HONR278X Clear Thinking in an Uncertain World: Human Reasoning and its Foundations

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Semester:	Fall 2013
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Course Website:	Available on ELMS
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Office Hours:	T 1 - 2 PM
Class Times:	MW 2 - 3:15 PM
Class Location:	CCC 1115

Course Description

Reasoning is a transition in thought, were some beliefs (or thoughts) provide grounds or reasons for coming to another. What makes certain transitions of thought "rational" or reasonable while others are considered irrational or erratic? This question has been a major focus of investigation in many different research areas, such as philosophy, logic, psychology cognitive science and artificial intelligence. In this course, we will discuss important philosophical puzzles that have driven much of the foundational research on human reasoning. (See example 1 below) A second component of this course is to examine key experiments that have demonstrated the supposed limitations of our ability to reason "correctly. (See example 2 below)

The class-meetings will be spent discussing readings from the different disciplines mentioned above, although no prior knowledge of any of these fields is presupposed. Students will also be encouraged to test their ideas and intuitions by developing experiments or computer simulations. The goal is to develop a broad understanding of the principles that guide human reasoning.

Example 1: **The Lottery Paradox**: Imagine a fair lottery with a million tickets in it. For each ticket, it is so unlikely to win that it you are justified in believing that it will lose. From this you can infer that each ticket will lose. Yet, since the lottery is fair, you also know that there must be some ticket that will win. This line of thought seems perfectly reasonable; however, it leads to beliefs that are logically inconsistent.

Example 2: **The Conjunction Fallacy**: This experiment is from Daniel Kahneman and Amos Tversky. Linda is 31 years old, single, outspoken, and very bright. She majored in philosophy. As a student, she was deeply concerned with issues of discrimination and social justice, and also participated in anti-nuclear demonstrations. Which is more probable?

1. Linda is a bank teller.

2. Linda is a bank teller and is active in the feminist movement.

In numerous experiments, it has been demonstrated that people tend to choose option 2. Does this show that something is wrong with our best theory of reasoning under uncertainty (probability theory)?

Literature

The course will be based on readings from various textbooks are journal articles. Readings for the course will be drawn from the following texts. The reading for each week will be available on ELMS.

- J. Adler and L. Ripps (eds.), *Reasoning: Studies of Human Inference and its Foundations*, Cambridge University Press, 2008 (especially the introductory survey by J. Adler, pgs. 1 - 34).

- R. Grandy and D. Osherson, *Setential Logic for Psychologists*, 2010, available at `http://www.princeton.edu/~osherson/primer.pdf`

- I. Hacking, *Introduction to Probability and Inductive Logic*, Cambridge University Press, 2001 (Chapter 6)

- D. Kahneman, *Thinking, Fast and Slow by Daniel Kahneman*, Farrar, Straus and Giroux, 2011

- B. Skyrms, *Choice and Chance: An Introduction to Inductive Logic*, Cengage Learning, 1999 (Chapter 6)

- K. Stenning and M. van Lambalgen, *Human Reasoning and Cognitive Science*, The MIT Press, 2008

- E. Yudkowsky, *An Intuitive Explanation of Bayes' Theorem*, available at `http://yudkowsky.net/rational/bayes`

Grading Policy

The course requirements are: participation & short writing assignments (20%), take-home midterm exam (30%), final exam (30%), and final presentation (20%). The final will be an in-class exam given during finals week. Information about the final presentation will be provided roughly three weeks into the course.

Schedule

Below is a tentative schedule for the semester. A more detailed schedule, including links to the reading material, can be found on the course website. The first lecture of each week will start with an introductory lecture on the topic followed by a preliminary discussion. The second lecture of the week will be a structured discussion of issues raised during the first lecture. Starting the fourth week, students will be required to prepare a short (1-2 page) list of discussion questions and commentary on the required reading.

Week	Date	Topics
1	Wed 9/4	Introductory Remarks
2	Mon 9/9	Understanding Logical Reasoning (Failures of Modus Ponens, Non-Monotonicity)
2	Wed 9/11	Understanding Logical Reasoning
3	Mon 9/16	**Class Canceled** (Speaking at the Asian Logic Conference)
3	Wed 9/18	**Class Canceled** (Speaking at the Asian Logic Conference)
4	Wed 9/23	Understanding Probabilistic Reasoning (Birthday Paradox, Three Prisoner's Dilemma, Base-Rate Fallacy)
4	Wed 9/25	Understanding Probabilistic Reasoning
5	Mon 9/30	The Wason Selection Task
5	Wed 10/2	The Wason Selection Task
6	Mon 10/7	A Brief Introduction to Conditionals
6	Wed 10/9	A Brief Introduction to Conditionals
7	Mon 10/14	The Lottery & Preface Paradox
7	Wed 10/16	The Lottery & Preface Paradox
8	Mon 10/21	The Conjunction Fallacy
8	Wed 10/23	The Conjunction Fallacy
9	Mon 10/28	Paradoxes of Induction: Paradox of the Ravens
9	Wed 10/30	Paradoxes of Induction: Paradox of the Ravens
10	Mon 11/4	Paradoxes of Induction: The Grue Paradox
10	Wed 11/6	Paradoxes of Induction: The Grue Paradox
11	Mon 11/11	Framing effects
11	Wed 11/13	Framing effects
12	Mon 11/18	Reasoning about others (The False Belief Task)
12	Wed 11/20	Reasoning about others (The False Belief Task)
13	Mon 11/25	Can Human Irrationality be Experimentally Demonstrated?
13	Wed 11/27	Can Human Irrationality be Experimentally Demonstrated?
14	Mon 12/2	Student Presentations
14	Wed 12/4	Student Presentations
15	Mon 12/8	Student Presentations
15	Wed 12/10	Student Presentations