

Carnegie Mellon University - Department of Philosophy
Graduate Courses
Fall 2007

80-600 Minds Machine and Knowledge

TR 03:00PM 04:20PM

BH 150

Arlo-Costa

We examine important presuppositions in several contemporary essays that debate the scope and limits of artificial intelligence. Specifically, the class discusses contemporary views on foundational versus coherence models of human knowledge. (Does human knowledge have a secure basis or is it a mere "web of beliefs"?) These questions about the organization of knowledge are contrasted with objections raised, for example, by Searle and Dreyfus against the "strong AI" thesis of Newell and Simon. Also, we consider several current models of knowledge which incorporate probability and other measures of uncertainty, including some recent work on "parallel" systems.

80-605 Rational Choice

MW 10:30AM 11:50PM

BH 150

Seidenfeld

This course will cover selected topics in rational choice theory, which informally is the analysis of how to make correct decision in a given context. The course offers an introduction to the main normative theories of rational choice: von Neumann-Morgenstern theory of expected utility, Anscombe-Aumann's account and Savage's theory of choice under uncertainty. Possible topics may include, and are not limited to: individual choice under uncertainty and related issues in the psychology of judgment and decision making, problems of public choice in which a group of individuals must collectively make a decision, game-theoretic problems of conflict and coordination, alternative approaches to the problem of fair division of goods as well as recent theories that abandon the Bayesian assumption that the decision maker's beliefs can always be represented by a unique probability distribution. This course will stress the role that formal methods can play in the analysis of decisions and alternative applications of decision theory to issues in philosophy and social science.

80-610 Logic & Computation

TR 01:30PM 02:50PM

SH 214

Kelly

Among the most significant developments in modern logic is the formal analysis of the notions of provability and logical consequence for the logic of relations and quantification, known as first-order logic. These notions are related by the soundness and completeness theorems: a logical formula is provable if and only if it is true under every interpretation. This course provides a formal specification of the syntax and semantics of first-order logic and then proves the soundness and completeness theorems. Other topics may include: basic model theory, intuitionistic, modal, and higher-order logics.

80-614 Logic and Artificial Intelligence

WF 12:00PM 01:20PM

BH 150

Arlo-Costa

An introduction to several formalisms used in knowledge representation and database theory. The emphasis is placed on non-monotonic logic, conditional logic and belief revision methods. We will also study recent issues in the logics of knowledge and belief and consider applications in distributed AI. Several methodological problems in AI are discussed.

80-616 Probability and Artificial Intelligence

TR 10:30AM 11:50AM

DH 2122

Danks

In this course we will examine foundational questions about the concepts of causality and probability, how artificial intelligence techniques can be used to solve some of the computational problems presented by the use of probabilities and representations of causal relations, and how probabilities and representations of causal relations have been incorporated into recently developed expert systems. The foundational questions we will examine are: What do causal and probabilistic statements mean? How can probabilities and causal relations be inferred? Are there any axioms relating causal relations to probability distributions? What are the advantages and disadvantages of using probabilities as compared to alternative representations of uncertainty? We will then discuss recent developments in Artificial Intelligence (e.g. Bayesian networks) which have solved some of the long-standing computational problems associated with the use of probabilities and statements about causal relations. Finally, we will study in detail some expert systems, such as QMR and Pathfinder, which have incorporated these new techniques in order to perform medical diagnosis. Prerequisites: 36-226 or 36-202 or 36-217 or instructor permission.

80-630 Research Ethics

TR 01:30PM 02:50PM

PH 125B

London

This course covers foundational issues in the ethical evaluation and regulation of research involving human subjects. It begins with a historical overview of the origins of research ethics after World War II

as a response to high profile cases of abuse or scandal. This unit covers "classic cases" including the Tuskegee syphilis study, the Willowbrook hepatitis study, the Jewish Chronic Disease Hospital Case, and others. It also covers seminal documents such as the Nuremberg Code, the Belmont Report, and the current federal regulations known as the Common Rule. Against this historical backdrop, the course then examines foundational philosophical issues in human-subjects research including ethical issues in clinical trial design, the concept of equipoise and the use of placebo controls, the requirements of justice in the research context, and the values of privacy and informed consent.

80812 Seminar on Causation

W 02:00PM 04:20PM

135BH Seminar Room

Scheines, Spirtes

Textbooks: James Woodward - Making Things Happen

Sosa and Tooley - Causation

Collins, Hall, and Paul - Causation and Counterfactuals

various online articles

This class will examine a number of recent developments relating to philosophical questions about token causation.

1. What is the relationship between type causation (e.g. "Aspirin cures headaches") and token causation (e.g. "This aspirin cured this headache")? Is either kind of causation reducible to the other, and if so, how? We will consider recent theories based on graphical causal models (e.g. Woodward, Pearl and Halpern, Glymour et al.). No background in graphical causal models will be presupposed.
2. What is the point of theories of token causation? Tort law often involves attributions of token causation (e.g. "Cigarette smoking caused Joe's cancer."), as do historical explanations (e.g. "Hitler was elected chancellor because of the economic hardships imposed upon Germany after World War I."). What is the relationship token causation, responsibility, and explanation? How are questions of token causation handled in our legal system?
3. How can theories of token causation be properly evaluated? Does the psychological literature have anything to tell us about the correctness of theories of token causation?
4. How can inferences about type causal relations be made? What assumptions do they presuppose?

80-814 Philosophy of Science

T 12:30PM 02:50PM

BH 150

Danks

This seminar will cover a range of issues in present-day philosophy of science, such as: nature of laws, models and theories, Bayesianism, theories of causation, and explanation. More specifically, we will focus on articles that have appeared in the past 2-3 years in the major philosophy of science journals, as well as the historically significant papers that have shaped the current debates.

80-823 Seminar on the Philosophy of Language

MW 02:30PM 03:50 PM

BH 150

Simons

The prevailing standard model of linguistic interpretation traces back to the work of Paul Grice. On Grice's model, the interpretation of a linguistic utterance is a two stage process. First, an interpreter calculates the meaning of the sentence uttered on the basis of the conventional meanings of the words and syntactic constructions used. The output of this compositional process is assumed to be a proposition. Then, the interpreter proceeds to make inferences, based on this proposition and other contextual information, as to what the speaker meant. Crucially, this process (a) treats the truth conditional content of sentences as compositionally determinable on the basis of purely linguistic information and (b) clearly separates the contribution of semantic processes and pragmatic (inferential) ones.

This standard picture has been critiqued from a variety of perspectives, and there is an ongoing debate surrounding the theory of the construction of meaning. Some philosophers and linguists have argued that inferential processes indeed do contribute to the determination of truth conditional content, or "what is said." Others defend some version of the standard view, and have provided a variety of responses to critiques. Both kinds of view come in different degrees, ranging from extreme contextualists to those who deny that naive intuitions about utterance interpretation provide insight into the actual meanings of sentences.

In this seminar, we will read the literature in which this debate has been and is being carried out. Readings will primarily be drawn from the philosophical and linguistic literature, with some forays into psycholinguistics and computational linguistics.