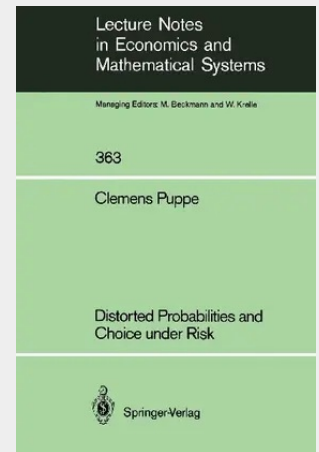


Distorted Probabilities and Choice under Risk

During the development of modern probability theory in the 17th century it was commonly held that the attractiveness of a gamble offering the payoffs $x_1, \dots, x_n$ with probabilities $p_1, \dots, p_n$ is given by its expected value $L = \sum_{i=1}^n p_i x_i$. Accordingly, the decision problem of choosing among different such gambles - which will be called prospects or lotteries in the sequel - was thought to be solved by maximizing the corresponding expected values. The famous St. Petersburg paradox posed by Nicholas Bernoulli in 1728, however, conclusively demonstrated the fact that individuals consider more than just the expected value. The resolution of the St. Petersburg paradox was proposed independently by Gabriel Cramer and Nicholas's cousin Daniel Bernoulli [BERNOULLI 1738/1954]. Their argument was that in a gamble with payoffs $x_1, \dots, x_n$ the decisive factors are not the payoffs themselves but their subjective values $u(x_i)$. According to this argument gambles are evaluated on the basis of the expression $L = \sum_{i=1}^n p_i u(x_i)$. This hypothesis - with a somewhat different interpretation of the function u - has been given a solid axiomatic foundation in 1944 by v. Neumann and Morgenstern and is now known as the expected utility hypothesis. The resulting model has served for a long time as the preeminent theory of choice under risk, especially in its economic applications.

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