(Non)contextuality and its applications

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Contextual analysis deals with *systems of random variables*. Each random variable within a system is labeled in two ways: by its *content* (that which the variable measures or responds to) and by its *context* (conditions under which it is recorded). Dependence of random variables on contexts is classified into (1) *direct* (causal) cross-influences and (2) *purely contextual* (non-causal) influences. The two can be conceptually separated from each other and measured in a principled way. The theory has numerous applications in quantum mechanics, and also in such areas as decision making and computer databases. A system of deterministic variables (as a special case of random variables) is always void of purely contextual influences. There are, however, situations when we know that a system is one of a set of deterministic systems, but we cannot know which one. In such situations we can assign *epistemic* (Bayesian) probabilities to possible deterministic systems, create thereby a system of *epistemic random variables*, and subject it to contextual analysis. In this way one can treat, in particular, such logical antinomies as the Liar paradox. The simplest systems of epistemic random variables describing the latter have no direct cross-influences and the maximal possible degree of purely contextual influences.

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