

Category cohesion and distinctiveness in human visual cortex

favor basic level representations

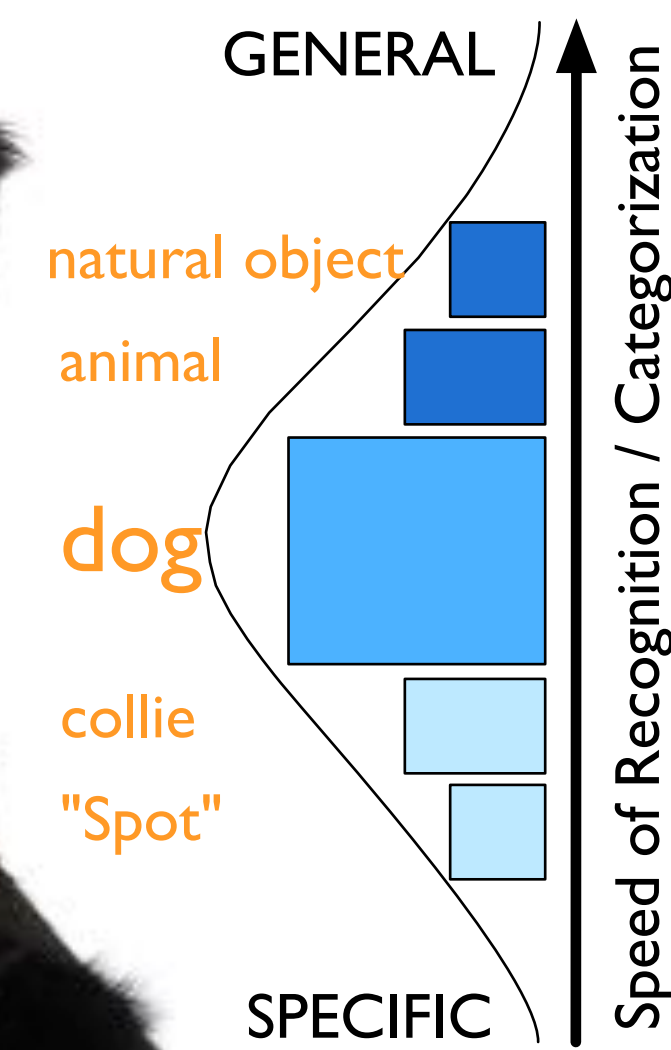


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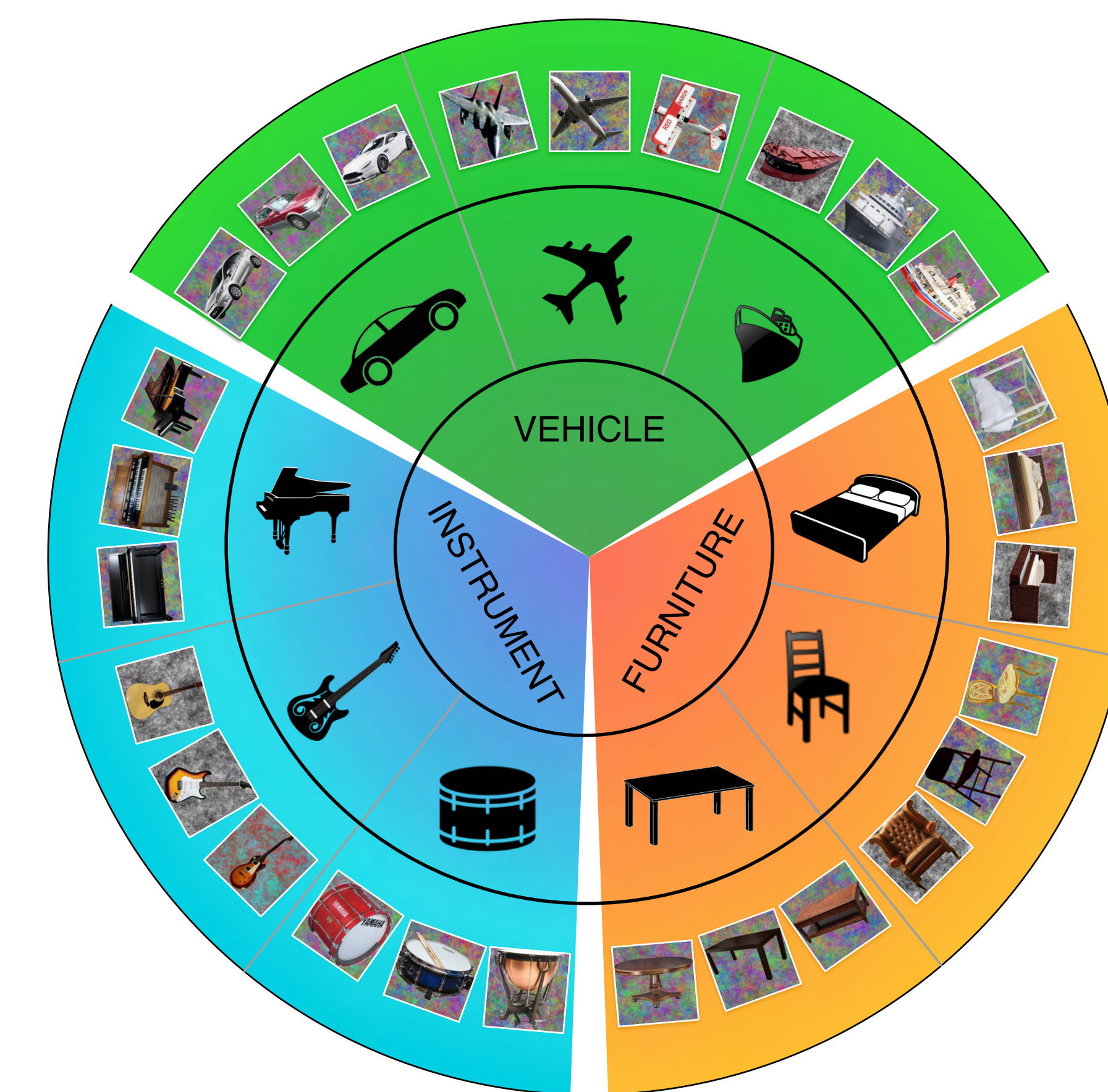
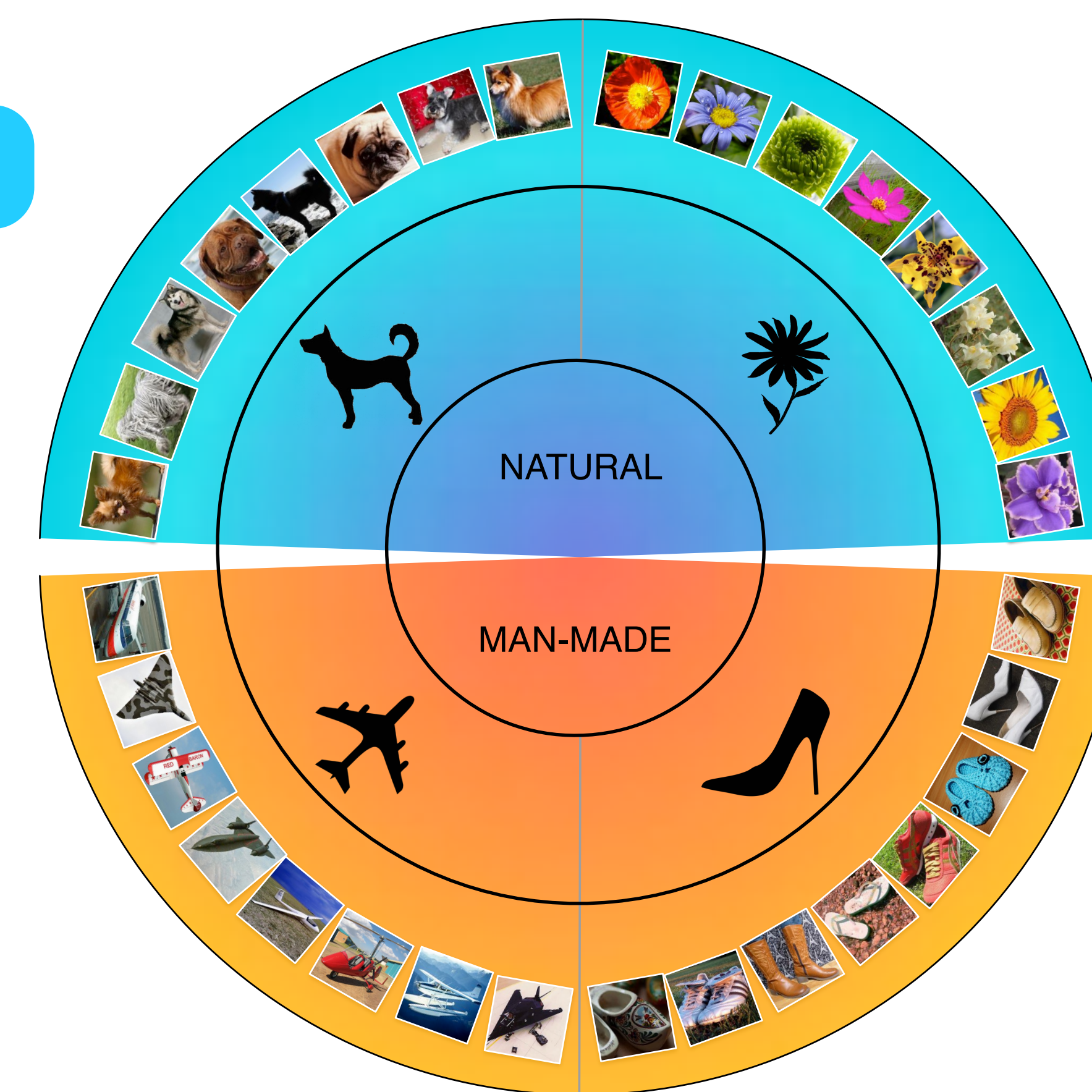


Taxonomic Hierarchy of Real-World Objects

multi-level representation:
objects can be simultaneously categorized at several levels of specificity

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

the **mechanisms** behind these phenomena are **unknown**



fMRI Experiment

methods:

32 images per 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 and dissimilarity of activity patterns across taxonomic levels

Summary

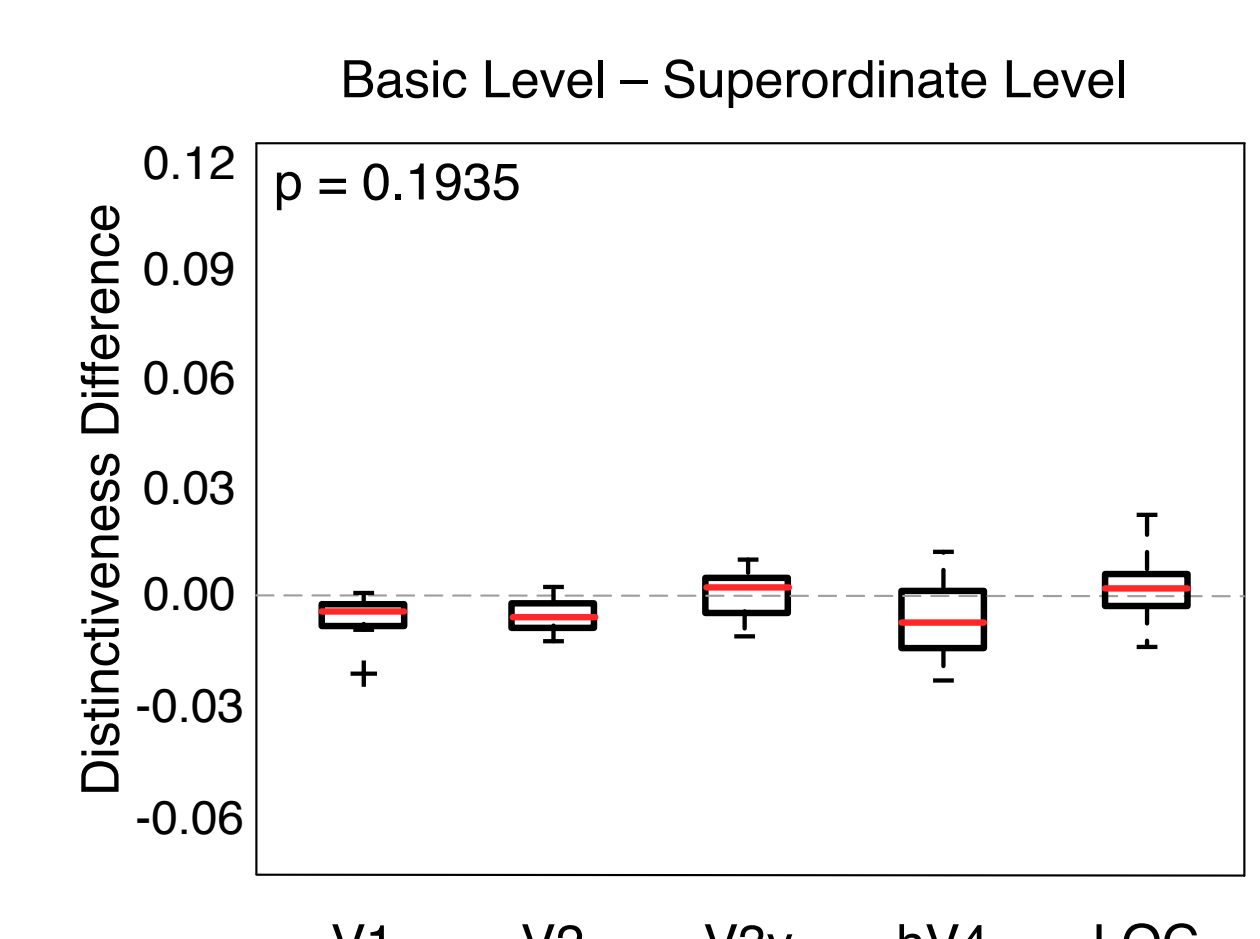
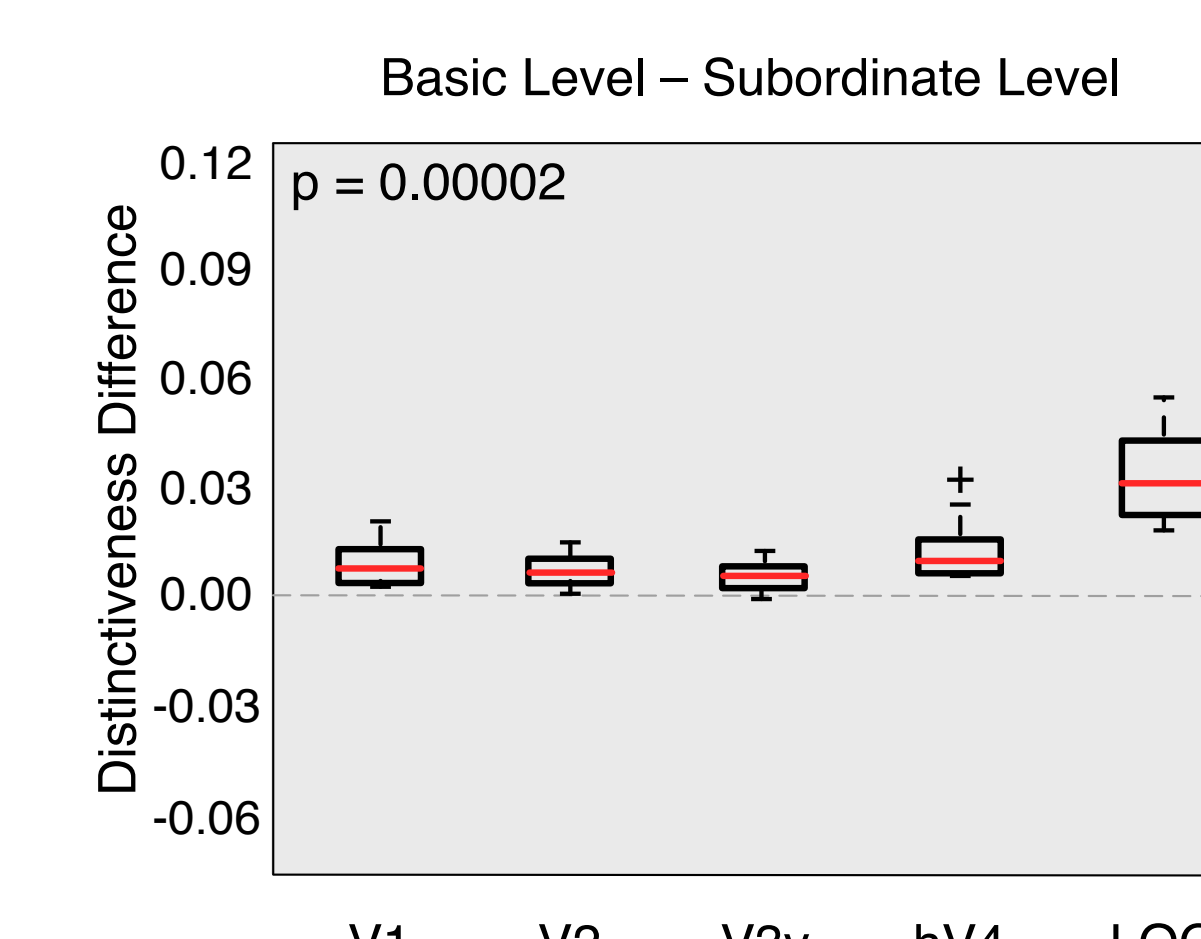
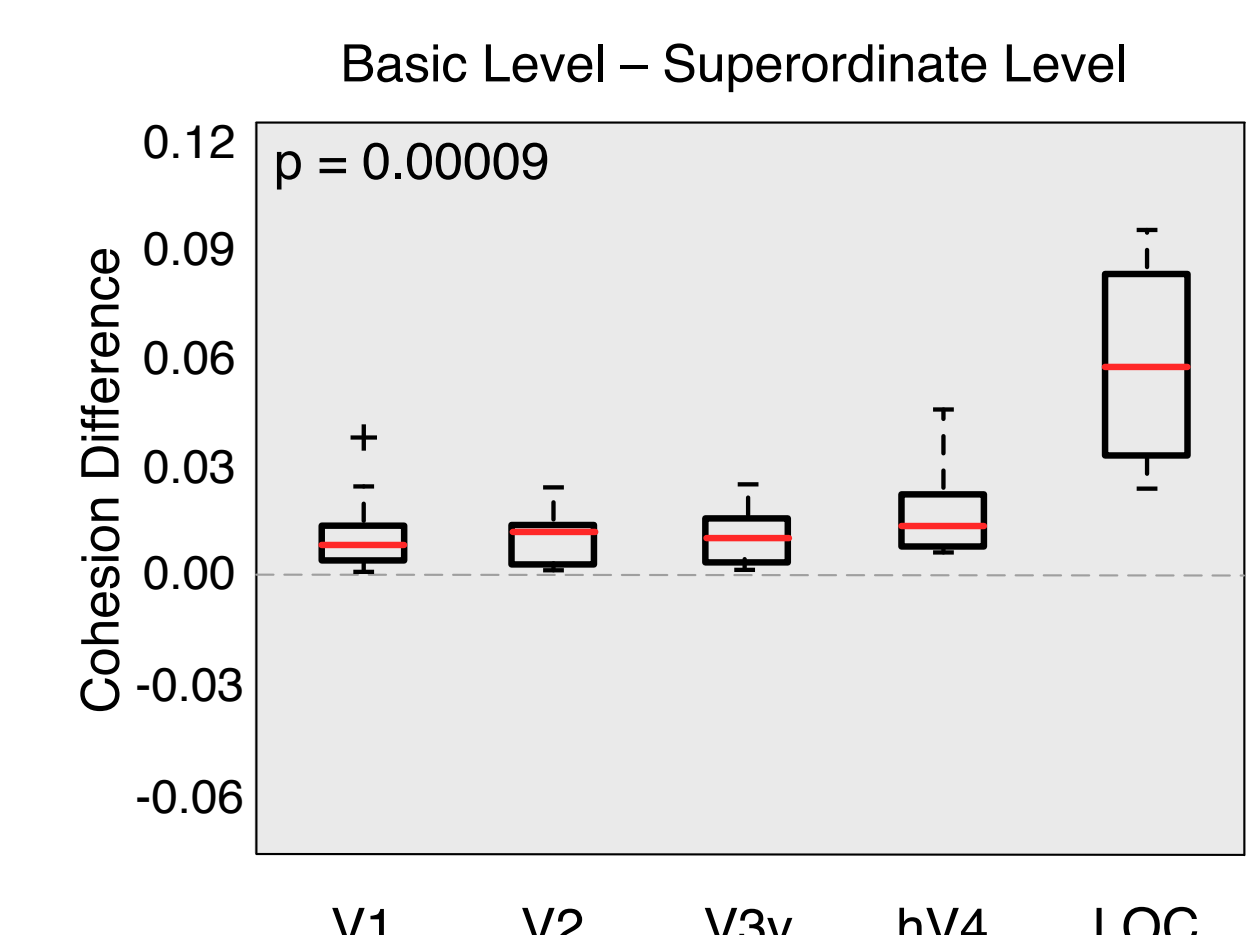
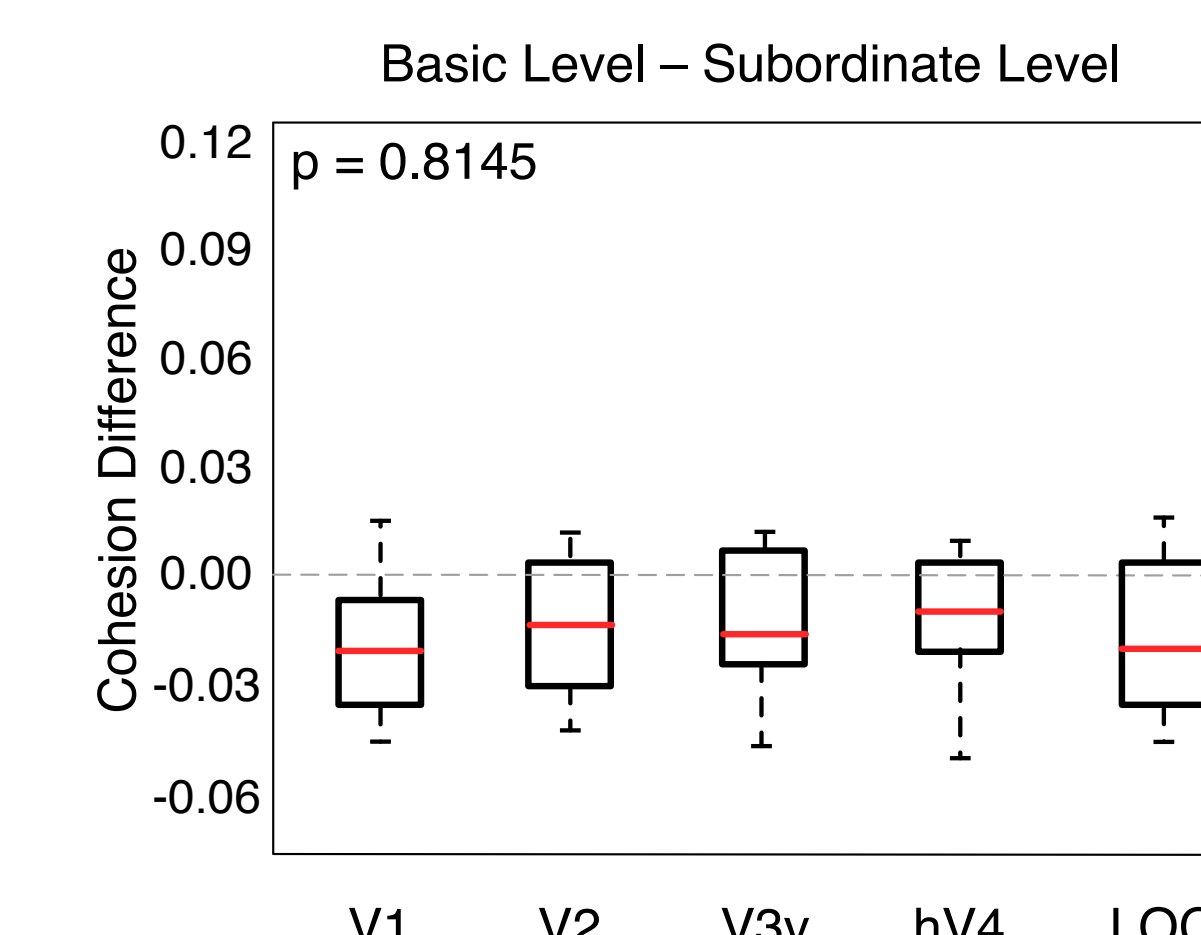
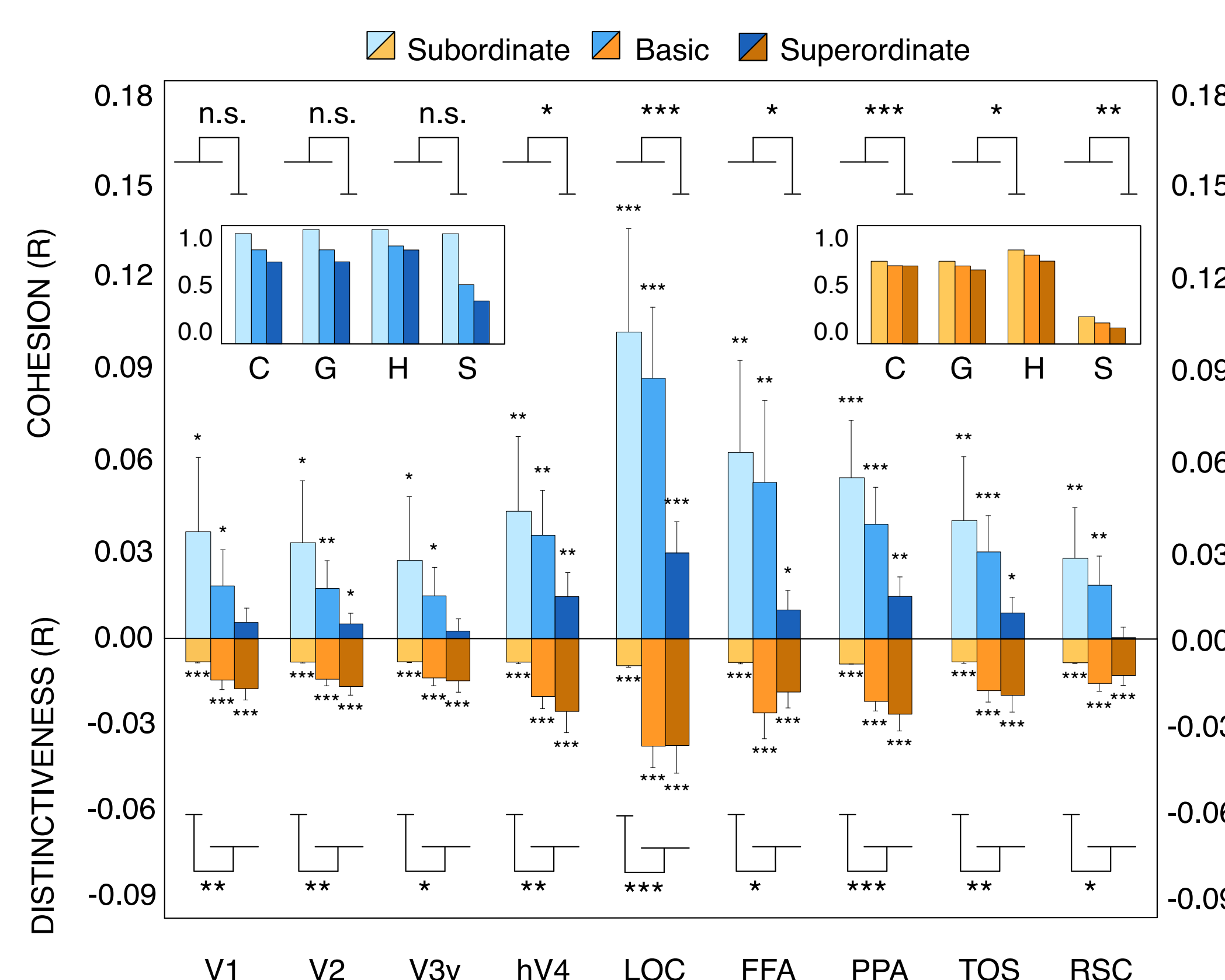
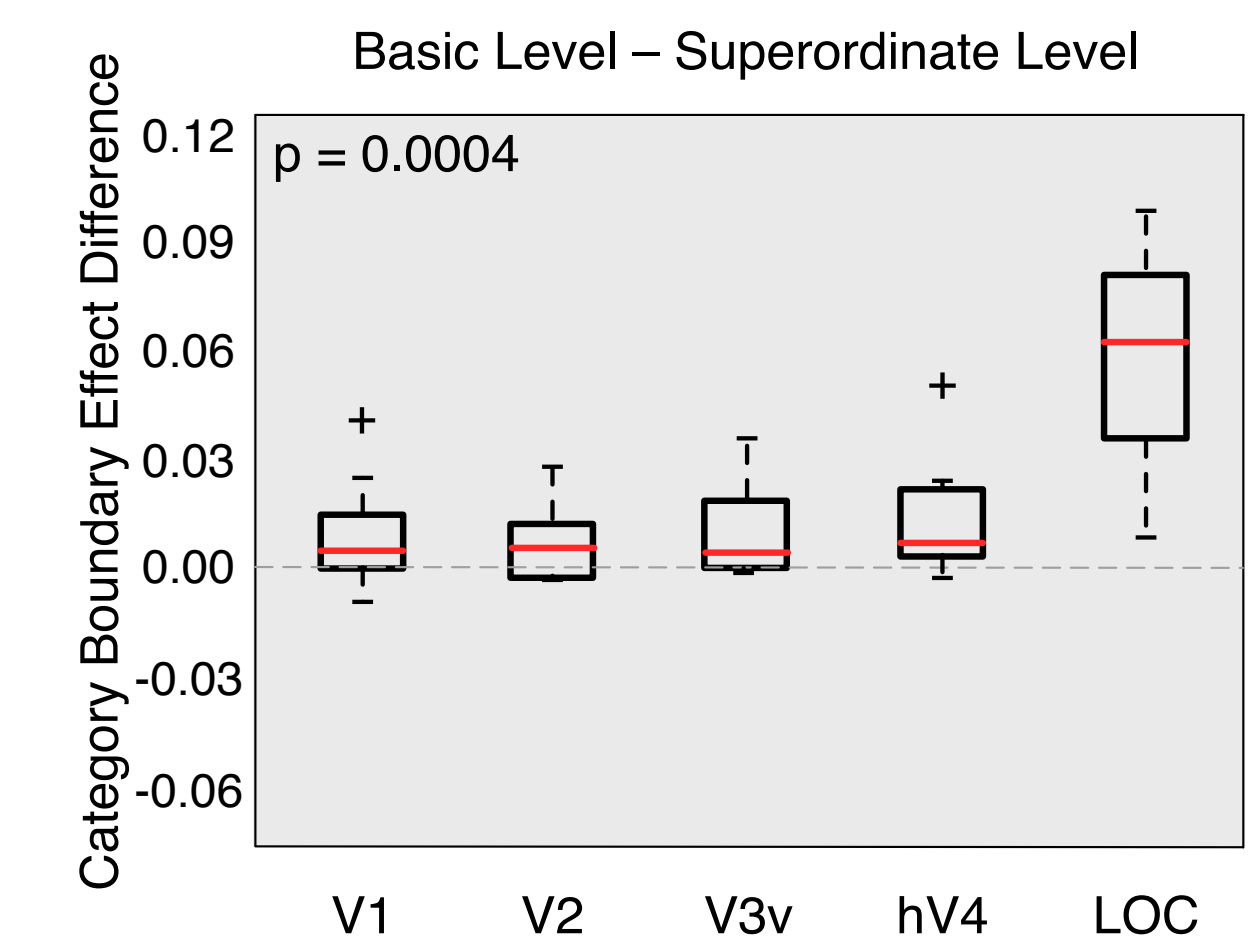
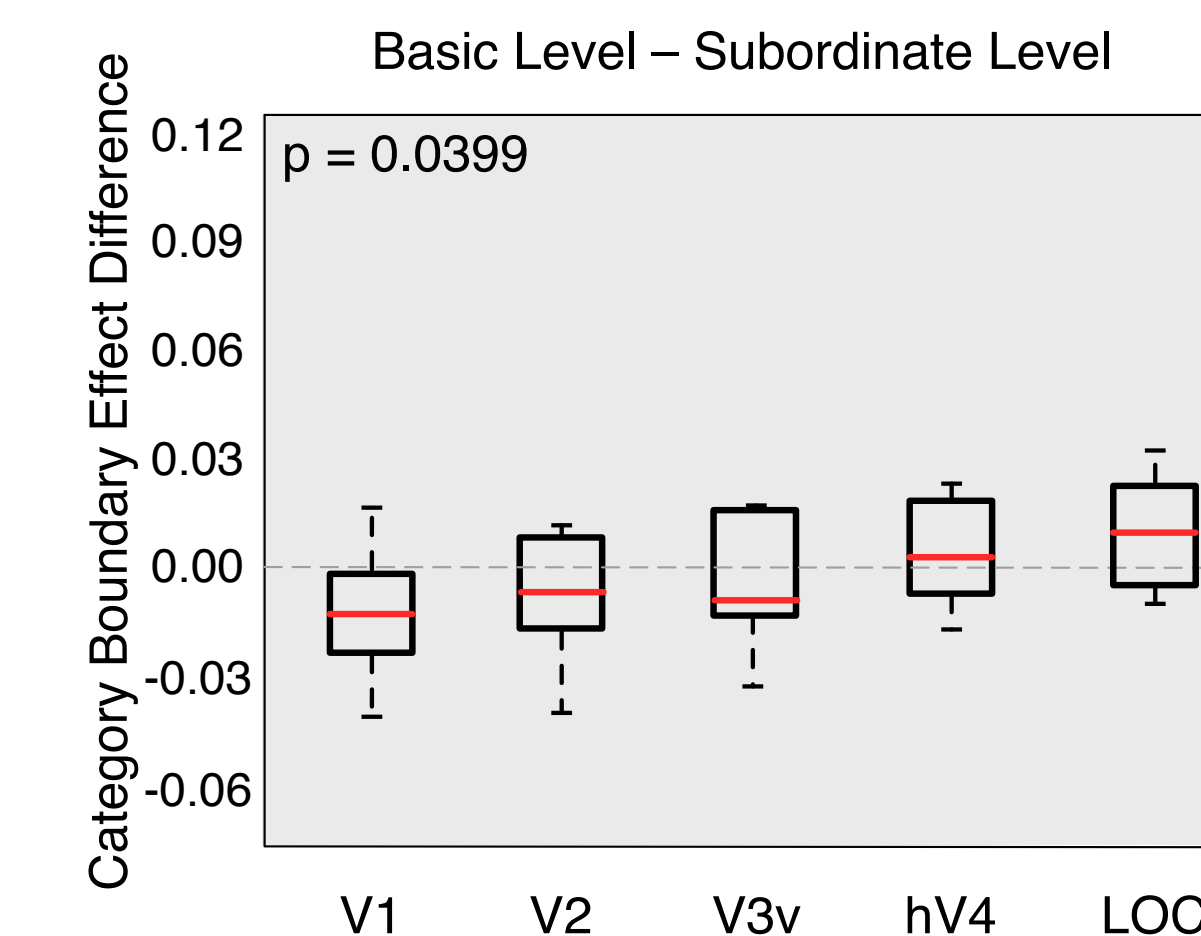
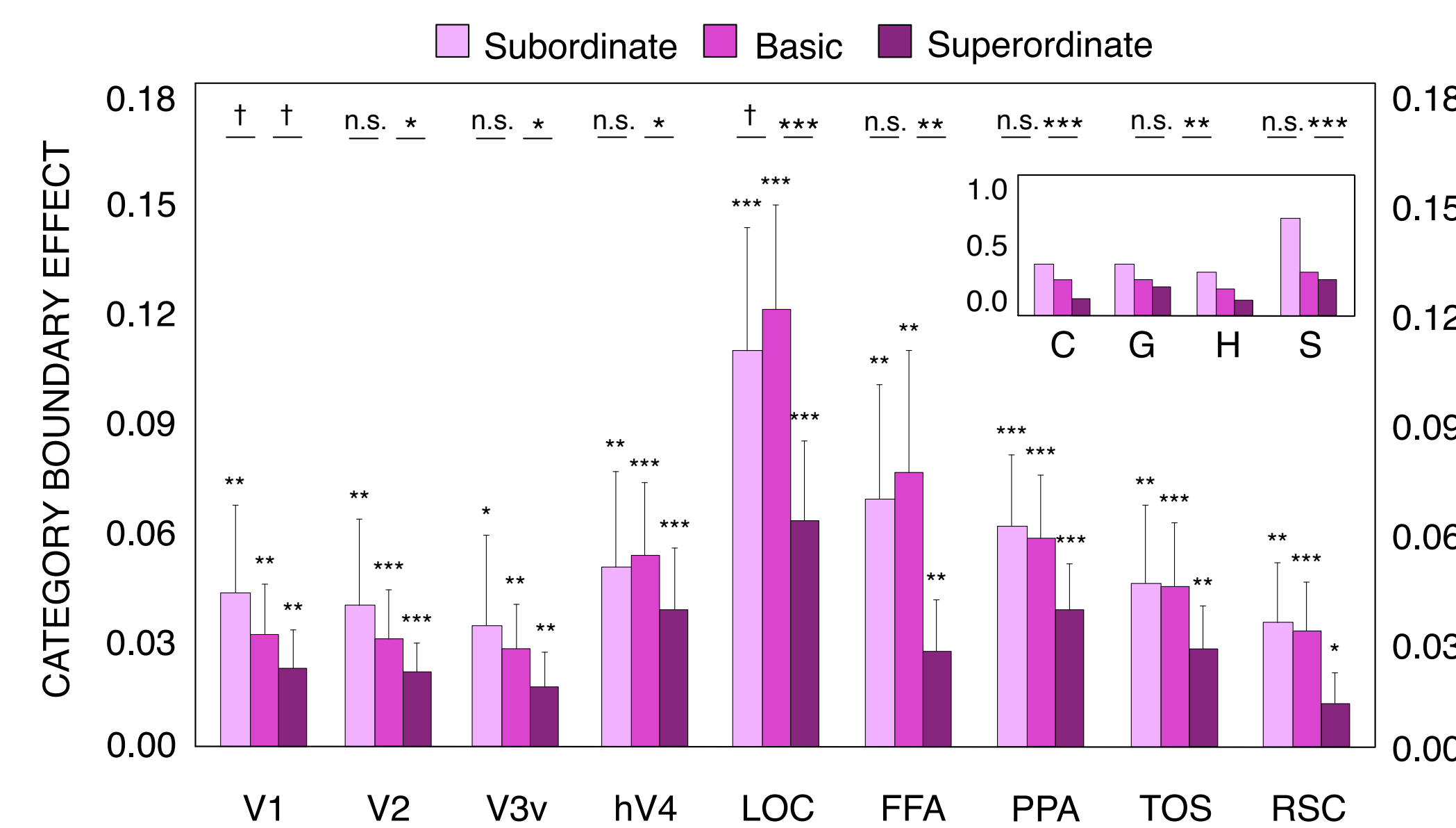
in early visual cortex, real-world objects are best represented at the subordinate level (greatest similarity)

this advantage diminishes in favor of the basic level as we move up the visual cortical hierarchy, disappearing in object-selective cortex (LOC)

this pattern stems from a combined increase in cohesion and distinctiveness at the basic level, compared to both subordinate and superordinate levels

our results suggest that successive visual areas may be optimizing basic level representations

Category Boundary Effect, Cohesion and Distinctiveness



MVPA Decoding

