Typicality Sharpens Category Representations in Object-Selective Cortex

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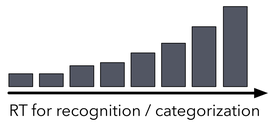
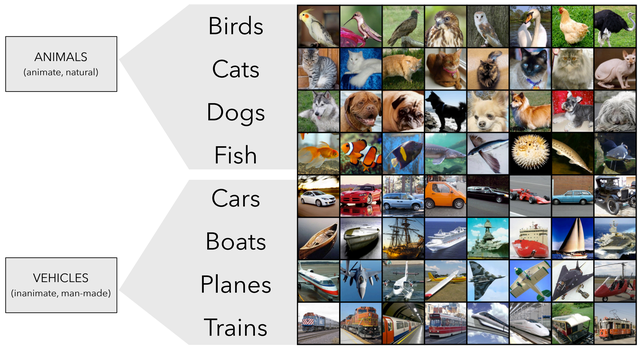
Typicality Rankings for Real-World Categories

which is the best dog?

faster recognition, faster categorization for typical items
Posner & Keele (1968), Rosch (1973), Rosch & Mervis (1975)



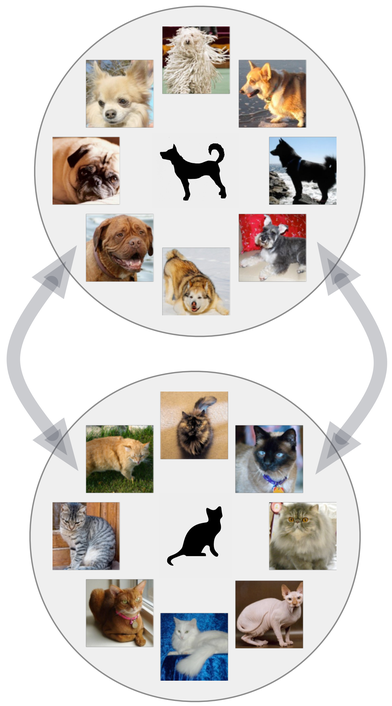
more typical ← → less typical



stimulus set
8 categories
8 exemplars per category
16 images per exemplar

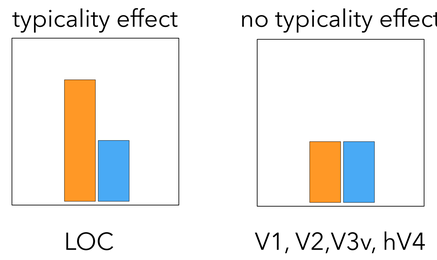
behavioral experiment
typicality rankings
for each 8 exemplars
within their category

Neural Typicality Hypothesis: Family Resemblance



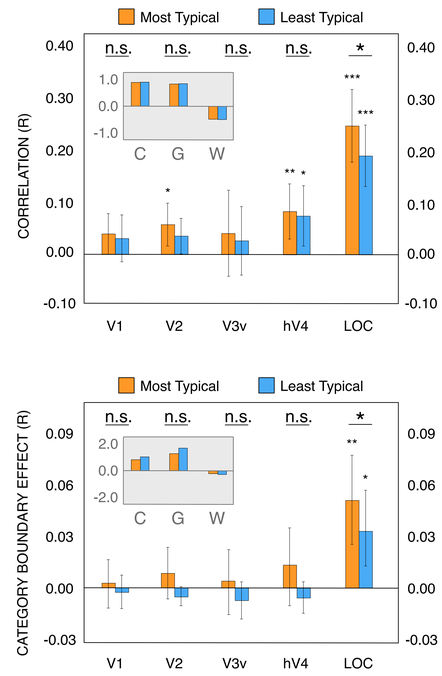
relationship with central category tendency

typical items share more features in common with central tendency

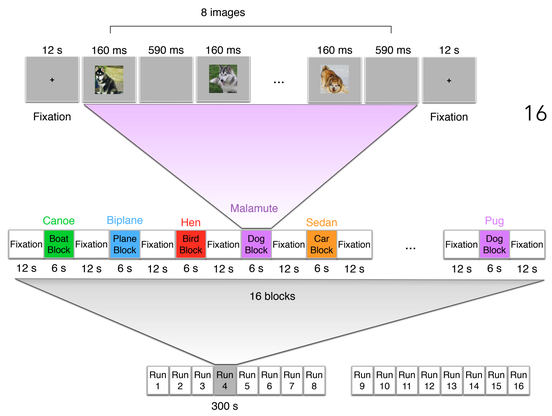


differentiating between categories

sharper category boundaries between typical items compared to less typical items



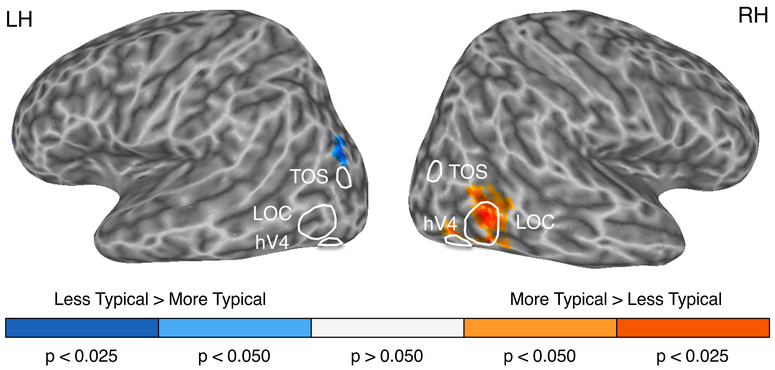
fMRI Experiment



methods:
16 images per exemplar (across 2 blocks)
passive viewing

analysis:
use MVPA to characterize
similarity and dissimilarity
of activity patterns
within and between categories

Whole-Brain Searchlight Analysis



Summary

Typical exemplars more similar to central category tendency in LOC
Typical exemplars distinguish more strongly between categories in LOC
Suggests prototype representation for real-world objects

Less typical exemplars more distinguishable in cIPL
cIPL involved in category learning, memory of object context
Suggests contextual facilitation of categorization for atypical exemplars

New Hypotheses

- Typicality may constitute a previously unexplored principle of organization for intra-category neural structure
- Intermediate visual processing may prioritize the embedding of behaviorally relevant dimensions of variance directly into neural representations

Selected References: Posner & Keele (1968) *J. Exp. Psychol.* ✦ Rosch (1973) *Cogn. Dev. Acq. Lang.* ✦ Rosch & Mervis (1975) *Cogn. Psychol.* ✦ Deng et al. (2011) *CVPR* ✦ Davis & Poldrack (in press) *Cerebral Cortex* ✦ Iordan, Greene, Beck, & Fei-Fei (in press) *JOCN*