

Toward a logic for imprecise probabilities

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Imprecise probabilities over fuzzy events are interpreted in terms of bets in de Finetti's style. That is, the upper probability of a fuzzy event ϕ is the betting odd α that a bookmaker would accept for the following bet: the bettor pays α and gets the truth value of ϕ . The lower probability of ϕ is the amount β that a bookmaker would accept for the opposite bet (that is, the bookmaker pays β and gets the truth value of ϕ). Our coherence criterion (joint work with M. Fedel, K. Keimel and W. Roth) is given for a whole book (a finite system of pairs event-betting odd) and not for a single bet: a book is coherent if there is no bad bet, that is, there is no bet for which there is an alternative system of bets based on the book which gives the bettor a better payoff. A similar condition, but without direct reference to bad bets, is introduced in Walley's work on lower and upper previsions of gambles. In the first part of this talk, we compare Walley's approach with ours. In the second part of the talk we discuss a logical and algebraic approach to imprecise probabilities and to lower and upper previsions of gambles. Somewhat surprisingly, both topics can be treated inside a variety of universal algebras, consisting of MV-algebras with a unary operator reflecting the properties of upper probabilities.