Cogs 111: Introduction to Cognitive Science
Fall 2010 Syllabus

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Course Description

This course will introduce basic concepts, issues and methodologies associated with the interdisciplinary study of human cognition. Specific topics will include (among others) mind, memory, perception, intelligence, and consciousness. We will also examine some elementary neuroscience, agent-environment relations, robotics and other efforts to model human intelligence using machines. Insights will be appropriately drawn from several fields, including anthropology, artificial intelligence, biology, linguistics, neuroscience, philosophy, psychology and robotics. Students should note from the start that this is not a science course in the conventional sense, but a preliminary preparation for the scientific study of cognition.

This course is offered for general education credit as a three-hour non-lab science option. However, it also serves as a requirement for majors and minors in cognitive science and majors in psychology and will be taught accordingly.

Required Texts


Assignments

Each student will be required to read all of the assignments, write two thought papers, take a midterm exam, and post eight questions to the class discussion board. The final exam is optional. Details follow.

Grading

20% - Papers – 10% Each
20% - Mid-Term Exam
30% - Final Exam
15% - Discussion Board Questions – 1.875% each
15% - Class Participation

Paper Guidelines, Recommendations and Evaluation

Both papers must be 900 to 1100 words in length. References are not required, but should you use them, consistently format them (along with a bibliography) using either MLA or APA style. An abstract is not required. Submit electronic copies to Turnitin.com before the start of the class in which they are due, and bring three print copies, stapled in the top, left corner to class. Late papers will not be accepted.
Your papers will be evaluated according to the following qualities, though they will not be graded according to an average based on an individual assessment of each area. (In other words, we will consider the paper as a whole looking at the following for guidance.)

- **Focus** – Does the paper stick to its topic, addressing necessary details while avoiding extraneous ones?
- **Organization** – Is the paper well-organized with respect to the order and presentation of ideas? Are ideas properly subordinated throughout the paper?
- **Clarity** – Is the paper generally clear and the prose readable? Are important ideas explicitly stated?
- **Factuality** – Are the factual assertions advanced in the paper true? Are they adequately supported by documentation as needed?
- **Documentation** – Is the selection and use of sources appropriate for the topic? Is the paper properly documented with citations to your sources?
- **Format** – Does the paper adhere to the formatting guidelines of the MLA and APA style if references are used.
- **Grammar** – Is language used according to the rules of grammar? Is it properly academic?
- **Presentation** – Is the paper presented professionally? Is the ink and font readable? Is it properly stapled? (This should be obvious, but apparently it is not.)

**Midterm and Final Exams**

The midterm examination will consist of a single question on broad themes raised in Minsky. The exam will cover the whole book which will be discussed in class the week of 10/4. To facilitate conversation and close examination of the text, the class will be divided into two discussion groups for the week. Each will meet separately with a TI. The meeting times will still be MWF at 2:00pm. The midterm will then follow Fall Break on 10/13.

The final examination will consist of two questions chosen randomly from a set of eight, one on each chapter of Clark. The questions are given in advance on the course calendar below. At the beginning of the final exam session (2:45pm on 12/14), each student will be presented with the two questions and his/her grade going into the exam, along with calculations showing how the exam can affect the final grade. Students will then decide whether they want to take the exam understanding that if they take it, the score will count toward the final grade.

Preparation for the final exam will begin early in the semester with the first discussion board assignment on 9/10.

**Discussion Board Questions**

Discussion board questions are due by 10pm the night before we begin each chapter in Clark as indicated on the calendar below. During this exercise, each student will be required to post one question on the reading assignment that has not already been posted by someone else. Questions will be evaluated before the start of class, and ranked as good, passing or bad. Those ranked good will be used in class to structure discussion on that chapter of Clark and on cognitive science more generally.

Questions should focus on understanding the exam question for the reading assignment, its answer and its context. Asking the exam question itself is prohibited. However, students should know that while their own interest might be to get easy answers to the exam questions, our goal (the professor and the TI's) is
to introduce some of the preliminaries helpful for engaging in the scientific study of cognition more generally.

**Policies and “Rules”**

It would be a wonderful world, if classrooms could run without rules, but experience has repeatedly taught me that they are necessary. The following stem primarily, but not exclusively, from two sources. The first is a matter of maintaining respect for honest students with a genuine desire to know. Being fair makes it imperative that they have every opportunity to learn and that they are not lost among the students who take a class only to meet a requirement and who, as a consequence, may only be looking for the highest grade in exchange for the least amount of learning.

The second is to help me maintain my concentration in the classroom. Most of my difficulty with this latter issue derives from the fact that class lecture is a form of conversation. Once I perceive that my interlocutor is no longer listening, my priority automatically shifts from delivering a message to re-establishing contact, and I lose my train of thought. One student in a class can easily throw me off.

It is my hope that the following will respond adequately to these issues and that we will be able to conduct class at a level befitting an institution of higher learning. (In other words, we’re not in high school anymore!)

**Academic Honesty**

All work submitted in this course must be prepared by the student expressly for this course. A student who submits work that is plagiarized, bought, borrowed from the archives of a fraternity, copied from another student, etc., will fail the course. (If you don’t believe me, ask around.) I fully support the University’s Academic Honor Code. To avoid confusion, students should keep in mind that plagiarism occurs not only when someone copies an author word for word, but also when someone uses another’s ideas without giving credit, even if the ideas are paraphrased. Always document your sources!

**Attendance Policy**

I do not have an attendance policy per se. However, this course is structured in such a way that students who do not show up regularly may (will?) have trouble passing it. After all, it is difficult to participate if you’re not present, and I frequently test on material that is not in the reading. (Since I do not have an attendance policy, there is no reason to send excuses for missing class, whether by email or by phone. Your reasons for missing class are private and do not concern me. Please, in other words, keep them to yourselves.)

**Course Participation**

Course participation grades are not automatic. They are based on oral contributions to the collective learning experience of the class as a whole in terms of asking pertinent questions, answering questions correctly or, at least, provocatively, making insightful observations, and offering other meaningful expressions of interest in the material that help encourage learning. I begin by assuming a C for each student’s course participation grade and move from there. Students should realize that it is possible to talk a lot in class and receive a low grade for course participation. Consideration for the course participation grade will take into account any meaningful attempts to answer questions posted to the discussion board and any discussion that develops as a result.

**Electronic Technology in the Classroom (Cell Phones, Laptops, Etc.)**

The use of laptops, cell phones, gaming devices and other electronic contraptions is not permitted in class. Students caught using them will be asked to leave. (You can wear a watch, if you must, but please don’t sit staring at it during my lectures.)
Email / Office Hours

I do not read my UE email at home and, as a consequence, I will only answer student email during my scheduled office hours. Even then, I am not apt to sustain long, academic dialogues in this forum. (For extended discussion, please come visit me in person. Office hours are posted above.) Furthermore, during office hours, I will defer to students who show up in person, and this means that I may not be able to answer your email in the short term. In addition to the office hours listed above, I am available by appointment, either in person or by Skype.

Food in the Classroom

No eating in class.

Packing Up to Go

Often the most critical minutes in a class session are the last five, where conclusions are drawn and assignments are made. Please do not start to pack up your belongings before the end of class.

Stay at Home Policy

I easily lose focus when students aren’t paying attention, whether because they are talking to each other, passing notes, studying for another class, etc. If you do not wish to pay attention, please take advantage of my lack of an attendance policy and stay at home. After all, you get nothing for just showing up without paying attention, and I’m probably going to dock your participation grade just the same as if you had stayed at home.

Course Calendar

8/25 In class video, Frontline: Digital Nation, pt. 1
8/27 In class video, Frontline: Digital Nation, pt. 2
8/30 Syllabus Review. Introduction to course. Comments on video
9/1 Reading Assignment: Clark, Preface and Introduction
9/4 In class writing workshop. Preparation for the first paper. Bring writing tools and actual paper
9/6 Crick Lecture: Dr. Dennis Barbour (Washington University), “Control Points in the Brain: Manipulating Neural Networks.” 4pm, Vectren Lecture Hall, KC 100. Note the unusual meeting time and place
9/8 First thought paper due. “What is intelligence?”
9/10 Reading Assignment: Clark, Chapter 1. Meat Machines: Minds as Software

Discussion board question due by 10pm on 9/9

Final Exam Question 1: Explain what Clark means when he asks, “Is consciousness like calculation or is it more like a pizza?” (25). Be sure to address the subjects of computation (esp. Box 1.5), the relationship between syntax and semantics (esp. Box 1.2), and Haugeland’s famous quote, “If you take care of the syntax, the semantics will take care of itself” (9).

9/13 Discussion: Clark, Chapter 1
Final Exam Question 2: Explain what Newell & Simon claim with the physical symbol system hypothesis (28). Include a definition of physical symbol system. Discuss objections to the hypothesis such as (but not limited to) Searle's Chinese room thought experiment (34), Block's China brain thought experiment (36), Dreyfus' argument from holism (37), and the argument from evolutionary psychology (39).

Final Exam Question 3: Explain the views concerning folk (common-sense) psychology advanced by Fodor (43), Churchland (44) and Dennett (46). Discuss their points of agreement and disagreement.

Final Exam Question 4: Explain how the connectionist approach to AI differs from the symbolic approach. What are their relative strengths and weaknesses? Include practical advantages (such as those mentioned on 66) as well as methodological advantages (such as those mentioned on 67). Also, include mention of how each paradigm stands with regard to biological plau-
Final Exam Question 5: Evidence has been collected from a number of sources (see 86-88, 91-93, 95) which suggests that the relationship between sensation and action is tighter than allowed by the three-tier framework for task analysis proposed by Marr (84). Use (some of) this evidence to argue for the inadequacy Marr’s framework.

Final Exam Question 6: Various research on the robotic instantiation of cricket phonotaxis by Webb (104), computational simulation of animal flocking by Reynolds (107), and stigmergic nest construction observed in termites (108) suggests that complex behavior can emerge from the interaction of parts according to a minimal set of rules without any need for internal representations or centralization of control. Use these and other examples from the chapter, esp. discussion section B, Emergence, (112) and the virtual ecosystem, Tierra, developed by Ray (117) to argue either for or against the notion that emergent behaviors can account for intelligence.

Final Exam Question 7: Dynamic systems theory (DST) is a powerful framework for understanding the robust, yet simple behavior of complex, interrelated systems (e.g. see the three cases presented in section A on 121, 124 & 125). The explanatory ability of DST has led some researchers to the conclusion Clark calls “The Radical Embodied Cognition Thesis” (tRECT, 128). Does tRECT amount to a rejection of the idea that the brain computes? (133) Include discussion of the arguments Clark presents concerning why it does not.
Final Exam Question 8: Clark uses this final chapter to discuss the extended mind hypothesis. While he doesn't mention it here by name, the hypothesis includes the notion that the environment is another place for us to store and interact with memories. Thus, it follows that objects in the environment (including other people and various technologies) enhance our cognitive capacity (see 144-145, 147, 149, 157). There's an obvious concern to be addressed here. How could such clever and purposeful tool use arise from unintelligent beings? “Surely, … only intrinsically smart brains could have the knowledge and wherewithal to create such cognitive technologies in the first place” (150). Sketch the argument from neural constructivism (Box 8.4, 152) that Clark suggests as a possible reply to this concern.