The Effect of Causal Strength on the Use of Causal and Similarity-based Information in Feature Inference

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Abstract: Category-based feature generalizations are affected by similarity relationships between objects and by knowledge of causal relationships between features. However, there is disagreement between recent studies about whether people will simultaneously consider both relationships. To help resolve this discrepancy, the current study addresses an important difference between past experimental designs: the strength of causal relationships between features. Participants were trained on a set of four different kinds of artificial alien animals, and were taught about three novel features. Participants were taught that either: 1) there were no relationships between the three features; 2) the features shared weak causal relationships; or 3) the features shared strong causal relationships. After training, all participants made feature predictions about the four kinds of animals, to test which relationships the participants used. Three probabilistic graphical models were fit to participants' predictions: one that considers only the tree-structured similarities between objects, one that considers only the causal chain relationships between features, and one that combines knowledge of both relationships. It was found that the strength of the causal relationships influenced the degree to which participants' feature generalizations were affected by causal and similarity considerations.