

For Kitcher, 'dissolving rationality' does not involve abandoning it, but rather acknowledging how socially guided interactions with nature give rise to superior ways of framing beliefs. Progress is determined by society, nature and sound individual reasoning.

The general conclusion of this examination of growth, progress and rationality is that the celebrations of the post-modernist critique of the exalted role of scientific reason in Western culture are premature and misguided. In general, argues Kitcher, Legend was right about science, its progress, and capacity for truth maximisation. These insights, insists Kitcher, can be reconciled with the arguments of Legend's critics, providing that the social context of science is both recognised and restored to its place in the history and philosophy of science.

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Betting on Theories

(Cambridge Studies in Probability, Induction, and Decision Theory)

By PATRICK MAHER

Cambridge University Press, 1993. xii + 310 pp. £35.00

The main point of this book is to defend a Bayesian account of theory acceptance. To accept a theory is to perform an act, according to Maher, which may or may not be rational depending on one's probabilities and utilities. In particular, it may not be rational to accept a theory even when it has a very high probability or to reject it when it has a very low one. For utilities also come into the picture. For Maher the relevant utilities are cognitive. They are the utilities of such things as accepting falsehoods. In terms of science-specific cognitive utilities, Maher hopes to explain patterns of theory-acceptance in science and to defuse some issues about scientific realism.

Accepting a theory is notoriously unlike giving it a high probability. Some philosophers who see probability at the heart of evidence plot therefore to marginalise acceptance, making the important things in science work solely in terms of probability. Maher's strategy is different. Acceptance is not a function of probability alone, but an act which like all acts is rational if it maximises expected utility. The most revealing working out of the idea is in a discussion of the estimation of the value of a parameter. One supposes a probability distribution and looks for an interval which it will maximise expected utility to assign it to. Then given a utility function which depends on the relation between the chosen interval and the true value, there may be an interval choosing which maximises utility. This is the interval which it is rational to accept as containing the value of the parameter.

In this way some of the content of traditional estimation theory can be captured in a Bayesian framework, given suitable utilities. The idea is not entirely original, but Maher's handling of it brings out interesting hard questions about the role of the concept of belief. What maximises utility in the estimation case is the act of accepting that the value of the parameter lies in a given interval: the proposition that it is in the interval need not have maximal probability, in fact it can have zero probability. And for many

propositions neither the proposition nor its negation will be accepted; so in that sense the idea of suspension of belief will be captured, although in general one of the pair will have higher probability than the other. All these natural-seeming facts about acceptance follow because what makes it rational to accept the proposition is a matter of utility as well as probability. But if acceptance is belief and utility is desire does this not run against the wisdom that what you think true should not depend on what you would like to be true? Not if the desires in question are cognitive. Cognitive utilities, or more specifically scientific utilities, attach values only to such things as the truth of a belief, or its nearness to truth, or its explanatory value. If these are the things one wants, then some rules of theory-acceptance will maximise them, and these rules are in that sense rational.

Cognitive utilities can explain other things too. Maher discusses some very puzzling issues about diachronic rationality, involving what he calls Reflection (often called Miller's principle) and Conditionalisation. The questions concern whether it is rational to have probabilities at a later time which differ from one's conditional probabilities at an earlier time, conditional on the information that one's probabilities will change to the later ones. For example, if you expect to be manic tomorrow your present probability of being alive in two days' time is less than it will be then, when you will consider yourself immortal and invincible. On the other hand, if you learn that you are about to obtain a piece of evidence that will shift your probabilities in a given direction then it is plausible that if you are rational then your probabilities conditional on this information should be the same as the probabilities the evidence will shift you to. (It is a bit like rational expectations in economics: once information about future information is given, its effect should be immediate.) Maher derives a complicated but plausible set of conditions, under which Reflection is satisfied. But they cannot be stated in terms of probabilities alone. Again utilities have to play a role.

Maher also uses cognitive utilities to discuss theory acceptance in the history of science. What he does is just sketchy and suggestive, but in effect he is suggesting a method of modelling scientific movements by attributing to them cognitive utility functions which, if the model is to succeed, should predict the pattern of theory acceptance in that part of science. There seems to be a possible new discipline here, or perhaps just another way in which everything becomes economics. But abstracting from the particular cognitive utilities of particular scientists another possible source of interesting generalisations arises. Suppose one accepts a hypothesis and new evidence arrives; one changes one's probabilities and as a result it becomes rational to accept different hypotheses. Then questions of acceptance kinematics enter. What patterns of acceptance change are suggested by Maher's or similar theories? Are they intuitively the right ones?

Maher also applies his general picture of acceptance, though not any of the details of his theory, to questions about scientific realism. The main target is van Fraassen. According to van Fraassen's Constructive Empiricism, scientists should not accept hypotheses about the unobservable. They can attach probabilities to them, and they can think of evidence telling for and against them; they can even in some sense believe them, as long as this is a

matter of unofficial extra-scientific belief and not part of their function as scientists. So it is the notion of acceptance that is crucial. Maher points out that there are many cognitive utility functions which produce a van Fraassen-like pattern of acceptance, in that they assign the same utility to a hypothesis in all states in which it is empirically adequate. But there are many utility functions which are not like this. Is one kind of cognitive utility uniquely scientific? It is hard to see why it should be. I found this discussion strangely comforting; it took the urgency out of the issues. If the question is just about which set of values is to be associated with the label 'science' then I am sure I don't particularly care what the answer is. But I do care about what set of values we would be best off having.

The crucial concepts are acceptance and cognitive utility. I am much more impressed with Maher's arguments for the relevance of these concepts to various epistemic questions than I am with his explanations of them. When he has to define acceptance of a proposition it comes down to not much more than a disposition to assert it. But in that case the rationality of acceptance should depend on much more than simply cognitive utilities. And something like this should be true for most kinds of act that one could take acceptance to be. So there is a real puzzle about cognitive utilities: given that it is rational for agents to maximise their expected utility, given their total utility functions, why should they perform any acts just on the basis of their restricted preferences over such quantities as truth and verisimilitude? This question may have an answer, and in fact I suspect that some of the material from the discussion of reflection may be relevant to it. What Maher does when he applies his theory for instance in the example of interval estimation, is to define a particular cognitive utility function and see what acts of acceptance are made rational. Then it is in effect the utility function that is defining the notion of acceptance. To accept a proposition is to do what maximises some balance of truth, explanation, and verisimilitude.

This is a rich, suggestive and interesting book. It contains discussions of a number of topics besides those I have mentioned. There is a recurrent diagnosis of what is wrong with Dutch book arguments, and to me a not very satisfying account of verisimilitude. It also leaves unanswered as many questions as it finds. It opens a real can of worms, in fact. But they are interesting worms.

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INTRODUCTIONS

Environmental Ethics: An Introduction to Environmental Philosophy

By JOSEPH R. DES JARDINS

Wadsworth, 1993. xvi + 272 pp.

This is a text book. It is divided into three parts: Basic Concepts, Environmental Ethics as Applied Ethics, and Theories of Environmental Ethics. Each chapter within these parts begins with one or two case studies, followed by a text that expands the point of the case studies. Each chapter ends with a summary, discussion questions and further readings.