Perirhinal and Anterolateral Entorhinal Cortex Patterns Reflect Subjectively Perceived Visual Similarity of Objects

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Introduction

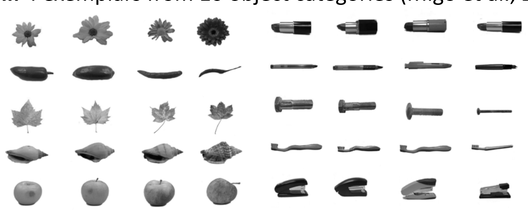
- fMRI evidence with multi-voxel pattern analyses shows PRC supports discrimination of objects with high visual feature overlap (e.g., Erez et al., 2016)

GENERAL RESEARCH QUESTIONS:

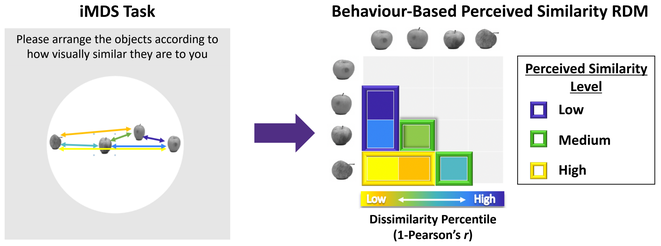
1. **Do fMRI activation patterns in PrC (and downstream anterolateral entorhinal cortex; alErC) reflect perceived visual similarity of objects?**
2. **Are patterns in these regions distinguishable at levels of perceived visual similarity at which earlier VVS regions cannot discriminate between objects?**

Methods and Materials

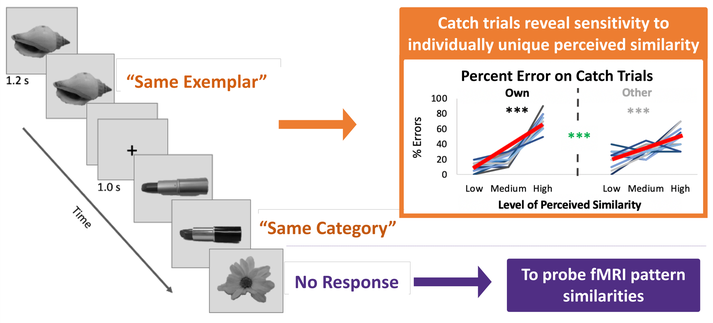
- **Stimuli:** 4 exemplars from 10 object categories (Migo et al., 2016)



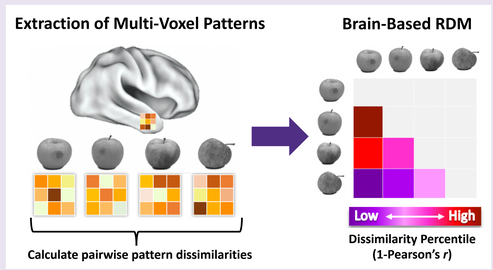
- **Perceived Similarity Estimates:** Inverse Multi-Dimensional Scaling Task for exemplars within each of the 10 categories (Kriegeskorte & Mur, 2012)



- **3T fMRI Task:** Category-Exemplar 1-Back Task

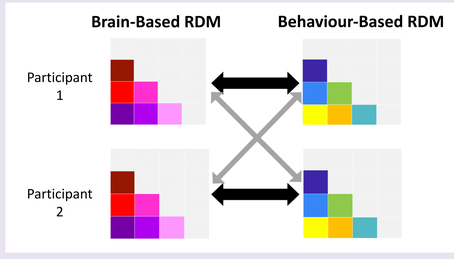


fMRI ROI Analysis

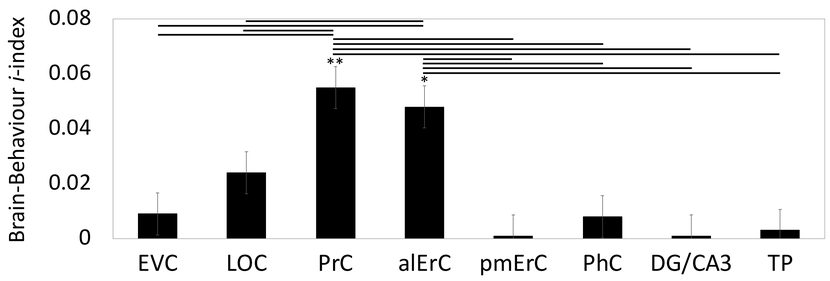


EVC	= Early Visual Cortex
LOC	= Lateral Occipital Complex
PrC	= Perirhinal Cortex
alErC	= Anterolateral Entorhinal Cortex
pmErC	= Posteromedial Entorhinal Cortex
PhC	= Parahippocampal Cortex
DG/CA3	= Dentate Gyrus/CA3
TP	= Temporal Pole

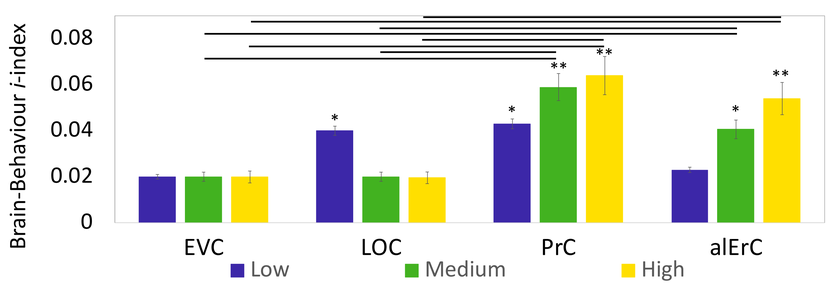
Brain-Behaviour *i*-index = **within subject *r* – between subject *r***



PrC and alErC patterns reflect perceived similarity ratings unique to each individual

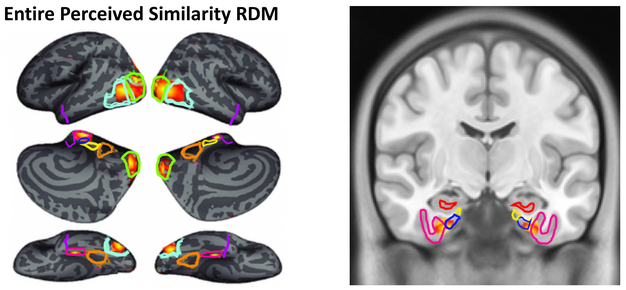


PrC and alErC patterns relate to ratings in individually unique manner at high levels of perceived similarity



fMRI Searchlight Analysis

Patterns in PrC, alErC & early VVS regions reflect entire perceived similarity RDM



Only PrC and alErC patterns reflect the highest perceived similarity RDM

Summary and Conclusion

1. fMRI activation patterns in PrC and alErC (but not pmErC and PhC) reflect perceived visual similarity of objects unique to the individual
2. Patterns in PrC and alErC relate to individually unique ratings at high levels of perceived visual similarity

Findings provide support for PrC and alErC as extensions of the VVS for object processing

References

Erez, J., Cusack, R., Kendall, W., & Barense, M. D. (2015). *Cerebral Cortex,26*(5), 2271-2282.
Kriegeskorte, N., & Mur, M. (2012). *Frontiers in psychology*, *3*, 245.
Migo, E. M., O'daly, O., Mitterschiffthaler, M., Antonova, E., Dawson, G. R., Dourish, C. T., ... & Jackson, S. H. D. (2016). *Aging, Neuropsychology, and Cognition*, *23*(2), 196-217.