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Looking for Categorical Perception in a Dot-Pattern Classification Task

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Defining categorization

Category learning entails two processes: similarity-based clustering, which involves positioning objects in a multi-dimensional psychological space, and labeling, which involves associating arbitrary linguistic labels with each acquired cluster.

In human cognition, categorization serves an optimization purpose; a way of overcoming limited processing resources via the reduction of information. One such optimization procedure is learned categorical perception (LCP). It maximizes categorical knowledge by enhancing within-category similarity and/or reducing between-category similarity. While often taken for granted, LCP has yet to be shown *convincingly* in empirical work.

A classic categorization task is the dot-pattern classification paradigm. Participants must learn to categorize exemplars created by probabilistically distorting prototypical patterns. This technique is widely used, because the properties of these artificial categories are thought to resemble those of real-world, natural ones. (Homa, 1984).

We hypothesized that if dot-patterns are representative of real-life categories, and categorical perception is an optimal way of enhancing information use, then LCP should be found in a dot-pattern task.

Our experiment

The methodology was based on Shin and Nosofsky's (1992) Experiment 1. Half of our participants were asked to make similarity judgments about pairs of never before seen dot-patterns, while the other half was asked to categorize these exemplars for 15 blocks before making similarity judgments.

Results

As seen in Figure 1, training with dot-pattern categories did not modify inter-stimulus similarities. When exploring the similarity data using MDS, we discovered that the expected result was not found because the clusters existed before

category learning. That is, they naturally emerged from the probabilistic distortion creation technique.

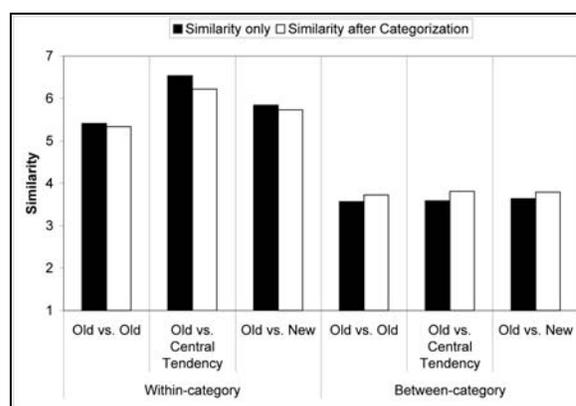


Figure 1: Mean inter-stimulus similarity scores for participants who did or did not categorize before judging.

Discussion

LCP was not found in this experiment. Rather, the results suggest that the dot-pattern classification paradigm entails the labeling process only. Hence, it may be argued that the dot-pattern classification task is not useful to understand similarity-based clustering.

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References

- Homa, D. (1984). On the nature of categories. *Psychology of Learning and Motivation*, 18, 49-94.
- Shin, H.J., & Nosofsky, R.M. (1992). Similarity-scaling studies of dot-pattern classification and recognition. *Journal of Experimental Psychology: General*, 121, 278-304.