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Recovering human category structure across development using sparse judgments

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Abstract

Multidimensional scaling (MDS) has provided insight into the structure of human perception and conceptual knowledge. However, MDS usually requires participants to produce large numbers of similarity judgments, leading to prohibitively long experiments for most developmental research. Here we propose a method that combines simple grouping tasks with recent neural network models to uncover participants' psychological spaces. We validate the method on simulated data and find that it can uncover the true structure even when given heterogeneous groupings. We then apply the method to data from the World Color Survey and find that it can uncover language-specific color organization. Finally, we apply the method to a novel developmental experiment and find age-dependent differences in conceptual spaces.