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Core knowledge objects in reasoning and language use for highly abstract inductive tasks

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Abstract

Core knowledge concepts such as object behavior principles provide a rich inventory of primitives for thinking and learning in the natural world. However, it remains unexplored how these concepts are reused for problem-solving and communication in highly abstract domains.

We analyze a large-scale natural language study drawing on the Abstraction and Reasoning Corpus (ARC), a set of highly abstract visual tasks where solvers construct outputs from input grids according to an inferred pattern. ARC explicitly incorporates core knowledge principles without any real-world objects. In the study, subjects solved and communicated the inferred patterns of ARC tasks via written explanations for other subjects attempting to solve tasks using only the explanations.

We examine how subjects solve, communicate, and interpret these explanations, and we show that subjects use fundamentally abstract core knowledge properties—object cohesion and contact causality—to reason about, understand, and communicate the inference tasks with language.