References

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Learning shifts in our inner psychological category structures

Kiera Ludlow, Eric Y Mah, James Tanaka
The Different Minds Lab, Dept. of Psychology, University of Victoria, British Columbia, Canada

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Introduction

- Category learning is a process where individuals progress from basic recognition of stimuli or categories to expert-level understanding, enabling quicker and more accurate categorization (Gauthier, et al., 1998; Tanaka & Taylor, 1991).
- We utilize RUBubbles, a novel artificial stimuli designed to avoid biases from prior familiarity (Apostel & Rose, 2021).
- Training with feedback typically results in improved behavioral performance, and clearer category structures in psychological embeddings (Goldstone, 1998).

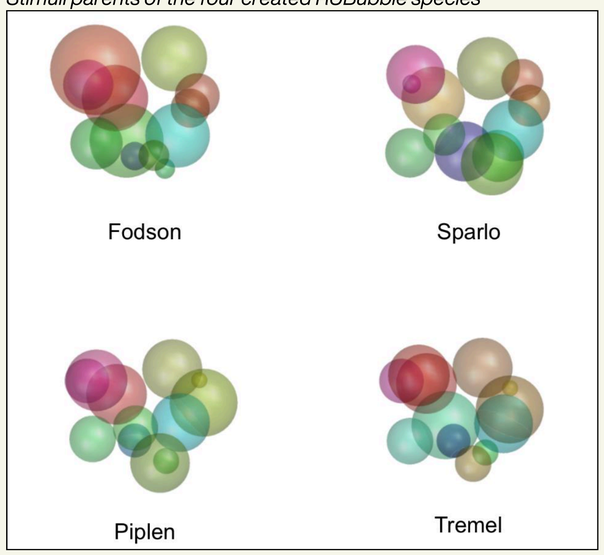
Three Questions:

1. How can we know and show that someone has defined differences between categories?
2. How do our representations of categories become restructured by learning?
3. Is there within-group differences in category shifts?

Methodology

- An RUBubble master "parent" stimulus was chosen based on contiguity and complexity, serving as the superordinate category. Using the VGG-16 neural network and t-SNE algorithm, a similarity space was created to identify four subordinate categories. This approach aimed to mimic naturalistic category structures using artificial stimuli.

Figure 1
Stimuli parents of the four created RUBubble species

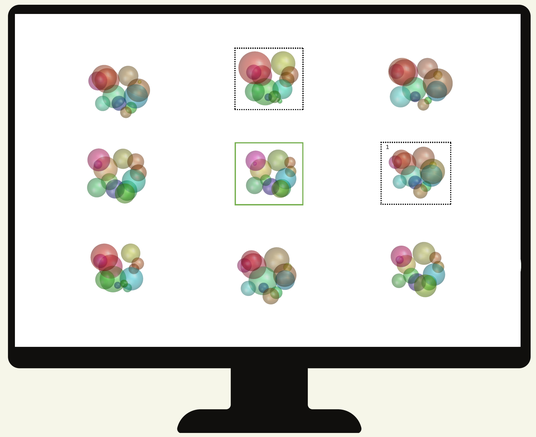


Procedure

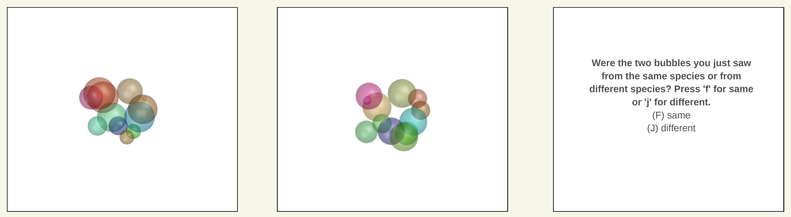
Session 1:

- **Three components**

1. Initial category structure assessed by a **similarity judgement task**.



2. Participants then completed a **same-different task**, judging if two stimuli presented presented seperately are the same species

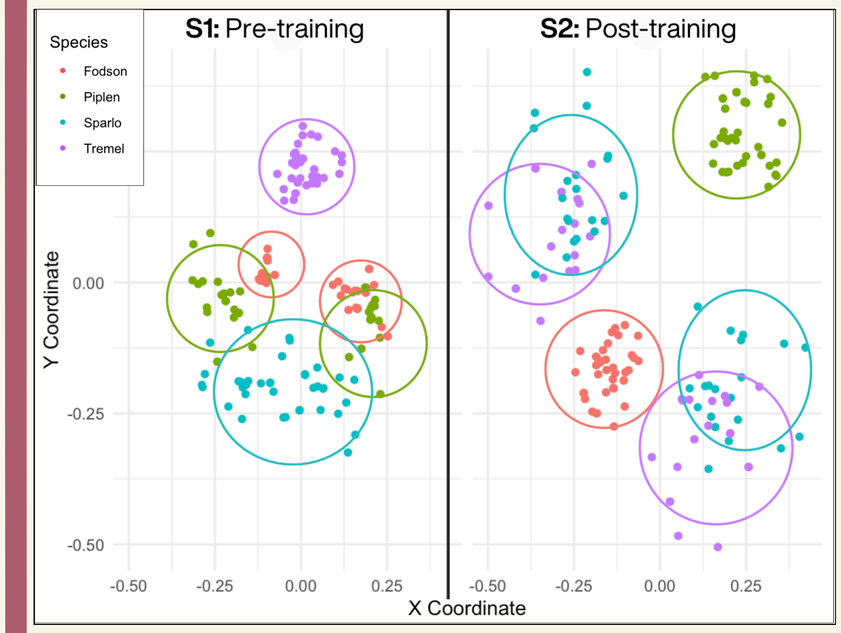


3. Participant engages in **incremental perceptual training**.
   - Receives immediate feedback as “correct” or “incorrect”.

Session 2: One week later, participants category structure reassessed with same similarity judgement and same-different task as in Session 1.

- Measure changes in the recognition and accuracy of species families.

Results



- Differences in similarity values between- and within-groups significantly different in S1 and S2, ($p < 0.05$).
- RT significantly different for S2. S2 RT is significantly smaller than S1, ($p < 0.05$)
- While overall accuracy did not significantly improve from S1 to S2 ($p > 0.05$), a median split analysis revealed that the top-performing group achieved significantly higher accuracy, highlighting individual differences in performance ($p < 0.05$). These findings suggest variability in how participants learn and process categories.

Conclusions

- These findings suggest that category learning involves restructuring mental representations, with training enhancing behavioral performance and clarifying category structures.
- Using RUBubbles, a novel artificial stimulus, allowed us to minimize prior familiarity biases and explore how individuals progress from basic recognition to expert-level categorization.
- Future work will further investigate within-group differences in category shifts and the mechanisms underlying category definition and learning.