Cogs 498h: Seminar in Philosophy, Neuroscience, and Psychology:
Artificial Intelligence and Human Cognition

Spring 2010 Syllabus

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(Office hours will not be held on days that class does not meet; to ease wait time, students may make an appointment to see me in advance. This is highly recommended.)

**Course Description**

This course will examine what we can learn about human intelligence by attempts to model it with machines. After a (very) quick discussion of strong artificial intelligence (GOFAI) and its weaknesses, the course will examine other alternatives, including connectionist models (artificial neural networks or ANNs), dynamic associative networks (or DANs) and agent-based models. No global explanation of human cognition will be attempted, just a study of the forms of “initial intelligence,” the basic building blocks of larger scale cognitive initiatives, that we can discover and explore using computer modeling. The course will center primarily around two initially disconnected components, 1) a discussion of the strengths and weaknesses of connectionist modeling and 2) project-oriented exploration with agent-based modeling.

**Required Text and Software**


**Recommended Text**


**Assignments**

Each student will be required to come to class prepared, where “prepared” means having read the reading assignment for the week and attempted a genuine understanding of it. Additionally, each student will be assigned to a team to work on a semester-long project connected in some way to cognition using agent-based modeling. Weekly progress on both the text and the project will be expected.

At the end of the semester (**deadline May 4th, 6 pm**), each team will be required to submit a working computer model and a carefully written five to ten page “white paper” that explains it. (Successful models and papers will be posted to the digital humanities laboratory website.)
Grading

75% - Modeling Project & Team Paper
25% - In Class Participation

Seminar Format

Each class meeting will be divided into two parts, the first dedicated to an examination of the reading assignment for the week (6:00-7:30) and, then, after a short break (10 minutes), the second to reports concerning the team projects described below (7:40-8:45), during which a team delegate will make a 20 minute presentation on the current state of their team's project.

Team Assignments

<table>
<thead>
<tr>
<th>Team</th>
<th>Barker</th>
<th>Carrasco</th>
<th>Sigler</th>
<th>Wyant</th>
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<tbody>
<tr>
<td>A Team</td>
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<td>B Team</td>
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<td>C Team</td>
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Projects

Each team will use NetLogo (or, if necessary, some other agent-based modeling software) to attempt to model interactivity between agents and environments. The material to be modeled is here assigned according to the following: **Team A** will examine the propagation of humor in a network of people following the lead of Brent Sigler’s research in social psychology. **Team B** will explore the effects of storing agent-based information in the environment for subsequent retrieval by other agents. **Team C** will explore ways to instantiate Tony Beavers’ work with dynamic associative networks in agent-based models.

Evaluation

Evaluation will be determined using a variety of forms. The primary consideration will be, of course, the quality of the final project and its corresponding white paper. However, sometimes in team work, work does not end up getting spread out evenly. Thus, peer evaluations of team members will enter into my consideration when determining final grades. Regular progress on the project throughout the semester is also a pertinent factor in assessment. Class participation grades will be based on peer assessment as moderated by my sense of an individual’s contribution to the class.

Google Group

A Google Group (i.e., an archived mailing list) has been set up for the class. Please use it liberally to ask questions, post answers or post anything else of interest to the class. Topically appropriate humor is also welcome (e.g., cartoons and what have you). To send material to the group, use cogs-498h-sp10@googlegroups.com.

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

For a seminar such as this, my attendance policy differs from my regular lecture courses. It is quite simple: don’t miss!

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. Students should realize that it is possible to talk a lot in class and receive a low grade for course participation. Absences are also grounds for a low participation grade.

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

The use of laptops, cell phones, gaming devices and other electronic contraptions for purposes other than promoting the flow of ideas in the class is not permitted. (This means no checking of email, texting, surfing the net, etc.) Students caught doing so will be asked to leave.

Food in the Classroom

No eating in class!
COGS 498h – Seminar in Philosophy, Neuroscience, and Psychology

Artificial Intelligence and Human Cognition

Course Calendar

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1/12</td>
<td>General Introduction, Part I</td>
</tr>
<tr>
<td>1/19</td>
<td>General Introduction, Part II</td>
</tr>
<tr>
<td>1/26</td>
<td>B&amp;A Ch. 1. “Networks versus Symbol Systems: Two Approaches to Modeling Cognition”</td>
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| 2/2  | B&A Ch. 2. “Connectionist Architectures”  
     | Team Presentations by Barker (A), Kinsey (B) and Burrows (C) |
| 2/9  | B&A Ch. 3. “Learning”  
     | Team Presentations by Carrasco (A), Purcell (B) and Gullquist (C) |
| 2/16 | B&A Ch. 4. “Pattern Recognition and Cognition”  
     | Team Presentations by Sigler (A), Roden (B) and Howard (C) |
| 2/23 | Working Session – Extended Presentations by Teams as a Whole |
| 3/2  | Professor out of town. No class |
| 3/9  | Spring Break. No Class. |
| 3/16 | B&A Ch. 5. “Are Rules Required to Process Representations?”  
     | Team Presentations by Wyant (A), Woody (B) and Will (C) |
| 3/23 | B&A Ch. 6. “Are Syntactically Structures Representations Needed?”  
     | Team Presentations by Barker (A), Kinsey (B) and Burrows (C) |
     | Team Presentations by Carrasco (A), Purcell (B) and Gullquist (C) |
| 4/6  | B&A Ch. 8. “Connectionism and the Dynamical Approach to Cognition”  
     | Team Presentations by Sigler (A), Roden (B) and Howard (C) |
| 4/13 | B&A Ch. 9. “Networks, Robots and Artificial Life”  
     | Team Presentations by Wyant (A), Woody (B) and Will (C) |
| 4/20 | B&A Ch. 10. “Connectionism and the Brain”  
     | Open Discussion |
| 4/27 | Formal Team Presentations (PowerPoint or some equivalent strongly recommended) |