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Title: How cognitive modeling can benefit from hierarchical Bayesian models

Abstract: Hierarchical Bayesian modeling provides a flexible and interpretable way of extending simple models of cognitive processes. We focus on three advantages, and explain each using a case study. The first advantage involves the development of more complete theories, including accounting for variation coming from sources like individual differences in cognition. We demonstrate this in a case study involving individual differences in category learning. The second advantage involves the capability to account for observed behavior in terms of the combination of multiple different cognitive processes. We demonstrate this in a case study involving searching and stopping processes in heuristic decision making. The third advantage involves using a few key psychological variables to explain behavior on multiple cognitive tasks. We demonstrate this in a case study involving children's acquisition of number concepts.