

Cognitive Strategies in Solving Indeterminate Term Series Problems: A Comparison with Total Order and Symmetric Partial Order Strategies

Takafumi Aoi

Japan Advanced Institute of Science and Technology, Nomi, Japan

Oki Hasewaga

Japan Advanced Institute of Science and Technology, Ishikawa, Japan

Shohei Hidaka

Japan Advanced Institute of Science and Technology, 1-1 Asahidai, Nomi, Ishikawa, Japan

Abstract

Term series problems have been used to study deductive reasoning based on propositions by asking for the order relations of given terms. Some tasks, known as indeterminate term series (ITS), leave certain order relations unspecified. This study explored computational models of how people solve ITS, examining the mental models they form and the way they derive answers. We tested two strategies: a total order strategy, which constructs all satisfying total order mental models, and a symmetry strategy, which collapses interchangeable terms into a total-order-like symmetric model. Statistical analyses of experimental data suggest that participants used total order strategies more often for easier ITS problems and symmetry strategies more for harder ones. This finding supports the hypothesis that encoding the order relations by symmetric structures can reduce cognitive load when solving ITS problems.