Course Description. Cognitive scientists share a commitment to developing theories of human cognition which can integrate findings from diverse fields (psychology, philosophy, linguistics, computer science, neuroscience). Interdisciplinary research methodology, including connectionist modeling, will be reviewed and applied to questions on human decision making, consciousness, creativity, development, social behavior, and psychopathology.

Prerequisites. Any one of the following courses: Cognitive Psychology (PS 336), Physiological Psychology (PS 231) Neuropsychology (PS 338), Minds and Machines (PH 265), Mind, Brain and Self (PH 266), Philosophy of Cognitive Science (PH 468), Artificial Intelligence. Prerequisites waived for graduate students. All students should have an understanding of basic statistical concepts (e.g., background in statistics to the level of MA 116 or PS 211). Auditors and visitors welcome.

Overview of class. Much of this class will be student-led. During the first three weeks, class members will discuss possible topics, and come to consensus about readings and topics. Students will join forces with one other classmate to lead the class for one week or can lead one day on their own. Students can choose any presentation day, beginning the week of Feb 2. I have listed tentative readings and topics through March 22. I will modify topics and readings depending on student interests. Also, if your topic could fit into one of the topics I have listed for February and March, it is best to present then, and I will adjust the schedule.

Topics should be chosen to maximize interdisciplinary themes or those relevant to the “grand philosophical questions” which cognitive scientists began to ask in the second half of the 20th century (see section on choosing topics below).

Course Requirements

- Readings for each class meeting: Read and be prepared to participate in class
- Weekly written comments: email to the class or bring copies to class
- Lead class discussion for one day (if solo) or 2 days (if with one other classmate)
- Mid-term test (Short-answer, including questions suggested by students)
- Final (covers 2nd half of course; Wed May 5, 2pm) OR 8-10 page paper.

There is no textbook for this class. Readings are articles which can be downloaded from sciencedirect.com or other sites, as noted in the list of readings. You can obtain texts for your own background reading (see list at next page).

When choosing a topic, consider classic philosophical questions, and also contemporary interdisciplinary issues.

Classic philosophical questions. What is consciousness? What forces shape human behavior? How does human intelligence differ from nonhuman (animal, computer) intelligence? What is the computational architecture of the human mind? Are there common information processing characteristics across multiple levels of inquiry (neuron, individual action, society?) What fields and subfields take the “cognitive” adjective and what does perspective does “cognitive” add (e.g., cognitive ethology, cognitive sociology, cognitive linguistics, cognitive anthropology).

Contemporary interdisciplinary questions

- What is the evolutionary or adaptive basis for this behavior?
- What is its developmental time course? How do developmental factors influence the shape of
this behavior or ability?
• What are the information processing or computational characteristics of this behavior?
• What is the brain basis or physiological underpinnings of the behavior?
• Is this behavior best described by multiple levels (micro/macro)?
• Does this behavior have an abnormal or pathological counterpart?
• Is this topic addressed by multiple disciplines? (Psychology, artificial intelligence, linguistics, neuroscience, philosophy, anthropology, sociology)
• What were the important historical questions about this topic, and how have the questions changed?

Note about topic choice: A possible topic could focus more on one of these question than on the others, e.g., the topic “evolutionary psychiatry” focuses mostly on the first question.)

Cognitive Science Books for Background Reading


Patricia Churchland, *Mindwise.* Takes a philosophical perspective: how does cognitive science shed light on classic questions about the mind?

I suggest browsing titles with key words “cognitive science introduction”. The MIT Press bookstore (small shop in Kendall Square) and cognitive science section of Barnes and Nobles are good places for looking at books.

David Lodge, 2001. *Thinks: A novel.* This novel is attempt to present key issues in cognitive science in the guise of a contemporary love story between two professors, one a humanities instructor and a skeptic of attempts to study consciousness scientifically the other a champion of cognitive science.

If you like the idea of reading fiction to learn about science, I also recommend Richard Power’s *Galatea 2.2,* 1995. This is easily ordered from amazon.com.

More on Course Requirements

Weekly email. Discussion leaders will distribute discussion questions about the reading. If we have two separate topics in a week, you only need to provide a written comment on one topic. You can distribute your comments by responding to this email. Send your email before Monday, so students can read it for Monday class, or on Tuesday, so students can read it for Wednesday class. If you were unable to circulate your comment ahead of time, bring 3 or 4 copies to class and students can read at the beginning of class. I expect students to read each other’s comments and will call on you to ask you to discuss the comments.

Comments do not need to be elaborate and can be as short as a few sentences giving your opinion on the topic. You can raise a question that was unanswered by the reading (something that could be addressed as a group). You could mention related work that you know of from other classes or other reading.

Leading class discussion

Students volunteer to lead class discussion on topic of their choice, and will collaborate with Prof Harris to select readings. Suggest: two class members work together to choose assessable readings, discussion topics, and activities. Either: you will both be in charge, for the Monday and Wednesday meetings, or you may each take charge of one day.

What distribution of articles to pick

When choosing readings for one week, students should aim for 4 articles/chapters. Choose articles that most of the students in the class will benefit from.
Possible distribution of articles

- one article from a popular source (e.g., Discover Magazine, Scientific American, newspaper)
- two contemporary readings, from contrasting disciplines or perspectives
- 1 additional article (such as a historical article)
- You can also suggest supplemental articles. Supplemental articles can be introductions, or advanced reading for people with a special interest in this topic.

Presenters should brainstorm with each other and Prof. Harris to find some hands-on applications or activity to do in class for one of the two days. Examples: experiments students can participate in an experiment or provide primary materials to review and analyze. Another idea is to organize a debate or to assign students to act out the roles of leading theorists in a subfield.

What are your responsibilities for leading class discussion?

- By the third week of class (if possible; we do have flexibility): Choose your topic, propose readings and presentation date. Present to the class the topic, your justification, and justification of the readings. (Readings can be modified if necessary later, at the latest, a week before your presentation date.)
- The week before your presentation date. Prepare and distribute your discussion questions. Meet with Prof. Harris to discuss ideas.
- During your presentation week. Bring relevant materials to class: outline, powerpoint presentation, primary materials for classmates to analyze, etc. After each class, the two leaders meet with Prof Harris briefly (10 minutes) to go over how the class meeting went. The following week, submit 2-4 short-answer questions for the test, with short answers. To construct your questions, think: what material or insights from these two class days would you hope students got at the end of the class hour? What would you hope they would retain by the end of the semester? A year later? Five years later?

Schedule of Readings and Topics

Wed Jan 14 Origins: The cognitive revolution; artificial intelligence
Harris, C.L. 2001. Language and cognition. Available from http://people.bu.edu/charris/encyclopedia.html. While focusing on language, this article reviews the three time periods we will discuss during the first week of class (the cognitive revolution, the connectionism paradigm shift, the contemporary focus on cognitive neuroscience).

-->Browse an on-line site dedicated to cognitive science. Do your own search or try this one: http://cscs.umich.edu/~crshalizi/notebooks/cognitive-science.html

Jan 19 (no class Monday) Wed The mid-80s Connectionist Revolution “Brain-style computer modeling”
If He Only Had a Brain: Right now it’s floating in a dish in Japan. Someday it may be offering you advice. By David H. Freedman DISCOVER Vol. 13 No. 08 | August 1992 | Biology & Medicine http://www.discover.com/issues/aug-92/features/ifheonlyhadabrai88/
On-line introductions: Public lecture from Jaap Murre, University of Amsterdam: http://
www.neuromod.org/courses/public.html

**Jan 26 Continue connectionism; Wed: Chaos Theory, Complexity, Robotics**

*Monday*


*Wednesday*


Fire in the Brain: Can programmable implants help epileptics detect the onset of seizures? By Kathy A. Svitil DISCOVER Vol. 23 No. 05 | May 2002 http://www.discover.com/issues/may-02/features/featfire/

**Feb 2 Language, Developmental Flexibility, Critical periods**

*Language and brain development*


*Critical periods*


**Feb 9 Savantism / Developmental Disorders**

*Savantism*


*Williams Syndrome*


For genetic analysis of Williams syndrome, if you are interested, see Bellugi et al, *From cognition to brain to gene* (can borrow from Prof. Harris)

**Tues Feb 17, Wed 18 Primate cognition**

Depending on student interests, we can modify readings to include evolution of human language, and animal cognition generally.


Primate Cognition at Emory University -- Click on video and field observation; there is also an overview of primate cognition and a bibliography http://www.learnlink.emory.edu/~npatel2/


**Feb 23 Evolutionary Psychology/Psychiatry**


An Evolutionary look at emotions and discussion of the modularity debate.

**Supplementary articles**


**Mar 1 Emotion; Neurobiology of social attachment**  **Wed Mar 3 Test 1**


**March 8 Enjoy Spring Break**

**March 15 Change blindness and Consciousness**

*Change blindness*


*Consciousness*


**March 22 Genes, Memes and the Biology of Religion**

*Memes are cultural concepts* which have unusual fitness, having survived the marketplace (or the battleground) of competing ideas. Memes are a big idea. They straddle genes and culture. They are controversial. Some people say they are nothing more that what anthropologists have always studied. Others say they are a new concept and have the potential for revolutionizing how we think.


For additional reading, browse these websites:

Blackmore’s webpage for links to other papers: http://www.susanblackmore.co.uk/publicat.htm see also: http://www.memes.org.uk/ and http://members.tripod.com/~Drahcir/memes/meme_read.html

*Biography of Religion*

As students decide their presentation dates/topics, the schedule above will be revised, with some topics being assigned to dates below, if a student’s topic will fit best into a February or March topic.

**April 5**
**April 12**
**Wed April 21**
**April 26** (Last day of instruction: Wed April 28)
**Wed May 5: Test 2** (or turn in paper)

**Other Topics**

Many other topics which could be pursued, depending on student interests. The following have generated a lot of interest in prior years: Emotion, decision making, cognition of literature, racial perception, social cognition, implicit attitudes and stereotyping, brain, visual imagery, and advertising, computational models of mental disorders, sleep/dreaming, pain perception. A very new topic is the genetics underlying disorders, and the genetics of human evolution.

**Discussion Questions for Wednesday Jan 19**

1. In the novel *Thinks*, Ralph Messenger, head of a cognitive science institute in Great Britain, shows the institute to Helen, a literature professor. The institute features a mural describing some classic questions in the last 30 years of work. Choose one of these and find additional material to flesh out the short description that Helen receives from Ralph.
   - Thomas Nagel, What is it like to be a bat?
   - Prisoner’s Dilemma (compare to current TV game show ‘Friend or Foe’) and Axelrod’s Tit for Tat
   - Searle’s Chinese Room
   - Frank Jackson’s Mary, the color scientist who is color blind
   - Philosophers’ obsessions with “Zombies”
   - Does quantum physics have the answer to consciousness?