



# Philosophy and Cognitive Science (PHIL321g)

Bates College, Winter 2013

Professor William Seeley

Office Hours: T/Th 11-1, 315 Hedge

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## Course Description:

Cognitive science is an interdisciplinary field in which theories and methods from psychology, computer science, neuroscience, linguistics, and philosophy are used to study cognitive phenomena, e.g. thinking, rationality, perception, language learning, and language comprehension. In its broadest form cognitive science is the study of how organisms acquire, represent, manipulate, and use information. In this context the goal of cognitive science is to provide an account of the sorts of mental computations that underlie intelligent performance. As a result what philosophers call the computational theory of mind has been central to this project. In this course we will evaluate the computational model of mind and discuss its application to three areas of cognitive research: artificial intelligence, language, and vision. Along the way we will discuss some challenges to this traditional model for cognitive science and evaluate the relationship between the computational model of mind and new research in cognitive neuroscience.

## Course Goals:

The goals of this course are threefold: first, to introduce students to the computational theory of mind and evaluate the role philosophers play in the interdisciplinary study cognitive science; second, to introduce students to interdisciplinary research methods in cognitive science through the study of computational models of vision, artificial intelligence, and language comprehension; third, to evaluate some of the philosophical issues concerning the nature of mind, consciousness, and rationality that emerge within cognitive science.

## Requirements:

- One 3 page (750-900 word) analysis papers as outlined on the syllabus. (15%)
- One 6 page (1800 word) mid-term paper on an assigned topic synthesizing the material covered in the first half of the semester. You will be given a choice between two paper topics. This paper will be due the day before the beginning of the mid-term break. (25%)
- A 12 page final paper on a topic of your choosing. All students must clear final paper topics with me one month before the last day of classes. The final paper is due at the end of the reading day before the spring exam week. (40%)
- Experimental philosophy exercises (10%).
- Class participation in the form of 10 short in-class reading quizzes is mandatory (10%). In addition poor attendance will have an effect on your grade, lowering it one +/- letter grade point.

## Texts:

- *How Children Learn the Meanings of Words*, Paul Bloom (Cambridge, MA: MIT Press, 2002). (**MW**)
- *Sight/Unseen*, Melvyn Goodale and Dale Milner (New York: Oxford University Press). (**SUGM**)
- Electronic resources and pdf files on (**LYCEUM**)

## Schedule of Readings:

### Topic 1: The Computational Theory of Mind

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Marr	The Philosophy and the Approach ( <b>LYCEUM</b> )
Haugeland	What Is Mind Design ( <b>LYCEUM</b> )

### Topic 2: Artificial Intelligence: GOFAI and Connectionist Models

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Rumelhart	The Architecture of Mind: A Connectionist Approach ( <b>LYCEUM</b> )
Smolensky	Connectionist Modeling ( <b>LYCEUM</b> )
The Mind Project	Connectionist Modeling ( <b>LYCEUM</b> )
Fodor & Pylyshyn	Connectionism and Cognitive Architecture: A Critical Analysis ( <b>LYCEUM</b> )
Ramsey, Stich & Garon	Connectionism, Eliminativism, and the Future of Folk Psychology ( <b>LYCEUM</b> )
Clark	The Presence of a Symbol ( <b>LYCEUM</b> )

### Topic 3: Language, Memory, & Concepts

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Medin, Ross, & Markman	Memory Systems and Knowledge ( <b>LYCEUM</b> )
Prinz	<i>Furnishing the Mind</i> ( <b>LYCEUM</b> ) Desiderata on a Theory of Concepts Traditional Philosophical Accounts Similarity-Based Accounts
Murphy	<i>The Big Book of Concepts</i> ( <b>LYCEUM</b> ) Chapter 2: Typicality and the Classical View of Categories Chapter 3: Theories
Bloom	<i>How Children Learn the Meanings of Words</i> (excerpts) ( <b>MW</b> ) Concepts and Categories Naming and Representation * Word learning and Theory of Mind

### Topic 4: Perception

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Marr	A Representational Framework for Vision ( <b>LYCEUM</b> )
Palmer	Theoretical Approaches to Vision ( <b>LYCEUM</b> )
Goodale & Milner	Sight Unseen ( <b>SUGM</b> )
Pessoa et al	Neuroimaging Studies of Attention ( <b>LYCEUM</b> )
Hayhoe and Ballard	Eye Movements in natural Vision ( <b>LYCEUM</b> )
Carroll and Seeley	Movies as Attentional Engines ( <b>LYCEUM</b> )
Kilner	More Than One Pathway to Action Understanding ( <b>LYCEUM</b> )
Pessoa & Adolphs	Emotion Processing and the Amygdala ( <b>LYCEUM</b> )
Koivisto & Revonsuo	How Meaning Shapes Seeing ( <b>LYCEUM</b> )
Tarr & Bulthoff	Object Recognition in Man, Monkey, and Machine ( <b>LYCEUM</b> )
Palmer	Perceiving Function and Category ( <b>LYCEUM</b> )
Bonnar et al	Understanding <i>Dali's...</i> ( <b>LYCEUM</b> )
Schyns & Olivia	Dr. Angry and Mr. Smile ( <b>LYCEUM</b> )
Schyns	A Diagnostic Recognition Framework for Object Recognition ( <b>LYCEUM</b> )

### Topic 5: Minds, Images, and Cognitive Neuroscience

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Kosslyn	Mental Imagery ( <b>LYCEUM</b> )
Pylyshyn	Return of the Mental Image: Are There Really Pictures in the Head? ( <b>LYCEUM</b> )
Kosslyn	If neuroimaging is the answer what is the question ( <b>LYCEUM</b> )
Kosslyn et al	The role of area 17 in visual mental imagery ( <b>LYCEUM</b> )
* Anderson	Arguments Concerning Representations for Mental Imagery ( <b>LYCEUM</b> )

### Topic 6: Dynamics: Another Challenge to the Computational Theory of Mind

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Brooks	Intelligence without Representation ( <b>LYCEUM</b> )
Clark	<i>Being There</i> (excerpts) ( <b>LYCEUM</b> )
Thelen & Smith	The Nature of Development: A Dynamic Approach ( <b>LYCEUM</b> )

**Some Miscellaneous Notes and Guidelines:**

The reading list for this class is arranged in topics as opposed to individual sessions. You can find a detailed bibliography of the readings below. I will announce the particular readings for each class as we go along. This will allow us some flexibility in discussion so that we can spend more time on issues of interest to the class. I will occasionally upload supplementary materials to LYCEUM for students interested in pursuing particular issues beyond class discussion. I also reserve the right to make changes to the syllabus which reflect our class interests.

Analysis papers are designed to give students a chance to stretch their legs a bit with the material and give me a chance to assess your understanding of the material. These papers should offer a philosophical defense of your take on the issue at hand. But this does not mean that they are a free forum for opinions. Rather, your evaluation should be based on the logic grounding the arguments in the debate. Make sure that your papers set out the philosophical issues germane to the question and that your responses relative virtues and shortcomings of theoretical positions discussed in class.

Finally, moral behavior is the grounds for, and the framework of, a healthy society. In this regard it is each of our responsibility as an individual within the community of our classroom to act responsibly. This includes following the rules and guidelines set out by the College for academic behavior. Plagiarism is a serious matter. It goes without saying that each of you is expected to do his or her own work and to cite EVERY text that is used to prepare a paper for this class. In general philosophy papers are NOT research papers. Your response papers should not involve any outside research and you should be able to manage your final papers using only material from the syllabus, assigned supplemental readings, and class discussion. As a general rule, I ask that you not use the internet for your research except as assigned in class.

**ASSIGNMENTS:**

**First Paper** – Please write a 3 page (900 word) paper on one of the following topics. Your paper should be double-spaced in 12 point font with 1” margins. The purpose of this assignment is to give you a chance to stretch your philosophical legs, provide you with some feedback about the expectations of the class, and to evaluate your understanding of the course material.

Paper Topic (1a):

Paper Topic (1b):

Due Date: 02/05/13 @ 5pm

**Second Paper** - Write a 6 page paper (1800 words) on one of two topics to be announced on the distribution date for the midterm. Your paper should be double-spaced in 12 point font with 1” margins. The purpose of this paper is twofold: a) to evaluate a standard argument in the literature; and b) to demonstrate that you can synthesize the material covered in the 1st half of the semester into a coherent position. Make sure to hand in an electronic copy in the 2<sup>nd</sup> Paper Dropbox on LYCEUM and a hard copy in the mailbox on my office door - 315 Hedge

Paper Topic (2a):

Paper Topic (2b):

Due Date:

**Third Paper** – Write a 12 page paper (3600 words) on a topic of your choice

Due Date:

**Experimental Philosophy and Cognitive Science Exercises**

Cognitive science and experimental methods have increasingly more important in areas of philosophy like epistemology, philosophy of mind, and ethics in recent years. In early March I will set up a series of exercises to introduce students to the fundamentals of experimental design and data collection and this new approach to philosophical analysis (which should be old hat to some of you). These exercises will be available in the computer lab in Hedge for you to access and work through.

## Bibliography:

### Topic 1: The Computational Theory of Mind (CTM)

- David Marr, "The Philosophy and the Approach," *Vision* (New York: W. H. Freeman & Company, 1982), 3-31.
- John Haugeland, "What is Mind Design?" in ed. John Haugeland, *Mind Design II*, (Cambridge, MA: MIT Press, 1997), 1-28.

#### Supplemental:

- \* Ned Block, "The Computer Model of Mind," in Alan Goldman, *Readings in Philosophy and Cognitive Science* (Cambridge, MA: MIT Press, 1993), 818-831

### Topic 2: Challenges to CTM: Connectionist Models

- David E. Rumelhart, "The Architecture of Mind: A Connectionist Approach," in ed. John Haugeland, *Mind Design II* (Cambridge, MA: MIT Press, 1997), 205-232..
- Paul Smolensky, "Connectionist Modeling: Neural Computation/Mental Connections," in ed. John Haugeland, *Mind Design II* (Cambridge, MA: MIT Press, 1997), 233-250..
- Jerry A. Fodor and Zenon W. Pylyshyn, "Connection and Cognitive Architecture: A Critical Analysis," in ed. John Haugeland, *Mind Design II* (Cambridge, MA: MIT Press, 1997), 309-350.
- William Ramsey, Stephen Stich, & Joseph Garon, "Connectionism, Eliminativism, and the Future of Folk Psychology," in ed. John Haugeland, *Mind Design II* (Cambridge, MA: MIT Press, 1997), 351-376.
- Andy Clark, "The Presence of a Symbol," in ed. John Haugeland, *Mind Design II*, (Cambridge, MA: MIT Press, 1997), 1-28.

#### Supplemental:

- Andy Clark, "Connectionist Minds," in eds. Cynthia Macdonald and Graham Macdonald, *Connectionism*, - Blackwell Publishers, 1995), 339-356.

### Topic 3: Language, Memory, and Concepts

- Douglas Medin, Brian Ross, & Arthur Markman, "Memory Systems and Knowledge," *Cognitive Psychology* (New York: John Wiley & Sons, 4<sup>th</sup> edition, 2005), 174-207.
- Jesse J. Prinz, *Furnishing the Mind* (Cambridge, MA: MIT Press, 2002), 1-49.
- George L. Murphy, *The Big Book of Concepts* (Cambridge, MA: MIT Press, 2004), 1-64.
- Paul Bloom, *How Children Learn the Meanings of Words* (Cambridge, MA: MIT Press, 2002), 55-88 & 145-190.

#### Supplemental:

- Paul Bloom, "Intention, History, and Artifact Concepts," *Cognition* 60(1), 1996, 1-29.
- Barbara Landau, Linda Smith, & Susan Jones, "Object Perception and Object Naming in Early Cognitive Development," *Trends in Cognitive Science*, 2(1), 1998, 19-24.

### Topic 4: Perception

- David Marr & Keith Nishihara, "Visual Information Processing: Artificial Intelligence and the Sensorium of Sight," *Technology Review*, 81, 1978, 2-23.
- Stephen Palmer, "Theoretical Approaches to Vision," *Vision Science* (Cambridge, MA: MIT Press, 1999), 45-93.
- Melvyn Goodale and Dale Milner, *Sight/Unseen* (New York: Oxford University Press).
- Luiz Pessoa, Sabine Kastner, and Leslie G. Ungerleider (2003), "Neuroimaging Studies of Attention: From Modulation of Sensory Processing to Top-Down Control," *The Journal of Neuroscience*, 23(10): 3990-3998.
- Mary Hayhoe and Dana Ballard (2005), "Eye Movements in natural Behavior," *TRENDS in Cognitive Sciences*, 9(4): 188-194.
- Noel Carroll and William P. Seeley (2013), "Cognitivism, Psychology, and Neuroscience: Movies as Attentional Engines," in ed. Arthur Shimamura, *Psychocinematics: Exploring Cognition at the Movies*, New York: Oxford University Press: 53-75.
- James M. Kilner, "More Than One Pathway to Action Understanding," *TRNDS in Cognitive Science*, 15(8), 2011: 352-357.
- Louiz Pessoa and Ralph Adolphs, "Emotion Processing and the Amygdala: From a 'Low Road' to 'Many Roads' of Evaluating Biological Significance," *Nature Reviews Neuroscience* 11, 2010: 773-782.

## Philosophy and Cognitive Science: syllabus

- Mika Koivisto and Antti Revonsuo, "How Meaning Shapes Seeing," *Psychological Science*, 18(10), 2007: 845-849.
- Michael Tarr & Henrich Bülthoff, "Image-Based Object Recognition in Man, Monkey, and Machine," *Cognition*, 67(1-2), 1-20.
- Stephen Palmer, "Perceiving Function and Category," *Vision Science* (Cambridge, MA: MIT Press, 1999), 433-453.
- Lizann Bonnar, Frederic Gosselin, and Philippe Schyns 2002). "Understanding Dali's *Slave Marker with Disappearing Bust of Voltaire*: A Case Study in the Scale Information Driving Perception," *Perception* 31: 683-691.
- Phillippe G. Schyns and Aude Olivia, "Dr. Angry and Mr. Smile: When Categorization Flexibly Modifies the Perception of Faces in Rapid Visual Presentations," *Cognition* 69, 1999: 243-265.
- Phillippe G. Schyns, "Diagnostic Recognition: Task Constraints, Object Information, and Their Interactions," *Cognition* 67, 1998: 147-179.

### **Topic 5: Minds, Images, and Cognitive Neuroscience (DROPPED)**

- Stephen Kosslyn, "Mental Imagery," in eds. Stephen Kosslyn and Daniel Osherhorn, *Visual Cognition* (Cambridge, MA: MIT Press, 1995), 265-296.
- Zenon Pylyshyn, "Return of the Mental Image: Are There Really Pictures in the Head?" *Trends in Cognitive Science*, 7(3), 2003, 113-118.
- John Anderson, "Arguments Concerning Representations for Mental Imagery," *Psychological Review*, 85(4), 1978, 249-277.
- Stephen Kosslyn, "If Neuroimaging is the Answer, What Is the Question?" *Philosophical Transactions of the Royal Society, London B*, 354, 1283-1294.
- Stephen Kosslyn, A. Pascual-Leone, O. Felician, S. Camposano, J. P. Keenan, W. L. Thompson, G. Ganis, K. E. Sukel, N. M. Alpert, "The role of area 17 in visual mental imagery," *Science* 284, 1989, 167-170.

### **Topic 6: Challenges to CTM: Dynamics and Embodied Cognition**

- Rodney Brooks, "Intelligence without Representation," in ed. John Haugeland, *Mind Design II* (Cambridge, MA: MIT Press, 1997), 95-420.
- Andy Clark, *Being There* (Cambridge, MA: MIT press, 1997), 1-70.
- Esther Thelen and Linda B. Smith, *A Dynamic Systems Approach to the Development of Cognition and Action* (Cambridge, MA: MIT Press, 1994), 1-71.

Philosophy and Cognitive Science: syllabus

Date	Readings ( * = suggested supplementary reading)	Assignments
01/08	Introduction: what is cognitive science	
01/10	Marr, The philosophy and the approach: 3-31. <i>(LYCEUM)</i>	
01/15	Haugeland, What is mind design, pp. 1-28. <i>(LYCEUM)</i>	
01/17	Rumelhart, The architecture of mind: 205-209. <i>(LYCEUM)</i> The Mind Project: Connectionist Modeling (web resource) <i>(LYCEUM)</i> Smolensky, Connectionist modeling, pp. 233-250. <i>(LYCEUM)</i>	
01/22	Fodor & Pylyshyn, Connectionism and cognitive architecture <i>(LYCEUM)</i>	
01/24	Ramsey, Stich, & Garon, Connectionism, eliminativism, and... <i>(LYCEUM)</i>	
01/29	Clark, The presence of a symbol, pp. 377-394 <i>(LYCEUM)</i>	<b>Topics 1 distributed</b>
01/31	Medin et al, Memory Systems and Knowledge, pp. 174-207 <i>(LYCEUM)</i>	
02/05	Prinz, "Traditional philosophical accounts," pp. 25-49. <i>(LYCEUM)</i> Murphy, "Typicality and the classical view of concepts," pp. 1-40. <i>(LYCEUM)</i>	
02/07	Murphy, "Theories," pp. 41-65. <i>(LYCEUM)</i> Prinz, "Similarity based accounts," pp. 51-74. <i>(LYCEUM)</i>	<b>Analysis 1 due: February 8 @ 5pm</b>
02/12	Bloom, Concepts and categories: pp. 145-170. <i>(MW)</i> * Bloom, Word learning and theory of mind: pp. 145-170. <i>(MW)</i>	
02/14	Bloom, Naming representations: 171-190. <i>(MW)</i>	
02/16-24	Winter Break!!!!!!!!!!	
02/26	Marr, A representational framework for vision: 31-38. <i>(LYCEUM)</i> Palmer, Theoretical approaches to vision: 70 - 92 <i>(LYCEUM)</i>	
02/28	Goodale & Milner, <i>Sight Unseen</i> : 1-38. <b><i>(SUGM)</i></b>	
03/05	Goodale & Milner, <i>Sight Unseen</i> : 39-72. <b><i>(SUGM)</i></b> Dijkerman & Milner, Copying without perceiving: 729-732. <i>(LYCEUM)</i>	
03/07	Goodale & Milner, <i>Sight Unseen</i> : 73-128. <b><i>(SUGM)</i></b>	<b>Second Paper Topics</b>
03/12	Pessoa et al, Neuroimaging studies of attention: 3990-3998. <i>(LYCEUM)</i> Hayhoe & Ballard, Eye movements in natural behavior: 188-194. <i>(LYCEUM)</i> Carroll & Seeley, Movies as attentional engines: 53-75. <i>(LYCEUM)</i>	
03/14	Kilner, More than one pathway: 352-357. <i>(LYCEUM)</i> Pessoa & Adolphs, Emotion and the amygdala: 773-783. <i>(LYCEUM)</i> Koivisto & Revonsuo, How meaning shapes seeing: 845-849. <i>(LYCEUM)</i>	
03/19	Tarr & Bulthoff, Image-based recognition <i>(LYCEUM)</i> Bonnar et al, Understanding Dali's...: 683--691. <i>(LYCEUM)</i>	
03/21	Schyns & Olivia, Dr. Angry & Mr. Smile: <i>(LYCEUM)</i> Schyns, Diagnostic recognition: <i>(LYCEUM)</i>	<b>Second Paper due: March 22<sup>nd</sup> @ 5pm</b>
03/26	Brooks, Intelligence without representation: 395-420. <i>(LYCEUM)</i> Clark, <i>Being There</i> : 1-70. <i>(LYCEUM)</i>	
03/28	NO CLASS	
04/02	Thelen & Smith, <i>A Dynamic Systems Approach</i> : 3-125. <i>(LYCEUM)</i>	
04/04	Thelen & Smith, <i>A Dynamic Systems Approach</i> : 3-125. <i>(LYCEUM)</i>	<b>Final Paper Due!</b>

Philosophy and Cognitive Science: syllabus

Resource Page:

The Mind Project:

<http://www.mind.ilstu.edu/>

A set of teaching modules and exercises on critical aspects of philosophy of mind, artificial intelligence, and cognitive science.