

**Local and Global Optima in Decision-Making:
a Sheaf-theoretical Analysis of the Difference between the Classical and
the Behavioral Approach to Decision-Making.**

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Abstract: One of the main differences between the traditional and the Behavioral approaches to decision making is that the latter has not yet been captured in a unifying framework. This hampers in a certain way the whole research program and poses the question of whether this competing approach can provide an encompassing alternative to the classical one. We analyze this issue in the light of the problem of reconstructing global choices of an agent up from the solutions found for local problems. We show that a representation based on category theory of the conditions for such reconstruction is general and robust enough to represent both the case in which problems are non-contextual and local as well as that, usual in the literature on Behavioral decision making, in which such properties do not hold. In the first case, we show that a sheaf-theoretical representation provides an abstract characterization of the global solution. In the latter case, we show that locality and contextuality generate an obstruction towards the reconstruction of global solutions, yielding a possible clue for the intrinsic difference between Behavioral and classical decision theory.

Palabras Clave: Decision-making; Behavioral Decision Theory; Optimal choices; Sheaves; Projections; Category Theory.