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Latent Structure of Intuitive Physics

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Abstract

Humans are born with an intuitive representation of the physics world. How accurate is intuitive physics? Researchers from education focus on the failures, students' errors and misconceptions while cognitive psychologists argue humans anticipate and manipulate physical environments in ways betraying veridical knowledge of classical mechanics. One solution is to hypothesize there are distinct systems of "cognitive physics" with different limitations and deployment in the tasks favored by the two literatures. The goal of current study is to gather evidence from psychometric studies by estimating how many distinct factors explain performance on intuitive physics assessments. We build an augmented concept inventory including several previously-validated concept inventories, around 120 items. The pilot study indicated that participants recruited online from Prolific displayed expected accuracy on the tasks. We are now collecting around 1,000 participants and applying multidimensional item response theory (MIRT) analyzes to identify the latent structure.