

What's going on? Surprising difficulties in complex relational rule discovery

Julia Conti

Carnegie Mellon University, Pittsburgh, Pennsylvania, United States

Kenneth Koedinger

Carnegie Mellon University, Pittsburgh, Pennsylvania, United States

Paulo Carvalho

Carnegie Mellon University, Pittsburgh, Pennsylvania, United States

Abstract

In the present study, we create an analog of a math task for judging whether one integer is greater than another. Shapes (e.g., triangle, square) represent integers (3, 4), colors (green, red) denote sign (+/-), and spatial arrangement (above) depicts the comparison (greater than). Across two experiments, we find that this discovery task is surprisingly hard: after approximately 120 trials with feedback, average final performance is about 58%, not far above chance. Additionally, training on sub-rules using a variety of previously effective treatments, both with the support of examples and otherwise, provide only short-term benefit to relational rule discovery. Our findings highlight the difficulty of learning complex relational structures purely from feedback, underscoring the possible need for more explicit guidance or extended practice to achieve robust transfer.