Introduction to Cognitive Science
CGSC 110 / PSYC 130
Fall 2015

Mondays & Wednesdays 9:00-10:15am
SSS 114

Instructor: Dr. April M. Ruiz, april.ruiz@yale.edu
Office Hours: Wednesdays 11:00am-Noon, Calhoun College Dean's Office (Calhoun Entryway G)

Teaching Fellows and Office Hours:
Thomas O'Connell, thomas.oconnell@yale.edu
Wednesdays 3:00-4:00pm & Thursdays 11:00am-Noon, SSS 305C

Lydia Hoffstaetter, lydia.hoffstaetter@yale.edu
Mondays 4:00-5:00pm & Tuesdays 10:00am-11:00am, Kirtland 101D

Emily Finn, emily.finn@yale.edu
Wednesdays 10:20am-12:20pm, Kirtland 101D

Course description

This course is designed to be an introduction to a field that asks, 'How does the mind work?' Since the best way to understand a question that big is to approach it from multiple angles, the field of cognitive science is interdisciplinary in nature. Cognitive scientists at this and other universities can be found in the departments of psychology, philosophy, neuroscience, anthropology, linguistics, and computer science (to name a few!). In this course, we will review major debates, classic methods, and seminal findings in a variety of disciplines and will discuss how these work together to give us a better understanding of the mind. Topics in this course include, but are not limited to, language, perception, neuroimaging, decision-making, and love.

One way to gain a more thorough understanding of any field is to hear from people who are working to develop that field currently. To this end, you will hear from several guest speakers who will tell you about their field of study, the research they are doing *right now*, and how their work is informing the great debates and unanswered questions of cognitive science.

In addition to presentations from guest speakers, you should also expect live demonstrations, videos, and other activities that will help you to engage the material.

This course is meant to give an overview of many of the topics studied by cognitive scientists but will not dive into any one of these topics in great depth. As such, this course is meant for those students who have not yet had much exposure to this material, with the hope that these students leave the course inspired to continue their studies in this and related fields.

Readings

All readings will be available in electronic format on the classesv2 server. http://classesv2.yale.edu

While some readings will involve book chapters and news articles, many of the readings will be primary sources: scholarly journal articles. This means you will be reading about research and debates in cognitive science right from the people who are shaping the field. While some aspects of these readings might be

challenging, you will gain a greater appreciation for the scientific process and a purer understanding of what is going on in cognitive science than you might gain from reading a textbook author's interpretation. In fact, you will be reading some material that won't even make it into textbooks for another couple of years! With the understanding that many of you will not have read material in this format before, we will discuss the basics of reading a journal article during our very first class so that you feel comfortable with the readings.

Exams

There will be three in-class exams during this course. These exams will comprise a mix of multiple choice, short answer (3-5 sentences) questions, and brief essays. Topics covered in the exams will come from the lectures, guest lectures, and the readings.

Exam #1 (October 5th) will cover everything learned 9/2 through 9/28
Exam #2 (November 2nd) will mainly focus on material from 9/30 through 10/26*.
Exam #3 (December 9th) will mainly focus on material from 10/28 through 12/7*.

* A note about exam topics: Although exams #2 and #3 will not be cumulative, *per se*, it is important to keep in mind that concepts discussed at the beginning of the semester echo in the topics discussed later in the semester. Since these ideas speak to one another as we move throughout the course, Exam #2 and Exam #3 cannot be truly isolated from material covered earlier in the term.

Final paper

Assignment: Current work in cognitive science; Paper due Monday, December 21st at 9:00am EST

In fairness to all students in the course, any paper submitted late will be graded at a penalty: ten points for the first hour (9:01am-10:00am), and an additional five points for each hour after that. For example, a late paper submitted at 11:45am EST on the deadline day would be graded at a 20-point penalty. It is each student's responsibility to ensure his/her paper is submitted on time and in the correct, undamaged format by the deadline. A Dean's Excuse or Temporary Incomplete are the only ways to submit work after the deadline without penalty.

Find a scholarly journal article that describes a recent (2012 or later) finding in cognitive science that we did not cover in lectures or in assigned readings. Your assignment involves two parts:

PART 1 (2-3 FULL PAGES)
- Explain the research question, and describe the research methods and the main findings (i.e., What were the results, and what do they mean?).
- Explain how the research is <u>interdisciplinary</u> in its motivations, methods, and/or implications (i.e., How is this cognitive science?).

PART 2 (3-4 FULL PAGES)
Propose <u>your own</u> idea for a study to follow up on these findings.
- Explain the background/context for your idea, citing sources when necessary. In other words, walk the reader through why your study would be a good one to build upon the previous work.
- Describe your proposed general research method (e.g., What is being measured? What are the experimental variables?). No need to develop a detailed strategy for data analysis, etc.
- If you conducted this study, what could your results suggest?

<u>Format:</u>
Papers should total 5-7 full pages in length (double-spaced with standard margins and 10- or 12-point font size. See: http://abstrusegoose.com/361). Sources <u>must </u>be cited, and a reference list in APA format must be provided.

Resources:
   Some places to look for relevant news, which could help you to choose a scholarly article to look up:
   http://www.sciencedaily.com/news/mind_brain/
   http://www.nytimes.com/section/science
   http://discovermagazine.com/topics/mind-brain
   Where to search for scholarly journal articles
   http://www.isiknowledge.com/
   (You must be logged into a Yale University network to use the Web of Knowledge site. If you are not on campus, you can establish a remote connection through https://access.yale.edu.)

   Citing courses (general information and guides for APA and other styles)
   http://writing.yalecollege.yale.edu/advice-students/using-sources/principles-citing-sources

   Academic honesty (*this will be taken seriously*)
   http://writing.yalecollege.yale.edu/advice-students/using-sources/understanding-and-avoiding-plagiarism

Grading

Grades will be determined as follows:

25% - Exam #1: Monday, October 5th
25% - Exam #2: Monday, November 2nd
30% - Exam #3: Wednesday, December 9th
20% - Paper: Due Monday, December 21st at 9:00am

Schedule & Readings
Please note that this schedule and the readings may be modified as needed

Wednesday, September 2nd – Introduction, foundational concepts, class policies

Bisson, T. (1991, April). They're made out of meat. *OMNI*.

Dennett, D. (1981). Brainstorms: Philosophical essays on mind and psychology. Cambridge, Massachusetts: MIT Press (Assigned selection is Chapter 17: Where am I?)

Friday, September 4th – Brain structure and neuroimaging

Millan, M. (2011). Apple triggers 'religious' reaction in fans' brains, report says. CNN.com post

Miller, G. (2008). Growing Pains for fMRI. *Science, 320*, 1412-1414.

Weisberg, D. et al. (2008). The seductive allure of neuroscience explanations. *Journal of Cognitive Neuroscience, 20*, 470-477.
OPTIONAL:
Henson, R. (2005). What can functional neuroimaging tell the experimental psychologist? *The Quarterly Journal of Experimental Psychology. A, Human Experimental Psychology, 58*, 193-233.
[For this article, don't get too bogged down with the technical side of things. Try to focus on the conceptual arguments.]

Monday, September 7th – No class! (Labor Day; Monday classes do not meet)

Wednesday, September 9th – Modularity

Barrett, H. & Kurzban, R. (2006). Modularity and cognition: Framing the debate. *Psychological Review, 113*, 628-647.

Monday, September 14th – Vision

New, J. J. & Scholl, B. J. (2008). 'Perceptual scotomas': A functional account of motion-induced blindness. *Psychological Science*, *19*, 653 - 659.

Nilsson, D-E. & Pelger, S. (1994). A pessimistic estimate of the time required for an eye to evolve. *Proceedings of the Royal Society, Biological Sciences, 256*, 53-58.
[For this article, don't get too hung up on the math and technicalities. Pay most attention to the main concepts.]

Wednesday, September 16th – Visual perception 1

Spelke, E. (1990). Principles of object perception. *Cognitive Science, 14*, 29-56.

Monday, September 21st – Visual perception 2

Simons, D. & Rensink, R. (2005). Change blindness: Past, present, and future. *Trends in Cognitive Sciences, 9*, 16-20.

Wednesday, September 23rd – Attention

Most, S. B., et al. (2001). How not to be seen: The contribution of similarity and selective ignoring to sustained inattentional blindness. *Psychological Science, 12*, 9 - 17.

Monday, September 28th – fMRI
(Guest lecture from Prof. Marvin Chun)

http://www.wired.com/2014/04/brain-scan-mind-reading/

Gabrieli, J., Ghosh, S., & Whitfield-Gabrieli, S. (2015). Prediction as a Humanitarian and Pragmatic Contribution from Human Cognitive Neuroscience. *Neuron, 85*, 11-26.

Wednesday, September 30th – Naïve physics

Baillargeon, R. (2004). Infants' physical world. *Current Directions in Psychological Science, 13*, 89-94.

Flombaum, J. I., Kundey, S. M., Santos, L. R., & Scholl, B. J. (2004). Dynamic object individuation in rhesus macques: A study of the tunnel effect. *Psychological Science, 15*, 795 - 800.

Scholl & Tremoulet (2000). Perceptual Causality and Animacy. *Trends in Cognitive Science, 4*(8), 299-309.

Monday, October 5th – Exam #1
(Material from 9/2 through 9/28)

Wednesday, October 7th – Language 1

Arnold, K. & Zuberbuhler, K. (2006). Semantic combinations in primate calls. *Nature, 441*, 303.

Boroditsky, L. (2003). Linguistic relativity. In: L. Nadel (Ed.) *Encyclopedia of cognitive science, Volume 2* (917-921). New York: Nature Publishing Group.

Saffran, J., Aslin, R., & Newport, E. (1996). Statistical learning by 8-month-old infants. *Science, 274*, 1926 - 1928.

Monday, October 12th – Language 2

Pinker, S. (1995). *The language instinct*. New York: HarperPerennial
(Assigned selection is Chapters 4 & 5. Scans provided by the Yale library; please ignore any markings and margin notes.)

Wednesday, October 14th – Memory 1

Mulligan, N. (2008). Memory: Implicit and explicit. In: L. Nagel (Ed.) *Encyclopedia of cognitive science.* Hoboken, New Jersey: Wiley Interscience.

Monday, October 19th – Memory 2

O'Connor, A. & Moulin, C. (2006). Normal patterns of déjà experience in a healthy, blind male. *Brain and Cognition, 62*, 246-249.

Koriat, A., Goldsmith, M., & Pansky, A. (2008). Memory distortions and forgetting. In: L. Nagel (Ed.) *Encyclopedia of cognitive science*. Hoboken, New Jersey: Wiley Interscience.

Wednesday, October 21st – No class! (October recess)

Monday, October 26th – Number

Mahajan, N., Barnes, J. L., Blanco, M., & Santos, L. R. (2009). Enumeration of objects and substances in non-human primates: Experiments with brown lemurs (*Eulemur fulvus*). *Developmental Science, 12,* 920-928.

Siegler, R., Fazio, L., Bailey, D., & Zhou, X. (2013). Fractions: the new frontier for theories of numerical development. *Trends in Cognitive Sciences, 17,* 13-19.

Wynn, K. (1992). Addition and subtraction by human infants. *Nature, 358*, 749 - 750.

Wednesday, October 28th – The role of philosophy in cognitive science
(Guest lecture from Prof. Joshua Knobe)

Goldman, A. & Mason, K. (2006). Simulation. In: P. Thagard (Ed.) *Philosophy of Psychology and Cognitive Science*. Oxford, UK: Elsevier.

Monday, November 2nd – Exam #2
(Material from 9/30 through 10/26)

Wednesday, November 4th – Reasoning & decision-making 1

Egan, L. et al. (2007). The origins of cognitive dissonance: Evidence from children and monkeys. *Psychological Science, 18*, 978-983.

Monday, November 9th – Artificial intelligence and social robotics
(Guest lecture from Prof. Brian Scassellati)

Fitzpatrick, P. et al. (2008). Shared challenges in object perception for robots and infants. *Infant and Child Development, 17*, 7-24.

McDermott, D. (1997). Yes, computers can think. *New York Times*, 5/14/97

Wednesday, November 11th – Reasoning & decision-making 2

Cassidy, J. (2006). Mind games: What neuroeconomics tells us about money and the brain. *New Yorker*, September 18th.

Lakshminarayanan, V. & Santos, L. (2010). Evolved irrationality? Equity and the origins of human economic behavior. In: P. Kappeler & J. Silk (eds.), *Mind the gap*. 245-259.

Monday, November 16th – Social cognition 1

Lyons, D., et al. (2006). Reflections of other minds: how primate social cognition can inform the function of mirror neurons. *Current Opinion in Neurobiology, 16,* 230-234.

Whiten, A. & Ham, R. (1992). On nature and evolution of imitation in the animal kingdom: Reappraisal of a century of research. *Advances in the Study of Behavior, 21*, 239-283.

Wednesday, November 18th – Social cognition 2

Baillargeon, R., et al. (2010). False belief understanding in infants. *Trends in Cognitive Sciences, 14,* 110-118.

Ruiz, A. & Santos, L. (2012). What does the primate mind know about other minds? A review of primates' understanding of visual attention. In: F. de Waal & P. Ferrari (Eds.) *The primate mind: Built to connect with other minds.* Cambridge, MA: Harvard University Press.

Monday, November 23rd and Wednesday, November 25th – No class! (November recess)

Monday, November 30th – Morality

Jones (2009). The good, the bad and the intentional. *The Psychologist, 22*(8), 666-669.

Litoiu, A., Ullman, D., Kim, J., & Scassellati , B. (2015). Evidence that Robots Trigger a Cheating Detector in Humans. In: *Proceedings of the 10th ACM/IEEE International Conference on Human-Robot Interaction.* Portland, USA, March 2-5.

Wednesday, December 2nd – Canine cognition
(Guest lecture from Prof. Laurie Santos)

Hare B. & Tomasello, M. (2005). Human-like social skills in dogs? *TRENDS in Cognitive Science, 9*, 439-444.

Range, F., Horn, L., Viranyi, Z., & Huber, L. (2009). The absence of reward induces inequity aversion in dogs. *Proceedings of the National Academic of Sciences, 106,* 340-345.

Monday, December 7th – Sex and love

Thornhill, R. & Gangestad, W. (1999). Facial attractiveness. *Trends in Cognitive Sciences, 3*, 452-460.

Wednesday, December 9th – Exam #3
(material from 10/28 through 12/7)