LGCS 11: Introduction to Cognitive Science
Fall 2015
Monday & Wednesday 11:00am-12:15pm
Mason 20

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Office hours: Tuesday 1:00-3:00pm and by appointment
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OVERVIEW

Cognitive science is an interdisciplinary field that studies the mind from the perspectives of multiple disciplines, including cognitive psychology, linguistics, neuroscience, philosophy, and computer science. This course will present a broad introduction to the study of the mind by examining and combining the approaches from each of these areas. We will cover a range of topics, including consciousness, artificial intelligence, language, attention, memory, emotion, cognitive neuroscience, and animal cognition. We will address several of the major questions studied in cognitive science and examine the methods that are used in various attempts to answer them.

READINGS

Rather than using a textbook, this course will make use of readings from a variety of sources that will illustrate the diversity of the field. All of the required readings will be available for download on Sakai. This will include a mixture of experimental papers, review articles, textbook chapters, and the occasional article intended for a more general audience. Please make sure to complete the readings before class on the date for which they are assigned. A large proportion of our class time will be spent discussing the readings, so in order for you to get the most out of this class, it is important that you arrive prepared to contribute.

Other course materials will also be available on Sakai, including presentation slides, handouts, and links to relevant webpages.

COURSE REQUIREMENTS

All written assignments will be submitted to your individual drop box on Sakai, so no paper copies are necessary. I will also be grading and providing feedback on your work using Sakai.

With the exception of the in-class presentations, note that all assignments are due on days when we do not meet for class! This is intended to prevent the assignments from interfering with your ability to complete the readings for each class. The exams and written assignments are due on Fridays by 5pm.

Take-home Exams (2 x 20%): There will be two take-home exams, which will consist of essay questions relevant to the readings, presentations, and class discussions up to that point in the course. You will be allowed to use the readings and any other resources you would like, but you must do your own work and refrain from discussing the questions with anyone else. Please submit your exams to your drop box on Sakai.

Book Project: For the first project, you will asked to select and read one of the following books about cognitive science:

- *The Stuff of Thought: Language as a Window into Human Nature*, by Steven Pinker
- *Thinking, Fast and Slow*, by Daniel Kahneman
- *Make It Stick: The Science of Successful Learning*, by Peter Brown, Henry Roediger, and Mark McDaniel
- *The Tell-Tale Brain: A Neuroscientist's Quest for What Makes Us Human*, by V.S. Ramachandran
- *Hallucinations*, by Oliver Sacks
- *Touching a Nerve: The Self as Brain*, by Patricia Churchland

All of these books are intended to be read by the general public, so they are significantly easier to read and written in a different style than academic textbooks. They are inexpensive (less than $20 on Amazon) and are also available in ebook editions. You will need to select your book and sign up for a group during the third week of class. There will be two assignments related to your book:

1. ***Discussion Facilitation (10%):*** Working in a group of 3-5 students, you will lead the class in a discussion of a topic of your choice selected from your book. You will be asked to select an excerpt from your book (perhaps a chapter or a segment of a chapter) that will become assigned reading for the class. I will scan the selected pages and post them to Sakai. Please let me know which pages you would like to assign at least a week before your discussion. You can present some background information, but keep in mind that your goal should not be to lecture to the class, but to involve everyone in an interesting and informative discussion. Each group will have approximately 30 minutes.
2. ***Book Paper (15%):*** You will also be asked to write a short paper related to your book. This should be completed individually. As part of the paper, you will need to find one of the original scientific papers that is cited in your book and compare the original study (i.e., the primary source) with its description in the book (i.e., a secondary source). You will receive a handout with a more detailed writing prompt later.

Final Project: For the final project, you will work in a group of 2-4 students to design and carry out an original experiment in cognitive science. You will form a hypothesis based on the existing scientific literature, design the experiment, collect data, and attempt to draw conclusions from the results. There will be one in-class work day that will be a great time to form groups and begin discussing your ideas. I have lots of experience designing experiments, so please feel free to ask for advice!

There will be three assignments related to your experiment:

1. ***Proposal (5%):*** Early on, your group will write a short description of your proposed experiment. It should include some general background information, your hypothesis, and a description of the methods you are considering. During the week after you submit your proposal, you will be required to meet with me outside of class to discuss my feedback.
2. ***Group Presentation (5%):*** During the last week of class, each group will present their experiments and results to the class. This will be a group presentation, but each student needs to contribute.
3. ***Final Paper (25%):*** The final paper must be written individually. It should be in the form of a complete scientific research report, and should include a title page, abstract, introduction (including background research and your hypothesis), methods section, results section, discussion section, and reference page. We will discuss the format in class and you will receive a handout with more detailed instructions.

GRADING

Grade Breakdown:

Take-home Exam #1:	20%
Take-home Exam #2:	20%
Book Project	
Discussion Facilitation:	10%
Book Paper:	15%
Final Project	
Proposal:	5%
Group Presentation:	5%
Final Paper:	25%

Grading Scale:

By default, the following scale will be used to assign letter grades. If necessary, grades will be curved up, but they will not be curved down. Scores will not be rounded (e.g., according to the default scale, 89.99% is a B+, not an A-).

A	93-100%	B	83-86%	C	73-76%	D	63-66%
A-	90-92%	B-	80-82%	C-	70-72%	D-	60-62%
B+	87-89%	C+	77-79%	D+	67-69%	F	<60%

Late Policy:

Late assignments will be accepted, but 10% will be deducted from the total score for each day they are late. Extensions will be granted only in emergency situations, and documentation will be required (e.g., doctor's note, etc.).

SCHEDULE

Week	Date	Topic
1	W 9/02	Introduction
2	M 9/07	The Mind-Body Problem
	W 9/09	Consciousness
3	M 9/14	Consciousness and the Brain
	W 9/16	Behaviorism and the Cognitive Revolution: Is the Mind Necessary?
4	M 9/21	The Mind as a Computational Device
	W 9/23	Connectionist vs. Symbolic Models
5	M 9/28	The Neural Basis of Mind
	W 9/30	Effects of Brain Damage on Cognition
6	M 10/05	Attention and Awareness
	W 10/07	Concepts and the Representation of Knowledge
	Take-home Exam #1 due by 5pm on Friday 10/09	
7	M 10/12	Organization of Memory
	W 10/14	Errors in Memory
8	M 10/19	NO CLASS - FALL BREAK
	W 10/21	Sampling Bias in Cognitive Science
9	M 10/26	*Book Presentations*
	W 10/28	*Book Presentations*
10	M 11/02	*Book Presentations*
	W 11/04	Work on Final Projects
	Book Paper due by 5pm on Friday 11/06	
11	M 11/09	Visual Perception and Mental Imagery
	W 11/11	Top-down vs. Bottom-up Processing
	Final Project Proposal due by 5pm on Friday 11/13	
12	M 11/16	Language Processing
	W 11/18	Language Acquisition
	Meetings to Discuss Project Proposal	
13	M 11/23	Emotion and Cognition
	W 11/25	NO CLASS
14	M 11/30	Reasoning and Decision-Making
	W 12/02	Animal Cognition
	Take-home Exam #2 due by 5pm on Friday 12/04	
15	M 12/07	*Final Project Presentations*
	W 12/09	*Final Project Presentations*
Finals Week	**Final Paper due by 5pm on Wednesday 12/16**	

READING LIST

9/02   Introduction

9/07   The Mind-Body Problem

- Descartes Meditations 1 & 2

9/09   Consciousness

- Koch, C. (2012). Chapter 1. In *Consciousness: Confessions of a Romantic Reductionist*. Cambridge, MA: MIT Press.
- Koch, C. (2012). Chapter 3. In *Consciousness: Confessions of a Romantic Reductionist*. Cambridge, MA: MIT Press.
- Searle, J. R. (1998). Chapter 2: How we fit into the universe: The mind as a biological phenomenon. In *Mind, Language, and Society: Philosophy in The Real World* (pp. 39-65), New York, NY: Basic Books.

9/14   Consciousness and the Brain

- Koch, C. (2012). Chapter 4. In *Consciousness: Confessions of a Romantic Reductionist,* Cambridge, MA: MIT Press.
- Koch, C. (2012). Chapter 8. In *Consciousness: Confessions of a Romantic Reductionist,* Cambridge, MA: MIT Press.
- Ramachandran, V. S. (2004). Chapter 5: Neuroscience – The New Philosophy. In *A Brief Tour of Human Consciousness* (pp. 83-112), New York, NY: Pi Press.

9/16   Behaviorism and the Cognitive Revolution: Is the Mind Necessary?

- Skinner, B. F. (1957). Chapter 1: A functional analysis of verbal behavior. In *Verbal Behavior* (pp. 1-11).
- Chomsky, N. (1959). A review of B. F. Skinner's *Verbal Behavior*. *Language, 35*(1), 26-58.

9/21   The Mind as a Computational Device

- Clark, A. (2013). Chapter 1: Meat machines: Mindware as software. In *Mindware: An Introduction to the Philosophy of Cognitive Science* (pp. 7-29), Oxford, UK: Oxford University Press.
- Searle, J. R. (1984). Can computers think? In *Minds, brains, and science* (pp. 28-41).

9/23   **Connectionist vs. Symbolic Models**

- Clark, A. (2013). Chapter 2: Symbol systems. In *Mindware: An Introduction to the Philosophy of Cognitive Science* (pp. 30-46), Oxford, UK: Oxford University Press.
- Clark, A. (2013). Chapter 4: Connectionism. In *Mindware: An Introduction to the Philosophy of Cognitive Science* (pp. 30-46), Oxford, UK: Oxford University Press.

9/28   **Neural Basis of Mind**

- Ward, J. (2009). Chapter 2: Introducing the brain. In *The Student's Guide to Cognitive Neuroscience* (2nd ed., pp. 17-31). New York, NY: Psychology Press.
- McCabe, D. P., & Castel, A. D. (2008). Seeing is believing: The effect of brain images on judgments of scientific reasoning. *Cognition, 107,* 343-352.

9/30   **Effects of Brain Damage on Cognition**

- Monti, M. M., Vanhaudenhuyse, A., Coleman, M. R., Boly, M., Pickard, J. D., Tshibanda, L., ... Laureys, S. (2010). Willful modulation of brain activity in disorders of consciousness. *The New England Journal of Medicine, 362*(7), 579-589.
- MacKay, D. G. (2014). The engine of memory. *Scientific American Mind, 25*(3), 30-38.

10/05   **Attention and Awareness**

- Simons, D. J., & Chabris, C. F. (1999). Gorillas in our midst: Sustained inattentional blindness for dynamic events. *Perception, 28,* 1059-1074.

10/07   **Concepts and the Representation of Knowledge**

- Sobel, C. P. & Li, P. (2013). Chapter 2: The approach of cognitive science. In *The Cognitive Sciences: An Interdisciplinary Approach* (2nd ed., pp. 27-54), Los Angeles, CA: SAGE Publications.

10/12   **Organization of Memory**

- Kornell, N., & Bjork, R. A. (2008). Learning concepts and categories: Is spacing the "enemy of induction"? *Psychological Science, 19*(6), 585-592.
- Roediger, H. L., & Karpicke, J. D. (2006). Test-enhanced learning: Taking memory tests improves long-term retention, *Psychological Sciemce, 17*(3), 249-255.

10/14   **Errors in Memory**

- Loftus, E. F. (2005). Planting misinformation in the human mind: A 30-year investigation of the malleability of memory. *Learning & Memory, 12,* 361-366.
- Roediger, H. L., & McDermott, K. B. (2000). Tricks of memory. *Current Directions in Psychological Science, 9*(4), 123-127.

10/19   **NO CLASS – FALL BREAK**

10/21   **Sampling Bias in Cognitive Science**

- Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world? *Behavioral and Brain Sciences, 33,* 61-83.

10/26–11/02   **Book Presentations**

- readings TBA

11/04   **Work on Final Projects**

11/09   **Visual Perception and Mental Imagery**

- Tarr, M. J., & Cheng, Y. D. (2003). Learning to see faces and objects. *Trends in Cognitive Sciences, 7*(1), 23-30.
- Shepard, R. N., & Metzler, J. (1971). Mental rotation of three-dimensional objects. *Science, 171,* 701-701.

11/11   **Top-down vs. Bottom-up Processing**

- McClelland, J. L., & Rumelhart, D. E. (1981). An interactive activation model of context effects in letter perception: Part 1. An account of basic findings. *Psychological Review, 88*(5), 375-407.

11/16   **Language Processing**

- McGurk, H., & MacDonald, J. (1976). Hearing lips and seeing voices. *Nature, 264,* 746-748.
- Warren, R. M. (1970). Perceptual restoration of missing speech sounds. *Science, 167,* 392-393.

11/18   **Language Acquisition**

- Kuhl, P. K. (2004). Language acquisition: Cracking the speech code. *Nature Review Neuroscience, 5,* 831-843.

11/23   **Emotion and Cognition**

- Hamann, S. (2001). Cognitive and neural mechanisms of emotional memory. *Trends in Cognitive Sciences, 5*(9), 394-400.
- MacKay, D. G., Shafto, M., Taylor, J. K., Marian, D. E., Abrams, L., Dyer, J. D. (2004). Relations between emotion, memory, and attention: Evidence from taboo Stroop, lexical decision, and immediate memory tasks. *Memory & Cognition, 32*(3), 474-488.

11/25   **NO CLASS**

11/30   **Reasoning and Decision-Making**

- Tversky, A., & Kahneman, D. (1974). Judgment under Uncertainty: Heuristics and Biases. *Science, 185,* 1124-1131.

12/02   **Animal Cognition**

- Call, J., & Tomasello, M. (2008). Does the chimpanzee have a theory of mind? 30 years later. *Trends in Cognitive Sciences, 12*(5), 187-192.
- Montgomery, S. (2011). Deep intellect: Inside the mind of the octopus. *Orion Magazine.* http://www.orionmagazine.org/index.php/articles/article/6474/
- Pepperberg, I. M. (2002). Cognitive and communicative abilities of grey parrots. *Current Directions in Psychological Science, 11*(3), 83-87.

12/07—12/09 Final Project Presentations