Introduction to Cognitive Science (Fall 2014)

(All *Intro to CogSci* lectures will be presented in live 3D, but only some will require special viewing glasses!)

What, When, & Where

Course #s	:	Cognitive Science 110a, Psychology 130a
When	:	Fall 2014, Mondays & Wednesdays, 2:30 - 3:45 pm
Where	:	Yale Art Gallery Auditorium (Entrance on High Street just north of Chapel Street)
Webpage	:	https://webspace.yale.edu/cgsc110_f14/

Instructor Info

Professor	:	Brian Scholl (Professor, Department of Psychology and Cognitive Science Program)
Office	:	SSS 304 (at the corner of College/Prospect Streets & Grove Street)
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Phone	:	432 - 4629 (but email is strongly preferred, and I often forget that I even have voicemail)
Office Hours	:	Thursdays 4:30 - 5:30 pm, just after many classes, or by appointment

Teaching Fellows

***Note**: This list may change as the semester begins. Check the class webpage for up-to-date information!*

Adam Bear	:	adam.bear@yale.edu	(*Mind & Development Lab*)	OHs = Mon 5:30 pm	[SSS 206]
Katie Duchscherer	:	katie.duchscherer@yale.edu	(*Intergroup Relations Lab*)	OHs = Thu 11 am	[Dunham 238A]
Cory Gordon	:	cory.gordon@yale.edu	(*School of Public Health*)	OHs = Mon 1 pm	[TBA]
Matt Jordan	:	matthew.jordan@yale.edu	(*Comparative Cognition Lab*)	OHs = Wed 1 pm	[SSS 211]
Bud Lambert	:	robert.lambert@yale.edu	(*Automaticity Lab*)	OHs = Tue 1 pm	[SSS 414]
Justin Mendoza	:	justin.menzoda@yale.edu	(*School of Public Health*)	OHs = Mon 9 am	[Bass Library Cafe]
Stefan Uddenberg	:	stefan.uddenberg@yale.edu	(*Perception & Cognition Lab*)	OHs = Thu 10 am	[SSS 312]

Course Description

Welcome! The goal of cognitive science — and of this course — is to understand ***how the mind works***. Trying to understand our own minds is perhaps the most ambitious and exciting (and difficult) project in all of science, and this project requires tools drawn from fields including experimental psychology, computer science, linguistics, vision science, philosophy, anthropology, behavioral economics, and several varieties of neuroscience (among others). This course will introduce you to the major tools and theories from these areas, as they relate to the study of the mind. We will employ these perspectives while exploring the nature of mental processes such as perception, reasoning, memory, attention, imagery, language, intelligence, decision-making, morality — and even love and attraction. In sum, this course will expose you to cognitive science, the assumptions on which it rests, and the most important results obtained so far. By the end of the course, you should have gained important new insights into ***what you are*** and ***how you work***!

Expected Work and Grading

1. (**20**%) Questions on Daily Readings
   To get the most out of this course, it is essential that you carefully and critically study the readings associated with each lecture. To encourage this — and to give the instructor feedback as to what you thought of the material — you will be asked to respond to a brief question concerning most readings. A sample (if boring) question might be: "Which of the two theories discussed in this article do you think is right, and why?" Your answers to each question — which you must email to your specified TF no later than one hour before the start of the class wherein that reading will be discussed — need be no longer than 1 or 2 paragraphs, and should take no longer than 15 minutes to write after you have read the material. The questions due for each class will be assigned at the end of the previous class. I will use these comments to gauge your reactions to (and understanding of) the ideas we'll discuss, and I will occasionally spend the first part of the following class responding to some of the issues you raise in these comments. Note that a significant portion of your grade (20%) will be based on these questions, and that late submissions will not be accepted for any reason.

2. (**60**%) Two Exams
   60% of your course grade will be determined by two exams. The first exam will be on *Monday, October 13th*, and will cover material from August 27th through October 8th. The second exam will be on *Wednesday, December 3rd* (aka our last class meeting), and will cover material from October 15th through December 1st. The exam on which you do the best will count for 35% of your grade; the other will count for 25%. There will be no exam during the final exam period. The nature of these exams will be described more fully in class. Make-up exams will be given only in exceptional circumstances, and in all cases may involve completely new questions, possibly in other formats. (Advice: you really want to avoid having to take a make-up exam.) To do well on these exams, you'll have to attend the lectures — especially since our readings and lectures will rarely overlap by more than ~ 25% (since just rehearsing the readings during our class time wouldn't be very fun).

3. (**20**%) Short Paper
   You will be required to write one short (7 - 8 page) paper for this course, on an assigned topic that is discussed near the end of this syllabus. This paper is due no later than one hour before class on *Wednesday, November 19th* (aka our last class before the break).

Readings

I have a low opinion of all extant introductory cognitive science textbooks. But even if there was a good one, I probably still wouldn't like it — since textbooks have always struck me as intrinsically unexciting and watered-down ways to discover a new field. As a result, the readings for this course have been drawn from many different sources, including textbook excerpts, selections from popular books, articles from popular-press venues such as the *New Yorker*, and many articles from the primary scientific literature (and an *OK Go* music video). All of the readings will be posted on our class webpage, for you to view or print as you wish. (There is nothing to buy!) Using readings from the primary literature will help us to capture the vitality and excitement of scientific discovery. (This includes work that hasn't yet filtered into textbooks, including readings published only a few months ago!) These readings will also be challenging, though: they will use terms and refer to ideas with which you are unfamiliar, and they'll sometimes leave you with more questions than answers. This is okay! Though the readings have been carefully chosen to be accessible, I don't expect you to fully understand every aspect of them, and I will frequently provide guidance about what you should try to get out of especially challenging readings. In the end, these challenges will pay off, as you get a direct look at the science of mind in the making.

Preliminary Course Outline

Here's a preliminary outline of the material that we'll cover in this course. The full references for these readings are listed at the very end of the syllabus. We'll start out by spending a few weeks on the major assumptions and themes of cognitive science as a whole, after which we'll branch out to a representative selection of the various tools cognitive scientists use, and the aspects of the mind that we study. The exact timing of these lectures (and the exact readings that we end up using) are subject to change. We may end up spending more time than is listed here on topics that strike you as especially interesting or difficult. Please interact with me regarding the course: If there are topics you would like to add, or cover in more depth, let me know!

Wed 8/27: An Introduction to Your Mind
[No Readings]

Fri 8/29: Foundations of Cognitive Science
Bisson (1991), "They're Made Out of Meat" (*Omni*)
Carandini (2012), "From Circuits to Behavior: A Bridge Too Far?"

(Mon 9/1: No Class: Labor Day)

Wed 9/3: Crossed Wires (*The Architecture of the Mind*)
Rafal (2001), "Bálint's Syndrome"
Sacks (2004), "Speed" (*New Yorker*)

Mon 9/8: What's Within? (*How Nature Supports Nurture*)
Bouchard (2008), selection from "Genes and Human Psychological Traits"
Sugita (2008), "Face Perception in Monkeys Reared with No Exposure to Faces"
Hershberger (1970), "Attached-Shadow Orientation Perceived as Depth by Chickens in an Environment Illuminated from Below"

Wed 9/10: Pieces of Mind (*Modularity and 'Mental Organs'*)
Carston (1996), "The Architecture of Mind: Modularity and Modularization"
Gallistel (2000), selection from "The Replacement of General-Purpose Learning Models with Adaptively Specialized Learning Modules"

Mon 9/15: Mental Circuitry (*Computation and Cognitive Science*)
Pinker (1997), selection from "Standard Equipment"
Pylyshyn (1999), "What's In Your Mind?"
Watch this strange movie: http://www.youtube.com/watch?v=E3keLeMwfHY

Wed 9/17: Two Mysteries of the Mind (*Evolution and Consciousness*)
Churchland (2013), chapter 2 of *Matter and Consciousness (3rd Ed.)*
Bloom (2004), "The Duel Between Body and Soul" *(NYTimes)*
Nilsson & Pelger (1994), "A Pessimistic Estimate of the Time Required for an Eye to Evolve"

Mon 9/22: My Brain Made Me Do It (*Cognitive Neuroscience*)
Nishimoto et al. (2011), "Reconstructing Visual Experiences from Brain Activity Evoked by Natural Movies"
Abbott (2014), "Row Hits Flagship Brain Plan" + Waldrop (2012), "Brain in a Box"
Rosen (2007), "The Brain on the Stand" *(NYTimes)*

Wed 9/24: Brain Scanning and Mind Reading
Greene et al. (2001), "An fMRI Investigation of Emotional Engagement in Moral Judgment"
Hasson et al. (2004), "Intersubject Synchronization of Cortical Activity During Natural Vision"
Iacobini and various unhappy people (2007), "This is Your Brain on Politics" (*NYTimes*)

Mon 9/29: Goo goo, ga ga *(The Minds of Babies)*
Wynn (1992), "Addition and Subtraction by Human Infants"
Topál et al. (2008), "Infants' Perseverative Search Errors are Induced by Pragmatic Misinterpretation"
Talbot (2006), "The Baby Lab" (*New Yorker*)

Wed 10/1: "*Goo goo, ga ga*" (*Acquiring Language*)
Jackendoff (1994), Chapters 8 - 10 of *Patterns in the Mind*
Enard et al. (2002), "Molecular Evolution of *FOXP2*, a Gene Involved in Speech and Language"
Kinzler et al. (2007), "The Native Language of Social Cognition"

Mon 10/6: *Now Hear This!* (*Linguistics*)
Pinker (1994), chapters 4 - 5 of *The Language Instinct*

Wed 10/8: Colorless Green Ideas Sleep Furiously (*Syntactic Theory*)
Stillings et al. (1995), "Syntax" and "Universals"

Mon 10/13: MIDTERM EXAMINATION! <————————————————————

Wed 10/15: Seeing: It's Not What You Think (*Perception*)
Marr (1982), "The Philosophy of the Approach" (from *Vision*)
Firestone & Scholl (2014), "Please Tap the Shape, Anywhere You Like…"
Hill & Barton (2005), "Red Enhances Human Performance in Contests"

Mon 10/20: She Blinded Me With Science (*Visual Cognition*)
New & Scholl (2008), "Perceptual Scotomas: A Functional Account of Motion-Induced Blindness"
Gao et al. (2010), "The Wolfpack Effect"
Watch this awesome music video: https://www.youtube.com/watch?v=m86ae_e_ptU

(Wed 10/22: No Class: October Recess)

Mon 10/27: Bringing Cognitive Science into Focus (*Attention*)
Most et al. (2001), "How Not to Be Seen"
Simons & Levin (1998), "Failure To Detect Changes to People in a Real-World Interaction"
Jiang et al. (2006), "A Gender- and Sexual Orientation-Dependent Spatial Attentional Effect of Invisible Images"

Wed 10/29: Deep Thought (*Roles of Philosophy in CogSci*) [Guest Lecture: Josh Knobe]
[Readings TBA]

Mon 11/3: Just Minds (*The Cognitive Science of Morality*)
Cushman & Greene (2012), "Finding Faults: How Moral Dilemmas Illuminate Cognitive Structure" (selections)
Bloom (2010), "The Moral Life of Babies" (*NYTimes*)
Slovic (2007), "'If I Look at the Mass I Will Never Act': Psychic Numbing and Genocide"

Wed 11/5: I, Robot (*AI & and Social Robotics*) [Guest Lecture: Scaz]
[Readings TBA]

Mon 11/10: Monkeying Around (*Comparative Cognition*) [Guest Lecture: Laurie Santos]
Emery & Clayton (2001), "Effects of Experience and Social Context on Prospective Caching Strategies by Scrub Jays"
Tomasello et al. (2003), "Chimpanzees Understand Psychological States…"
Hare & Tomasello (2005), "Human-like Social Skills in Dogs?"

Wed 11/12: Elementary, My Dear Watson (*Reasoning and Rationality*)
Osherson (1995), "Probability Judgment"
Groopman (2007), "Mental Malpractice" *(NYTimes)*
Ariely (2010), "Thoughts about the Subprime Mortgage Crisis and its Consequences"

Mon 11/17: Make Up Your Mind! (*The CogSci of Decision-Making*)
Rand & Nowak (2013), "Human Cooperation"
Tierney (2011), "Do You Suffer from Decision Fatigue?" (*New York Times*)
Barberis (2013), "Psychology and the Financial Crisis of 2007-2008"

Wed 11/19: Ooh la la! (*The CogSci of Love, Sex, & Attraction*) ***<SHORT PAPERS DUE!>***
Berglund & Rosenqvist (1993), "Selective Males and Ardent Females in Pipefishes"
Penton-Voak et al. (1999), "Menstrual Cycle Alters Face Preference"

(Mon 11/24 & Wed 11/26: No Class: November Recess)
http://tofurky.com/faq_tofurky.html

Mon 12/1: The Past, Present, and Future of Cognitive Science
[Readings TBA]

Wed 12/3: FINAL EXAMINATION! <————————————————————

Assigned Paper Topic: *Cognitive Science and Everyday Life*

In this short (7-8 page) thought paper, you'll choose a part of cognitive science that we've covered in class, and you'll discuss how the research in that area should (or should not!) impact the real world, and everyday life. In essense, you'll be asking: *Who cares?* Why should (or shouldn't) the 'person on the street' care about this research? This will be a 'thought paper' in part because our readings and lectures will not always discuss these themes explicitly, but I hope that you'll be thinking about them throughout our course. This topic and our expectations for the paper will be described in much more detail when the due date approaches.

Note also that although this is the 'assigned topic' for the paper, I am open to letting you write on another topic of your own choosing, if you are particularly engaged by some other idea. The only strict constraint is that this must be a 'thought paper', to be graded primarily on the degree of interesting and careful thought it conveys involving themes from cognitive science. (In contrast, this paper is not meant to be a research paper or a 'book report', in which you summarize others' already-published ideas. Indeed, you needn't read any new source material at all for this assignment, beyond what is already required for class.) To write on an independent topic, you must get it approved by me, *no later than Wednesday, November 12th* (aka a week before the paper is due).

Full References for Readings

Abbott, A. (2014). Row hits flagship brain plan. *Nature*, *511*, 133-144.

Ariely, D. (2010). Thoughts about the subprime mortgage crisis and its consequences. In *Predictably Irrational*, Revised and extended edition (pp. 279-329). Harper Collins.

Barberis, N. (2013). Psychology and the financial crisis of 2007-2008. In M. Haliassos (Ed.), *Financial innovation*. MIT Press.

Berglund, A., & Rosenqvist, G. (1993). Selective males and ardent females in pipefishes. *Behavioral Ecology & Sociobiology*, *32*, 331-336.

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

Bloom, P. (2004). The duel between body and soul. *New York Times*, 9/10/04.

Bloom, P. (2010). The moral life of babies. *New York Times*, 5/9/10.

Bouchard, T. (2008). Genes and human psychological traits. In P. Carruthers, S. Laurence, & S. Stich (Eds.), *The innate mind: Foundations and the future* (pp. 69-90). Oxford University Press.

Carandini, M. (2012). From circuits to behavior: A bridge too far. *Nature Neuroscience*, *15*, 507-509.

Carston, R. (1996). The architecture of mind: Modularity and modularization. In D. Green et al. (Eds.), *Cognitive science: An introduction* (pp. 53-83). Cambridge, MA: Blackwell.

Churchland, P. (2013). "The ontological problem (the mind-body problem)." Ch. 2 of *Matter and Consciousness, 3rd Ed.* (pp. 11-86). MIT Press.

Cushman, F., & Greene, J. (2012). Finding faults: How moral dilemmas illuminate cognitive structure. *Social Neuroscience*, *7*, 269-279.

Emery, N., & Clayton, N. (2001). Effects of experience and social context on prospective caching strategies by scrub jays. *Nature, 414*, 443-446.

Enard, W., Przeworski, M., Fisher, S., Lai, C., Wiebe, V., Kitano, T., Monaco, A., & Paabo, S. (2002). Molecular evolution of *FOXP2*, a gene involved in speech and language. *Nature, 418*, 869-872.

Firestone, C., & Scholl, B. J. (2014). 'Please tap the shape, anywhere you like': Shape skeletons in human vision revealed by an exceedingly simple measure. *Psychological Science*, *25*, 377-386.

Gallistel, C. R. (2000). The replacement of general-purpose learning models with adaptively specialized learning modules. In M. Gazzaniga (Ed.), *The new cognitive neurosciences* (pp. 1179-1191). Cambridge, MA: MIT Press.

Gao, T., McCarthy, G., & Scholl, B. J. (2010). The Wolfpack effect: Perception of animacy irresistibly influences interactive behavior. *Psychological Science, 21*, 1845-1853.

Greene, J., et al. (2001). An fMRI investigation of emotional engagement in moral judgment. *Science*, *293*, 2105-2108.

Groopman, J. (2007). Mental malpractice. *New York Times*, 7/2/07.

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

Hasson, U., Nir, Y., Levy, I., Fuhrmann, G., & Malach, R. (2004). Intersubject synchronization of cortical activity during natural vision. *Science, 303*, 1634 – 1640.

Hershberger, W. (1970). Attached-shadow orientation perceived as depth by chickens reared in an enviornment illuminated from below. *Journal of Comparative and Physiological Psychology*, *73*, 407-411.

Hill, R., & Barton, R. (2005). Red enhances human performance in contests. *Nature, 435*, 293.

Iacobini, M. et al. (2007). This is your brain on politics [with response]. *New York Times*, 11/11/07.

Jackendoff, R. (1994). *Patterns in the mind*. Basic Books.

Jiang, Y., Costello, P., Fang, F., Huang, M., & He, S. (2006). A gender- and sexual orientation-dependent spatial attentional effect of invisible images. *Proceedings of the National Academy of Sciences*, *103*, 17048-17052.

Kinzler, K., Dupoux, E., & Spelke, E. (2007). The native language of social cognition. *Proceedings of the National Academy of Sciences*, *104*, 12577-12580.

Marr, D. (1982). "The philosophy of the approach". Chapter 1 of *Vision*. New York: W. H. Freeman.

Most, S. B., Simons, D. J., Scholl, B. J., Jiminez, R., Clifford, E., & Chabris, C. F. (2001). How not to be seen: The contri-bution of similarity and selective ignoring to sustained inattentional blindness. *Psychological Science, 12(1),* 9-17.

New, J. J., & Scholl, B. J. (2008). 'Perceptual scotomas': A functional account of MIB. *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(1345)*, 53-58.

Nishimoto, S., Vu, A., Naselaris, T., Benjamini, Y., Yu, B., & Gallant, J. (2011). Reconstructing visual experiences from brain activity evoked by natural movies. *Current Biology*, *21*, 1641-1646.

Osherson, D. (1995). Probability judgment. In E. Smith & D. Osherson (Eds.), *Thinking*, Vol. 2 of *An Invitation to Cognitive Science*, 2nd Ed (pp. 35-76). Cambridge, MA: MIT Press.

Penton-Voak, I., Perrett, D., Castles, D., Kobayashi, T., Burt, D., Murray, L., & Minamisawa, R. (1999). Menstrual cycle alters face preference. *Nature*, *399*, 741-742.

Pinker, S. (1994). "How language works" and "Words, words, words". Chapters 4-5 of *The language instinct* (pp. 83-157). Harper.

Pinker, S. (1997). "Standard equipment." Chapter 1 of *How the Mind Work*s (pp. 3-36). W. W. Norton.

Pylyshyn, Z. W. (1999). What's in your mind? In E. Lepore & Z. Pylyshyn (Eds.), *What is cognitive science?* (pp. 1-25). Oxford: Blackwell.

Rafal, R. D. (2001). Bálint's syndrome. In M. Behrmann (Ed.), *Handbook of Neuropsychology* (pp. 121-141). Elsevier Science.

Rand, D., & Nowak, M. (2013). Human cooperation. *Trends in Cognitive Sciences*, *17*, 413-425.

Rosen, J. (2007). The brain on the stand. *New York Times*, 3/11/07.

Sacks, O. (2004). Speed. *New Yorker,* August 23rd, 48-59.

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Slovic, P. (2007). 'If I look at the mass I will never act': Psychic numbing and genocide. *Judgment and Decision Making*, *2*, 79-95.

Stillings, N., et al. (1995). "Syntax", "Universals". Sections 6.3 and 6.4 of *Cognitive science: An introduction* (pp. 241-268). MIT Press.

Sugita, Y. (2008). Face perception in monkeys reared with no exposure to faces. *Proc. of the National Academy of Sciences*, *105*, 394-398.

Talbot, M. (2006). The baby lab. *New Yorker*, September 4th, 90-101.

Tierney, J. (2011). Do you suffer from decision fatigue? *New York Times*, August 21st.

Tomasello, M., Call, J., & Hare, B. (2003). Chimpanzees understand psychological states — the question is which ones and to what extent. *Trends in Cognitive Sciences*, *7*, 153-156.

Topál, J., Gergeley, G., Miklósi, A., Erdöhegyi, Á., & Csibra, G. (2008). Infants' perseverative search errors are induced by pragmatic misinterpretation. *Science*, *321*, 1831-1834.

Waldrop, M. (2012). Brain in a box. *Nature*, *482*, 456-458.

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