

io-port 06053226

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Belief and probability: A general theory of probability cores.

Int. J. Approx. Reasoning 53, No. 3, 293-315 (2012).

Summary: This paper considers varieties of probabilism capable of distilling paradox-free qualitative doxastic notions (e.g., full belief, expectation, and plain belief) from a notion of probability taken as a primitive. We show that *core systems*, collections of nested propositions expressible in the underlying algebra, can play a crucial role in these derivations. We demonstrate how the notion of a probability core can be naturally generalized to high probability, giving rise to what we call a *high probability core*, a notion that when formulated in terms of classical *monadic* probability coincides with the notion of *stability* proposed by Hannes Leitgeb [32]. Our work continues by one of us in collaboration with Rohit Parikh [7]. In turn, the latter work was inspired by the seminal work of Bas van Fraassen [46]. We argue that the adoption of *dyadic* probability as a primitive (as articulated by van Fraassen [46]) admits a smoother connection with the standard theory of probability cores as well as a better model in which to situate doxastic notions like *full belief*. We also illustrate how the basic structure underlying a system of cores naturally leads to alternative probabilistic acceptance rules, like the so-called *ratio rule* initially proposed by Isaac Levi [34]. Core systems in their various guises are ubiquitous in many areas of formal epistemology (e.g., belief revision, the semantics of conditionals, modal logic, etc.). We argue that core systems can also play a natural and important role in Bayesian epistemology and decision theory. In fact, the final part of the article shows that probabilistic core systems are naturally derivable from basic decision-theoretic axioms which incorporate only qualitative aspects of core systems; that the qualitative aspects of core systems alone can be naturally integrated in the articulation of coherence of primitive conditional probability; and that the guiding idea behind the primary qualitative features of a core system gives rise to the formulation of lexicographic decision rules.

Keywords: Henry E. Kyburg; probability cores; acceptance rules; full belief; ordinary belief; expectation
doi:10.1016/j.ijar.2012.01.002