in-the-world • Mind as extending beyond skull into world • Mind as sense-act processing
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