Analogy and Explanation in Learning Causal System Categories

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Abstract: Causal system categories- e.g., positive feedback systems, are defined by common causal structure and extend across disparate domains- e.g., population growth and polar ice-cap melting are both governed by positive feedback. However, recognizing common causal systems across domains is challenging. Prior research suggests these categories are not obvious to novices; when participants sorted descriptions of natural phenomena that varied in causal system and content domain, science experts sorted via causal system, while novices primarily sorted by domain (Rottman, Gentner, & Goldwater in prep). In the current study, novices received training with a small set of real-world phenomena before carrying out the sorting task. We varied whether they read full causal explanations of the phenomena and whether they analogically compared pairs of descriptions from the same causal system. Either reading full explanations or analogically comparing descriptions alone helped little. However, combining analogy and explanation largely facilitated causal sorting, approximating expert levels.