

# Bounded Ecologically Rational Meta-learned Inference Explains Human Category Learning

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## Abstract

In his metaphor of 'behavioral scissors', Herbert Simon proposed that human behavior is shaped by scissors whose two blades are the structure of task environments and the computational capabilities of the actor. However, previous work has mostly studied the two blades of the "behavioral scissors" in isolation. We introduce a new class of models called bounded ecologically rational meta-learned inference (BERMI), which allows for study of the two blades in conjunction. BERMI is rationally adapted to ecologically valid tasks generated from a large language model, but its computational capacity is bounded. We found that BERMI quantitatively explains human choices better than eight other cognitive models in two different category learning experiments. In addition, it captures several qualitative aspects of human categorization, such as learning difficulty and learning speed, much better than other competing models.