Beyond the Lens:
Eye Movements as a Window into Pattern Separation

Olivia Leyden, Grace Veugelers, Dr. Jordana Wynn, Dr. Tarek Amer, Department of Psychology

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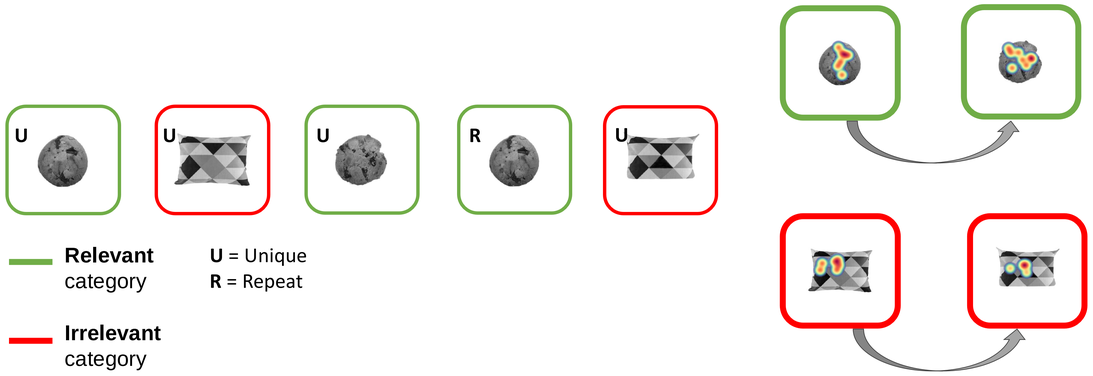
Introduction

Pattern Separation: A cognitive process crucial for storing memories of **similar events distinctly** in memory

- Without it, **similar neural representations** interfere with each other making it difficult to discriminate between two similar events
- Pattern separation has been thought of as a primarily memory-based process[1], and research has seldom explored other cognitive processes that contribute to pattern separation
- We rely on **attention** to identify **distinct features of items**, so it is thought to play a role in **pattern separation**[2]
- *This research explores the relationship between **attention** and **pattern separation***

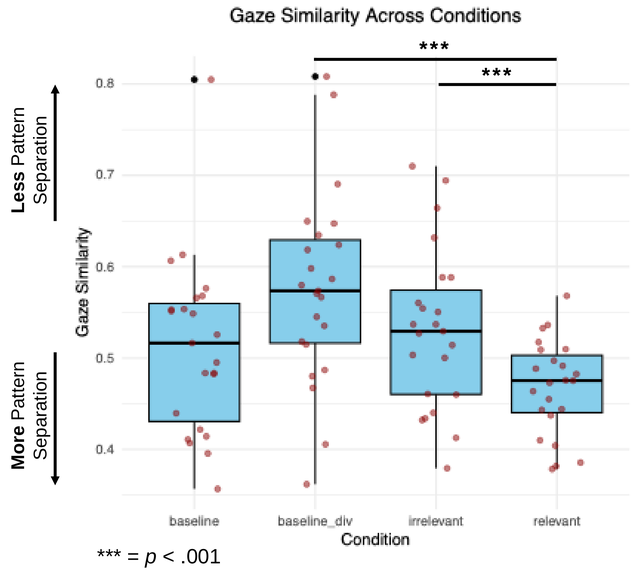
Methods

- **Indoor/outdoor judgment** task on all objects
- **Attention Manipulation Conditions**
  - For **one** of **two object categories** shown in one block, **count** the number of ***unique*** objects (i.e., objects that are not repetitions of a previously shown object)
  - Counting category = **Relevant**; non-counting category = **Irrelevant**
- **Baseline:** Indoor/outdoor judgment only, no counting task
- **Baseline Divided:** An additional baseline condition which included an **auditory counting task**, intended to **equate task demands** between *baseline* and *relevant* conditions
- 23 participants (*M* = 20.25 years, *SD* = 2.11) were tested



- Eye movement patterns were analyzed for each object, and then compared to the patterns for all other objects of the same category **("Gaze Similarity")**

Results



*** = $p < .001$

- *Gaze similarity* scores **differed significantly** between the 4 conditions
- *Gaze similarity* for the **baseline divided** condition was significantly **greater** than the **relevant** condition
- *Gaze similarity* for the **irrelevant** condition was significantly **greater** compared to the **relevant** condition

Discussion

- When participants are instructed to **attend to a set of objects**, we see evidence of **more pattern separation** for those objects
- This is indicated by comparing **gaze similarity** for the objects in the **relevant condition** to the **baseline divided and irrelevant conditions**
- The findings suggest a relationship between **attention** and **pattern separation,** demonstrating that **attention regulates** the extent to which **objects are differentiated in memory**

References

1. Yassa, M. A., & Stark, C. E. (2011). Pattern separation in the hippocampus. *Trends in Neurosciences*, *34*(10), 515-525.
2. Amer, T., & Davachi, L. (2023). Extra-hippocampal contributions to pattern separation. *eLife*, *12*, e82250.