Quantum Experimental Data in Psychology and Economics

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We prove a theorem that shows that a collection of experimental data of probabilities of decisions with respect to situations and their disjunction cannot be modeled within a classical probability structure in case the experimental data contain the effect referred to as the 'disjunction effect' in decision theory [1]. We identify different experimental situations in psychology and economics where the disjunction effect appears and point out the common nature of the effect [2, 3, 4, 5, 6, 7]. We analyze how our theorem constitutes a no-go theorem for classical probability structure [7] for common experimental data appearing with decision situations in psychology and economics. Inspired by work on Pitowsky [8], we put forward a simple geometric criterion that reveals the non classicality of the considered probabilities and use experimentally measured probabilities to illustrate our geometrical criterion. The violation of the classical probability structure is similar to the violation of the well-known Bell inequalities studied in quantum mechanics, and hence suggests that the quantum formalism and hence the modeling by quantum probabilities, as for example in [9, 10, 11], can accomplish what classical probabilities cannot do.

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