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RDM and Plural Rationalities: An Exploratory Application Using the Lake Model

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Abstract: Modelling techniques for decision making under deep uncertainty have evolved significantly in recent years. Use of techniques such as multi-objective robust decision making, decision scaling, or info-gap methods, has expanded, but these tools have thus far been limited in their ability to incorporate deep heterogeneity in belief systems into their quantitative modeling frameworks. Since qualitative work suggests that incorporating deeply heterogeneous worldviews, is important in developing politically acceptable environmental policies, this presents a challenge to the practical applicability of these methods. This paper seeks to address this gap by proposing an approach to analyzing a multi-scenario, multi-objective robust decision making problem that directly incorporates insights from the theory of plural rationalities, or Cultural Theory. Using a modified version of a widely used environmental planning model called the Lake Model, we expand the model to reflect a variety of beliefs about the lake, economy, and management options. We then utilize the Borg multi-objective evolutionary algorithm to identify pareto satisficing solutions for each world view. Finally, we compare solution performance across worldviews and assess how closely solutions preferred by one worldview perform for other worldviews preferences and beliefs. We conclude with a discussion of the implications of this work for practical deployment of these techniques in deeply uncertain planning contexts.

Keywords: Robust decision making; plural rationalities; deep uncertainty; multi-objective decision making