

Title: New formal methods for analyzing conceptual representation of continuous domains

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Abstract: Human categorization behavior plays an important role throughout behavioral science. It is essential to concept formation, psycholinguistics, developmental psychology, and perception. Despite much existing psychological and cognitive science research, many aspects of it remain poorly understood. In particular, there is no formal way of measuring how concepts are represented in domains that vary along continua, or how cognitive similarity and variation influence people's behavior in cognitive tasks that involve categorization judgments. Here we discuss a novel quantitative methodology to study human color triad choice behaviors, which captures the influence of categories on behavior in a systematic, mathematical way. We describe examples where applications of the methodology permits the creation of new concepts of distance-based similarity for color experiences and facial expression of emotion. The model addresses a substantial gap in understanding how humans develop, learn and share concepts and inductive categories. The project produces working models that can be generalized across a range of natural category domains. It also produces formalisms that capture influences from varying exogenous factors (e.g., environmental salience, social practices, language), in conjunction with identifiable universal factors (e.g., perceptual processes, emotion processing, communication demands).