Real-world objects acquire basic-level advantage in occipito-temporal cortex

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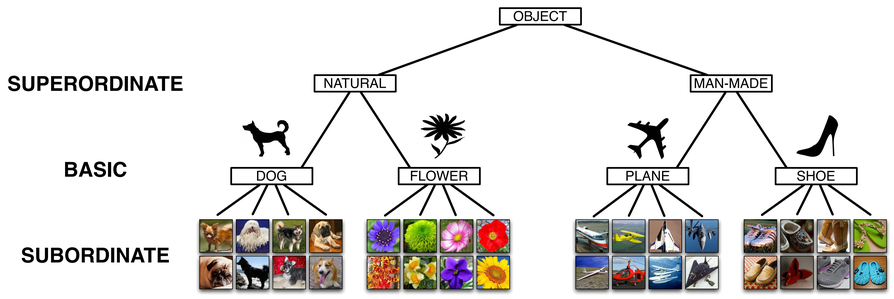
Background

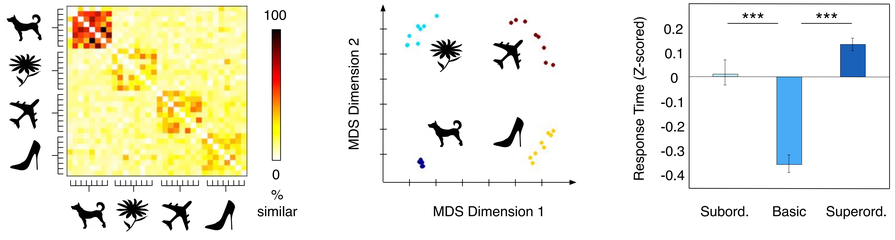
basic-level advantage: a mid-level of generality (basic-level, e.g. dog), is named, learned, and recognized faster than subordinate (Shar-Pei) or superordinate (animal) levels

the **mechanism** behind the basic-level advantage **is unknown**

Object hierarchy that mirrors real-world category organization



Our taxonomy exhibits a behavioral basic-level advantage



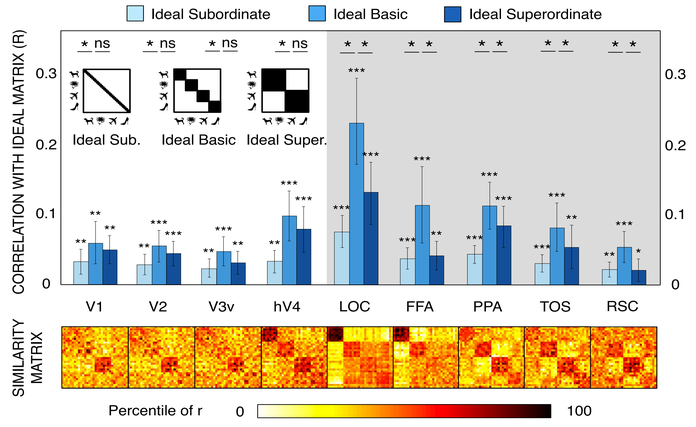
fMRI Experiment

methods: 32 images from each subordinate, block design, no explicit categorization task

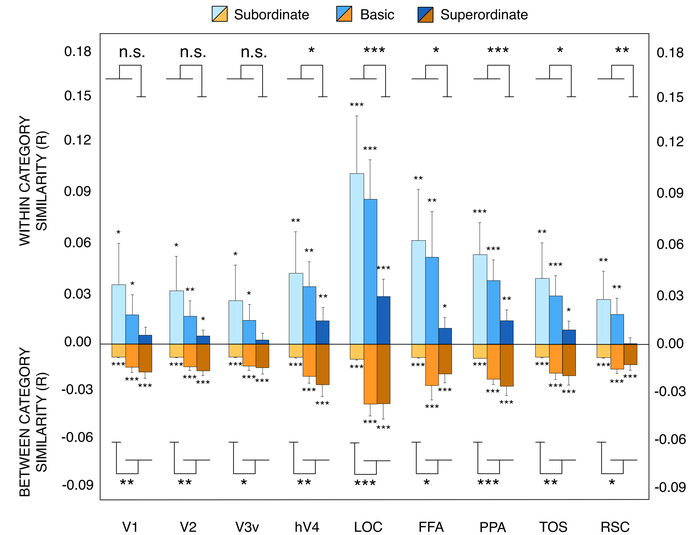
key idea: members of a category should elicit neural activity patterns that are simultaneously more similar to each other and more distinct from members of other categories

analysis: use MVPA to characterize **similarity** of activity patterns across taxonomic levels

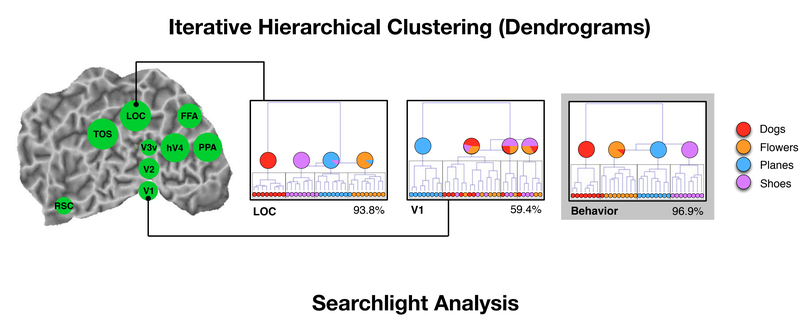
Neural activity patterns group most strongly at the basic-level in higher visual areas

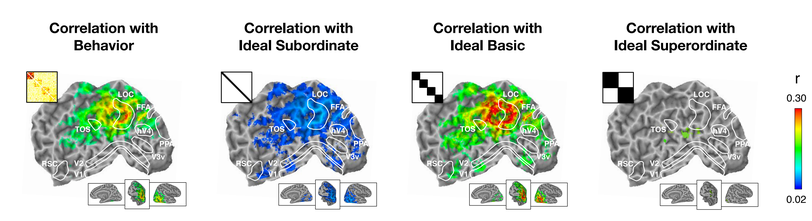


Basic-level strikes the best balance between category cohesion and category distinctiveness



Object-selective cortex favors basic-level organization and is the brain region most correlated with perceptual judgments





Summary

the basic-level advantage increases as we ascend the visual pathway, with the strongest effect in lateral occipital complex (LOC)

in object-selective cortex, basic-level categories maximize within-category similarity and between-category similarity

our results suggest that successive levels in the visual system may optimize basic-level categorizations

References

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