

Early Approaches to Exact Imprecision

Peter M. Williams

Associate, Department of Informatics, University of Sussex, Brighton, UK
Principal, BW Mining, Brighton, UK

The 1960s and 70s were a period of widespread interest in the philosophical and mathematical foundations of probability. Bayesian ideas were recognized though not well understood, and treated with caution by mainstream statisticians. This talk surveys the intellectual climate of the period, including the impact of de Finetti's ideas, then becoming more widely known in English translation, and traces the motivation and development of non-additive measures of uncertainty, together with their impact on the then developing treatment of uncertainty in artificial intelligence.

References

- De Finetti, Bruno (1970). *Teoria Delle Probabilità*. English translation: (de Finetti 1974–1975). Giulio Einaudi.
- (1974–1975). *Theory of Probability*. Two volumes; translation of (de Finetti 1970). John Wiley & Sons.
- Dempster, Arthur P. (1968). “A generalization of Bayesian inference.” *Journal of the Royal Statistical Society. Series B (Methodological)* 30.2, pp. 205–247. JSTOR: 2984504.
- Good, Irving John (1962). “Subjective Probability as the Measure of a non-Measurable Set.” *Logic, Methodology and Philosophy of Science*. International Congress on Logic, Methodology and Philosophy of Science. (1960). Ed. by Ernest Nagel, Patrick Suppes, & Alfred Tarski. Stanford University Press, pp. 319–329.
- Shafer, Glenn (1976). *A mathematical theory of evidence*. Princeton University Press.
- Smith, Cedric A. B. (1961). “Consistency in statistical inference and decision.” *Journal of the Royal Statistical Society. Series B (Methodological)* 23.1, pp. 1–37. JSTOR: 2983842.
- Walley, Peter (1991). *Statistical reasoning with imprecise probabilities*. Vol. 42. Monographs on Statistics and Applied Probability. London: Chapman & Hall.
- Williams, Peter M. (1975a). “Coherence, strict coherence and zero probabilities.” *Fifth International Congress of Logic, Methodology and Philosophy of Science*. Vol. VI, pp. 29–33.
- (1975b). *Notes on conditional previsions*. Tech. rep. Published as (Williams 2007). School of Mathematical & Physical Sciences, University of Sussex.
- (1976). “Indeterminate probabilities.” *Formal Methods in the Methodology of Empirical Sciences*. Conference for Formal Methods in the Methodology of Empirical Sciences. (Warsaw, Poland, June 17–21, 1974). Ed. by Marian Przełęczki, Klemens Szaniawski, Ryszard Wójcicki, & Grzegorz Malinowski. Vol. 103. Synthese Library. D. Reidel Publishing Company & Ossolineum Publishing company, pp. 229–246. DOI: 10.1007/978-94-010-1135-8_16.
- (2007). “Notes on conditional previsions.” *International Journal of Approximate Reasoning* 44. Published version of (Williams 1975b), pp. 366–383. DOI: 10.1016/j.ijar.2006.07.019.