Referee Report on

Idealizations of Uncertainty, and Lessons From AI

The paper discusses problems arising in Economics and in AI when dealing with decision making under uncertainty. It provides an overview over the development of different AI approaches to model human reasoning as well as insightful non-technical discussions of key concepts from probability theory, Bayesian statistics and information theory.

In my reading two main messages are put forward. First, both AI and Economics so far have been unable to develop convincing approaches that allow dealing with ontological uncertainty and with emotional aspects of decision making. Second, Economic modeling is well advised not to follow the example of AI in developing models that are essentially 'incremental refinements to otherwise idealized models'. With respect to the first of these points conviction narrative theory is described as a potential guidance for incorporating emotional aspects in decision models.

Overall, the paper is interesting to read because it presents a nice survey of a variety of aspects of decision modeling in AI and related areas. Although an Economist reader will learn nothing new in the discussion of probability theory and Bayes' rule, some of the other material might be interesting for that audience. My main concern is that it did not become clear to me what the main contribution of the text to the development of models of decision making in Economics is (after all, the paper is evaluated here for an Economics journal). Contrary to the claim on p23, it seems to me that different rather large strands of the Economics literature (e.g. Evolutionary Economics, Economics of Innovation) are well aware of the need to deal with ontological uncertainty (in the literature sometimes called radical uncertainty), the main challenge is how to capture such type of uncertainty in formal models. In this respect the paper provides very little guidance apart from stressing that we should not expect to find answers in the AI area.

As a minor comment I would like to add that the paper completely ignores the fast growing stream of literature in Economics dealing with (Knightian) uncertainty relying on multi-prior models, often referred to as Ambiguity models. Although, arguably, these approaches have little to say about ontological uncertainty I think that a text dealing the treatment of uncertainty (in Economics) should somehow refer to this rather recent development.