Uncertainty, Probability, and Ignorance: An Info-Gap Analysis of Ellsberg's Paradox

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Abstract Probability theory is a powerful tool for modeling and managing uncertainty. However, a prominent mis-conception is that probability is capable of handling all types of ignorance, uncertainty and surprise. In this lecture we present arguments from Popper and Shackle for a non-probabilistic conception of indeterminism. This motivates non-probabilistic and non-measure-theoretic info-gap theory for dealing with deep uncertainty. The main thrust of this lecture is methodological. To demonstrate the methodology we present a resolution of Ellsberg's paradox based on info-gap analysis of robustness to uncertainty. We also discuss the mathematical basis for establishing when robustness, which is non-probabilistic, is a proxy for probability.

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