Giles, Robin
A generalization of the theory of subjective probability and expected utility. (English)
Zbl 0759.60005

The “generalization of the theory of subjective probability and expected utility” offered in this paper aims in two directions. (1) While in the “classical” von-Neumann/Morgenstern approach the relation of preferability is assumed to be convex or “simple”, the present paper drops this condition in order to model a situation where, e.g., two actions \( a \) and \( b \) depend on the result of flipping a coin and where the agent has no idea whether the coin is fair or not. (2) Also the standard transitivity axiom is given up because it entails (or at least seems to entail) that, e.g., if an agent is willing to bet 10 $ on the outcome of a horse race, then he must also be willing to bet any multiple of 10 $ on the same event.

Within the mathematical framework of a topological vector space of continuous functions, the author presents a weaker than usual set of axioms for the preference relation (Def. 1). Next he defines for every pair \( s, s' \) of states (of the world) and for every real number \( \mu \) with \( 0 \leq \mu \leq 1 \) the “mixed state” \( s^* = \mu s + (1 - \mu)s' \) to represent the state of information that the world is either in state \( s \) or in state \( s' \), with probabilities \( \mu \) and \( 1 - \mu \), respectively. It is then shown that an agent can be characterized by a “risk function” which assigns to each “mixed state” \( s^* \) a real number that gives the maximum loss (in utility) the agent might expect if \( s^* \) should be the actual state of the world. Such an actor may be interpreted as if he were acting under the guidance of a set of “classical” advisors.

Reviewer: W. Lenzen (Osnabrück)

MSC:

60A05 Axioms; other general questions in probability
03A05 Philosophical and critical aspects of logic and foundations
91B99 Mathematical economics

Keywords:
non-convex and non-transitive preference relations; risk function; axioms for the preference relation; utility

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References:

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