Introduction to Cognitive Science  (Fall 2007)

What, When, & Where

Course #s : Cognitive Science 110a, Psychology 130a
Distro Group : Social Sciences (for 1st/2nd/3rd-year students) / III (for seniors)
When : Fall 2007, 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_f07/

Instructor Info

Professor : Brian Scholl  (Associate Professor, Dept. of Psychology; DUS, Cognitive Science)
Office : SSS 304  (at the corner of College/Prospect Streets & Grove Street)
Email : brian.scholl@yale.edu
Web : http://www.yale.edu/perception/
Phone : 432 - 4629 (but email is preferred!)
Office Hours : Thursdays from 3 - 5 pm, just after many class

Teaching Fellows

Tao Gao : tao.gao@yale.edu  (Perception & Cognition Laboratory)
Kiley Hamlin : kiley.hamlin@yale.edu  (Infant Cognition Laboratory)
Yi He : yi.he@yale.edu  (Human Neuroscience Laboratory)
Scott Kaufman : scott.kaufman@yale.edu  (Social Cognitive Neuroscience Laboratory)
Jeremy Shen : yankun.shen@yale.edu  (Visual Cognitive Neuroscience Laboratory)

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

Course Description

Welcome! This course will provide you with an overview of the theoretical and empirical approaches which constitute cognitive science. Cognitive scientists explore the nature of cognitive processes such as perception, reasoning, memory, attention, language processing and acquisition, and problem-solving. Our goal is to understand (1) the representations and processes in our minds that underwrite these capacities, (2) how they are acquired, and how they develop, and (3) how they are implemented in underlying hardware (biological or otherwise). Stated more simply, our goal is to understand how the mind works! Trying to understand our own minds is one of the most ambitious and exciting projects in all of science, and this project requires tools drawn from fields including experimental psychology, developmental psychology, computer science, linguistics, vision science, philosophy, and neuroscience (among others). This course will introduce you to some of the major tools and theories from each of these areas, and will relate them to each other. In sum, this course will expose you to cognitive science, the assumptions on which it rests, and the more 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 each reading. 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, starting during our 3rd week. I will use these comments to gauge your understanding of (and reactions to) 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 examinations. The first exam will be on Monday, October 15th, and will cover material from September 5th through October 10th. The second exam will be on Wednesday, December 5th (our last class meeting), and will cover material from October 17th through December 3rd. 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 later. 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%.

3. (20%) Short Paper
   You will be required to write one short (6 - 8 page) paper for this course, on an assigned topic which is discussed near the end of this syllabus. This paper is due no later than one hour before class on Wednesday, November 14th (our last class before the break).

Readings

I have a rather low opinion of all extant introductory cognitive science textbooks. As a result, the readings for this course have been drawn from many different sources, and are available in a reading packet from Audobon’s, located at 48 Whitney Ave. You should pick up a copy ASAP; Audobon’s typically has them ready 1 day after your place your order. Many of the readings come from the primary literature in cognitive science. This is a good thing, since they will help to capture the vitality and excitement of scientific discovery. (This includes work that hasn’t yet filtered into textbooks: 7 of the readings were published during or after 2006, and the most recent was only submitted for publication 3 days before our first class!) These readings may also be challenging, though, and they will often use terms and refer to ideas with which you are unfamiliar. Don’t be discouraged by this! Though the readings have been carefully chosen to be accessible, I don’t expect you to fully understand every aspect of the readings. Overall, I think you’ll get more out of reading the primary literature in this way than by reading the watered-down and less exciting secondary literature, and I will frequently provide guidance about what you should try to get out of especially challenging readings.
Preliminary Course Outline

Here’s a preliminary outline of the material we’ll cover in this course. The readings are included in the following order in your reading packet, and the full references are listed at the very end of the syllabus. Some of these readings will be optional; these will be noted as the semester progresses. Others will be added as the semester progresses, and will be made available online. Note that 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 topics we study. The exact timing of these lectures is very subject to change: we may end up spending more time than is listed here on topics which strike you as especially interesting or difficult. Overall, I encourage you to interact with me regarding this material: If there are any topics you would like to add, or to cover in more depth, let me know!

W 9/5: Preliminaries; What is Cognitive Science?; How to Study the Mind
[No Readings]

M 9/10: Foundations of Cognitive Science #1
Pinker (1997), selection from “Standard Equipment”
Pylyshyn (1999), “What’s In Your Mind?”

W 9/12: Foundations of Cognitive Science #2
Churchland (1988), chapter 2 of Matter and Consciousness (2nd Ed.)

M 9/17: Cognitive Architecture #1: Groundwork, Innateness
Bouchard (2006), Selection from “Genes and human psychological traits”
Hershberger (1970), “Attached-shadow orientation perceived as depth by chickens in an environment illuminated from below”

W 9/19: Cognitive Architecture #2: Modularity

M 9/24: Cognitive Neuroscience #1: Introduction
Cacioppo et al. (2003), “Just because you’re imaging the brain …”

W 9/26: Cognitive Neuroscience #2: Neuroimaging
Hasson et al. (2004), “Intersubject Synchronization of Cortical Activity During Natural Vision”

M 10/1: Origins #1: Infant Cognition
Onishi & Baillargeon (2005), “Do 15-Month-Old Infants Understand False Beliefs?”
Talbot (2006), “The Baby Lab” (New Yorker; optional)

W 10/3: Origins #2: Language Acquisition #1: Foundations
Jackendoff (1994), Chapters 8 - 10 of Patterns in the Mind
Wade (2002), “Language Gene is Traced to Emergence of Humans” (NYTimes)
**M 10/8: Origins #2: Language Acquisition #2: Other Approaches**
Saffran et al. (1996), “Statistical Learning by 8-Month-Old Infants”
Marcus et al. (1999), “Rule Learning by 7-Month-Old Infants”

**W 10/10: Linguistics #1: Foundations**
Pinker (1994), chapters 4 - 5 of *The Language Instinct*

**M 10/15: MIDTERM EXAMINATION!**

**W 10/17: Linguistics #2: Syntax**
Stillings et al. (1995), “Syntax” and “Universals”

**M 10/22: Vision Science #1: Why Vision is Impossible**
Marr (1982), “The Philosophy of the Approach” (from *Vision*)

**W 10/24: Vision Science #2: Natural Constraints**
Flombaum et al. (2004), “Dynamic Object Individuation in Rhesus Macaques”

McDermott (1997), “Yes, Computers Can Think” (*NYTimes*)

*The readings for this lecture will change as the date of the guest-lecture approaches!*

**W 10/31: Attention & Consciousness**
Most et al. (2001), “How Not to Be Seen”

**M 11/5: Higher-level Cognition #1: Reasoning**
Groopman (2007), “Mental Malpractice” (*NYTimes*)

**W 11/7: Higher-level Cognition #2: Decision-Making** <ALTERNATE PAPER TOPICS DUE!>
Uchitelle (2001), “Following the Money, but Also the Mind” (*NYTimes*)

**M 11/12: Computer Science & AI: Foundations & Robotics** [Guest Lecture: Brian Scassellati]
[Readings TBA]

**W 11/14: Comparative Cognition** [Guest Lecture: Laurie Santos] <FINAL PAPER DUE TODAY!>
Hare & Tomasello (2005), “Human-like Social Skills in Dogs?”
[Other readings TBA]

(M 11/19 & W 11/21: FALL RECESS . . . Happy Thanksgiving!)
Reading: http://www.tofurky.com/products/tofurkyfeasts.htm

When we inquire about the ‘ecological validity’ of a scientific enterprise, we are essentially asking: Who cares? In this short (6 - 8 page) paper, you’ll discuss the ecological validity of a part of cognitive science. How does (or should) the research in this area of cognitive science impact the real world, and everyday life? Why should the ‘person on the street’ care about it? (Sometimes a research project will have direct implications for everyday life — e.g. for how children should be educated. Other times the usefulness of this research will be mediated by certain technological applications — e.g. research on attention leading to better-designed airplane cockpits.) This topic and our expectations for this paper will be described in more detail when the due date approaches.

Comment on the ecological validity of one or two ideas or areas of cognitive science which we have covered in this course. Discuss both (1) how the issue of ecological validity was addressed (or wasn’t addressed!) in the relevant readings and discussion, and (2) what you yourself think about the ecological validity of this area. Discuss what you would say to proponents of positions other than the one you have chosen to defend. Play the ‘devil’s advocate’ to generate arguments for these other positions, and then try to counter them.

(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. If you wish to pursue an independent topic, however, you must get it approved by me, no later than Wednesday, November 7th.)

Full References for Readings
