



## MU Philosophy Colloquium and Keynote Address for the Missouri Philosophy of Science Association

FRIDAY 15<sup>TH</sup> APRIL, 2016  
3:30PM

Leadership Auditorium, Student Center, 2501

### “THREE DEGREES OF IMPRECISE PROBABILITY [IP] THEORY”

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AT CARNEGIE MELLON UNIVERSITY

Representing a rational agent's uncertainties using a non-trivial set of probability functions, rather than a single probability function, is at the core of many varieties of IP theory. In this presentation, I develop three degrees of *Imprecision* in IP theory, which represent ever more substantive departures from the canonical Bayesian theory where a single probability function suffices to represent an agent's credal state. The first and weakest interpretation of *Imprecision* is where intervals of (de Finetti) *fair prices* for random variables are the result of an incomplete elicitation of a canonical Bayesian agent. The second interpretation is where a single, *fair (2-sided) price* for buying and/or selling a random variable is replaced by two *one-sided prices* – denoting respectively a separate maximum buying price and a minimum selling price for a variable. The second interpretation, though allowing choices that are not permitted under the first interpretation, nonetheless, is based on a binary comparison between variables. The third interpretation recovers sets of probabilities from coherent choice functions over menus of options. By using choice functions that do not reduce to pairwise comparisons between the options in a menu, the third interpretation provides distinct behavioral content to each IP set of probabilities. This allows, for example, an agent to hold a credal set that makes two ordinary events, E and F, independent where the representing IP set consists entirely of probabilities that satisfy the usual condition for factoring a joint probability into the product of two marginal probabilities:  $\text{Prob}(EF) = \text{Prob}(E)\text{Prob}(F)$ .

QUESTIONS? ASK Paul Weirich ([weirichp@missouri.edu](mailto:weirichp@missouri.edu))