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Why were you initially drawn to probability theory and/or statistics?

I have always been more interested in the metaphysics of probability than in its mathematics or methodology (e.g. the foundations of statistics). I was initially drawn to the subject as a graduate student by lectures given in the Faculty of Philosophy at the University of Cambridge during the academic year 1963-4 by Richard Braithwaite, the University's Knightbridge Professor of Philosophy.

I became interested in physical probability, or chance, as a feature of the natural world, to be distinguished from epistemic probability, understood as a measure of how strongly evidence supports hypotheses about that world. Of the then current theories of chance, I preferred Popper's propensity theory to the frequency theories of Carnap, Reichenbach and von Mises. Yet none of these theories explained why, relative to the evidence that, say, a coin toss has a chance P of landing heads, the epistemic probability of the hypothesis that it will land heads must also be P. I devoted my Ph.D. thesis to developing a theory of chance that would explain this implication, a theory which combined a variant of Popper's propensity theory with Ramsey's theory of probability as a measure of degrees of belief. This is the theory presented in my first book, The Matter of Chance, published by Cambridge University Press in 1971.

What is distinctive about your work in the foundations of probability or its applications?

My work on the metaphysics of chance naturally led to an interest in indeterministic causation in modern science, technology and medicine, ranging from micro-physics to genetics and epidemiology. Making sense of this includes making sense of probabilistic theories of causation, whose credibility depends on how the probabilities they invoke are interpreted. On the one hand, while the frequency interpretations of Reichenbach, Salmon and others make probabilistic causation objective, tehy make no sense of single cases, e.g. of a particular person's being caused to die by smoking or exposure to infection. On the other hand, the subjective interpretations of most Bayesians, which do make sense of such singular causation, make no objective sense of it. Propensity interpretations, by contrast, enable probabilistic causation to be both objective and applicable to single cases. That is another strong point in their favour, as is their ability to let (e.g.) the chance P of any one uranium atom decaying within a year be what causes the frequency of those that do decay to lie, when it does, close to P.

How do you conceive of the relationship between probability theory and/or statistics and other disciplines?

That depends on whether by 'probability theory' is meant the mathematical theory, a theory of how to apply it - e.g. a theory of applied statistics - or philosophical theories of the nature of the probabilities involved. The latter, which are what concern me, come in three kinds, each of which applies to a different range of disciplines. The first kind, theories of physical probability, affect the content of theories in all sciences and technologies, like those mentioned above, that postulate physical probabilities. The second kind, theories of epistemic probability, affect the content of probabilistic theories of knowledge, ranging from theories of scientific method in general, and of statistical testing in particular, to theories of how what each of us knows depends on perception, testimony, memory and inference. The third kind, theories of credence, i.e. of degrees of belief, affect the content of theories of belief, inference and decision making.

What do you consider the most neglected topics and/or contributions in probability theory and/or statistics?

I think the main topics in the philosophy of probability are all receiving a fair amount of attention.

What do you consider the most important open problems in probability theory and/or statistics and what are the prospects for progress?

The most striking unsolved problems in the philosophy of probability seem to me to concern how to interpret probability in quantum physics. These problems will only be solved as part of a solution of the general conceptual problems that quantum physics poses, a solution whose prospects of achievement I'm not competent to judge.