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Title: An Invariance-based Foundation for Cognition: Accounting for Key Empirical Results on Conception, Perception, and Choice with Generalized Invariance Structure Theory

Abstract: Generalized Invariance Structure Theory (GIST; Vigo, 2014, 2015) is a mathematical and computational framework for the study of conceptual behavior (and cognition in general) based on categorical invariance (Vigo, 2009) and on invariance-detection constructs, principles, and mechanisms (Vigo, 2013). This talk gives an overview of GIST's ability to predict and explain a variety of fundamental cognitive capacities and their relationship to one another. The first part of the talk underscores the importance of invariance and symmetry principles in the natural sciences and, via empirical evidence and Gibson's proposal (1966, 1979), in the cognitive and social sciences. This will be followed by a brief introduction to some of the core invariance constructs and measures of GIST, to its underlying cognitive mechanism of invariance-detection, and to some of its integrative models: for example, a candidate law of invariance for concept learning (and more broadly, for human generalization behavior) and a new measure of information (Vigo, 2011, 2012). The second part of the talk will be devoted to the performance of these models in terms of their ability to account for historical and recent key empirical results on concept learning, choice behavior, and perceptual judgments. It is shown that these models without free-parameters are more accurate predictors of the data than competing models with or without free-parameters. The talk concludes with a brief discussion of GIST as an invariance-based blueprint for unifying the various strands of cognitive research and with some comments on current and future GIST applications to other fields, such as Neuroscience, Clinical Psychology, Informatics, and Data Mining.