

Symbolic Systems 202: The Rationality Debate

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Terminological Background for Luce (1992), 2/4/2004
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"a probability measure S over events" (p. 5)

- This is the same as a probability function P . Kolmogorov's axiomatization of probability made probability theory a special case of "measure theory", where a measure is a function from sets into a numerical scale (e.g. the unit interval).

"two extensive structures with the same normal form" and "the reduced version of a compound gamble" (p. 7)

- The extensive form of a game or gamble shows how outcomes depend on other outcomes in a tree structure. In the language of utility theory (see handout from 1/28/04), the gamble $((x, .6, y), .2, z)$ is an extensive form representation of a compound gamble in which, with probability .2, one will play the gamble $(x, .6, y)$, and otherwise (with probability .8) will receive z . The normal form represents payoffs in reduced or matrix form. The normal form of the above gamble would be:

	<i>probabilities</i>		
	0.12	0.08	0.8
<i>outcome</i>	x	y	z

"Archimedeaness" (p. 8)

- This ensures that all differences in magnitude between measured objects are finite.

"Dedekind completeness" (p. 8)

- This essentially means boundedness.

"order density" (p. 8)

- An assumption of continuity with intermediate values between any two points.

A hint for dealing with Luce's operator for representing gambles: draw out the gambles in trees. (pp. 7-17)

Some translations:

Luce says:

(universal) accounting equivalences
monotonicity or independence
isolation effect
rank-dependent
sign-dependent

Tversky/Kahneman say:

descriptive invariance
cancellation
pseudocertainty
cumulative
reference-point-dependent

"interval scale representations" (p. 18)

- These are mappings of preferences onto a utility scale with an arbitrary zero point and arbitrary units

"the representation is of ratio, not interval, scale type" (p. 22)

- A ratio scale has a well-specified zero point, but does not have unique units. Interval scales have neither. The zero point in sign-dependent theories is defined objectively by Luce to be the status quo. K&T define it to be a subjective point, which might be the status quo but might also be, for example, what one normally expects to receive in the future, or what one was used to in the past. The imposition of an objective standard on reference points is one of the main sources of misapplication of prospect theory.