Introduction to Cognitive Science

COGS-100

Fall, 1996

Time & Place:

Tuesday, Thursday 11:30-12:45, Blodgett 105

Instructors:

Jan Andrews (Blodgett 223; extension 7369; maildrop 146; email: ANDREWSJ)

Office Hours: Wednesday, 11:30-12:30, Thursday, 9:30-10:30

[Christopher Welty](http://www.cs.vassar.edu/faculty/welty) (OLB 117, extension 5992, maildrop 462, email: CHWELTY)

Office Hours: Monday, Wednesday, 11:30-12:30

Textbooks:

- The Engine of Reason, the Seat of the Soul by Paul Churchland (MIT Press, 1995) [ER]

- AI: the Tumultuous History of the Search for Artificial Intelligence by Daniel Crevier (BasicBooks, 1993) [AI]

- Wet Mind by Stephen Kosslyn & Olivier Koenig (Free Press, 1992) [WM]

- Turing's World by Jon Barwise & John Etchemendy (CSLI, 1993) [TW]

The books are available at the College Store. The letters in brackets indicate how the books are identified on the attached syllabus.

We will also be using a number of parts of Paul Churchland's 1988 book Matter and Consciousness (MC on the syllabus). This book was not ordered for this section, but there are numerous copies floating around. Several copies are also on reserve in the library (as are copies of the few other assigned readings not from one of our texts). Another book we will be using several excerpts from is called Speaking Minds: Interviews with Twenty Eminent Cognitive Scientists (Princeton University Press, 1995, edited by Peter Baumgartner and Sabine Payr). When a reading is identified on the syllabus as "Interview with...", it is from that book. The reserve copies are listed under the name of the person being interviewed, and there are a number of interviews on reserve that are not actually assigned, but which you might find interesting.

General Course Description

This course is designed to give you an overview of the questions that define the field of Cognitive Science, the conceptual and research tools that are used to investigate these questions, and some idea of the answers that seem to be emerging. Cognitive Science is a multidisciplinary field that has drawn, both historically and methodologically, from a number of older disciplines, most prominently philosophy, psychology, computer science, neuroscience, and linguistics. No background in any of these disciplines is assumed, and this course is intended to serve as an introduction, for both majors and nonmajors, to the unique approach to studying problems of mind, brain, and behavior that Cognitive Science represents. For students who go on to major in Cognitive Science, this course provides the intellectual perspective and tools that will prepare you for further Cognitive Science courses as well as for courses from other departments needed to fulfill major requirements. For non-majors, we would like the course to offer a new way of thinking about mind and behavior that can spill over into other courses you take.

Reading Assignments

The reading assignments for this course refer to the required texts or to reserve readings. Unlike most other disciplines, Cognitive Science does not yet have a good introductory textbook, so we need to use books that do not lend themselves easily to being carved up for the convenience of a course syllabus. For most of our books, the authors hoped that you'd read their books in the usual way, from cover to cover. We are listing here the sections in these books that are most relevant for particular topics, and you should be careful to do the relevant reading by the appropriate time, but, to enjoy them more fully, you may want to try to read through them in the more usual way, pacing yourself during the semester so as to not to become overloaded.

The attached course outline shows the schedule of topics and assigned readings for each class meeting. We have tried not to assign as much reading for Thursday as for Tuesday. It is very important to do the readings which have been assigned for a given class before the class; for reserve readings, especially, this requires some planning. Much of class time will be spent discussing, clarifying, and interrelating the material and issues covered in the assignments, and understanding and integrating diverse readings will be all the more difficult if you haven't read them. Lectures and discussion will often go well beyond the readings but will always require them as background.

Course Requirements

Everyone is expected to attend class regularly, complete assigned readings on time, and hand in assigned work on time. If you do have a legitimate and important reason for missing class or handing work in late, you should make every effort to contact one of us in advance about it.

You will be responsible for completing two categories of written work, both of which are spread out over the semester: papers, and quantitative exercises. The papers consist of three short ones and a longer, final paper which constitutes the final exercise for the course. The short papers contribute 12% each to the course grade, while the final paper counts 30% and will be flexible in topic. Three quantitative exercises will collectively account for

28% of the course grade. See the syllabus for due dates. The final component of the course grade is participation (6%). We will all get more out of this course if people are prepared for class and actively engaged with the material, which can be demonstrated by talking in a thoughtful and serious way in class and/or by sending us email discussing the readings or what we're doing in class.

Schedule

9/3 T Introduction: What the field of cognitive science (and the course) are about
9/5 R The mind–body problem: Dualism (and a quick reference to behaviorism)
K. Livingston. Chapter 2 of Integrating the Sciences of Mind
MC, pp. 1–22, 88–91
9/10 T One major alternative: Materialism (two classical versions)
MC, pp. 26–35, 43–49, 96–98
9/12 R How materialism looks in light of modern neuroscience
ER, Chapter 1
WM, Chapter 1
G. Fischbach, Mind and brain. Scientific American, 1992, pp. 48–57.
9/17 T Ammunition for modern materialists: Specific techniques for relating mind and brain
ER, Chapter 2, Chapter 7, pp. 151–158
9/19 R Another major alternative: Functionalism (the basic idea)
MC, pp. 36–42, 92–95
AI, Introduction, Chapter 1
(9/20 F First short paper due by 3:00)
9/24 T Abstract AI: Turing machines
TW, pp. 7–61
9/26 R Turing machines, continued; other basic computer programming concepts
TW, pp. 63–77
MC, pp. 99–112
10/1 T Brief history of early AI efforts
AI, Chapters 2, 3, and 4
10/3 R Critiques of traditional AI and functionalism
J. Searle, Is the brain's mind a computer program? Scientific American, 1990, pp. 26–31.
AI, Chapter 5
Interview with Hubert Dreyfus
(10/4 F Turing Machine exercise due by 3:00)
10/8 T Critiques, continued; the emergence of the idea of neural computation
P. Churchland & P. Churchland, Could a machine think? Scientific American, 1990, pp. 32–37.
AI, Chapter 11
10/10 R Parallel distributed processing or connectionism: A synthesis of functionalism and
materialism?
WM, Chapter 2
Interview with Terrence Sejnowski

10/15 T Where things stand on the correct approach: Far from consensus! Interviews with Jerry Fodor, Robert Wilensky
10/17 R Finally, some of what we're trying to explain! Let's begin with visual perception...
WM, Chapter 3, pp. 52–77
(10/18 F Second short paper due by 3:00)
Oct. 19–27 OCTOBER BREAK
10/29 T Visual perception, in depth (ha ha)
WM, Chapter 3, pp. 77–107
ER, Chapter 3, Chapter 4, pp. 57–84
10/31 R Effects of brain damage as a research strategy; action and movement
WM, Chapter 3, pp. 107–127, Chapter 7, pp. 286–312
ER, Chapter 4, pp. 91–96
(11/1 F PDP exercise due by 3:00)
11/5 T Visual cognition (imagery)
WM, Chapter 4
11/7 R Language
ER, Chapter 4, pp. 84–91, Chapter 6, pp. 132–143
WM, Chapter 6, pp. 211–232
11/12 T Language, continued
WM, Chapter 6, pp. 232–285
11/14 R Memory and knowledge representation
AI, Chapter 6, 7, and 8
(11/15 F Third short paper due by 3:00)
11/19 T Memory and knowledge representation, continued
WM, Chapter 8, pp. 341–388
11/21 R Learning and concepts
ER, Chapter 5
(11/22 F Long paper proposal due by 3:00)
11/26 T Problem-solving and reasoning
AI, Chapter 9, Chapter 10, pp. 237–263
WM, Chapter 9, p. 401–419
11/28 R THANKSGIVING
12/3 T Social cognition, emotion, and dysfunction
ER, Chapter 6, pp. 123–132, Chapter 7, pp. 158–183
WM, Chapter 9, pp. 437–443
12/5 R Human consciousness
ER, Chapter 8
WM, Chapter 9, pp. 431–437
(12/6 F Data analysis exercise due by 3:00)
12/10 T Who and/or what else could be conscious?
ER, Chapter 9, Chapter 10, pp. 253–271
(12/13 F Long paper due)