Organizing Object Knowledge by Real-World Size

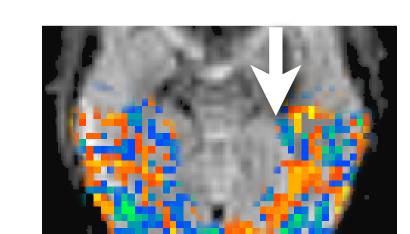


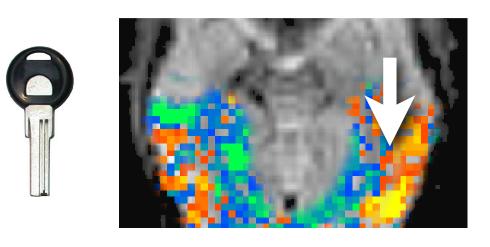
Talia Konkle & Aude Oliva

Department of Brain and Cognitive Sciences, MIT

Introduction







Object categories have distinct distributed patterns of activity (e.g. Haxby et al., 2001)

Patterns are reliable with increased spatial smoothing (Op de Beeck, 2010)

This suggests a large-scale organization of object knowledge in ventral visual cortex

Question

What is this large-scale organization?

Proposal: Object representations are organized by their real-world size

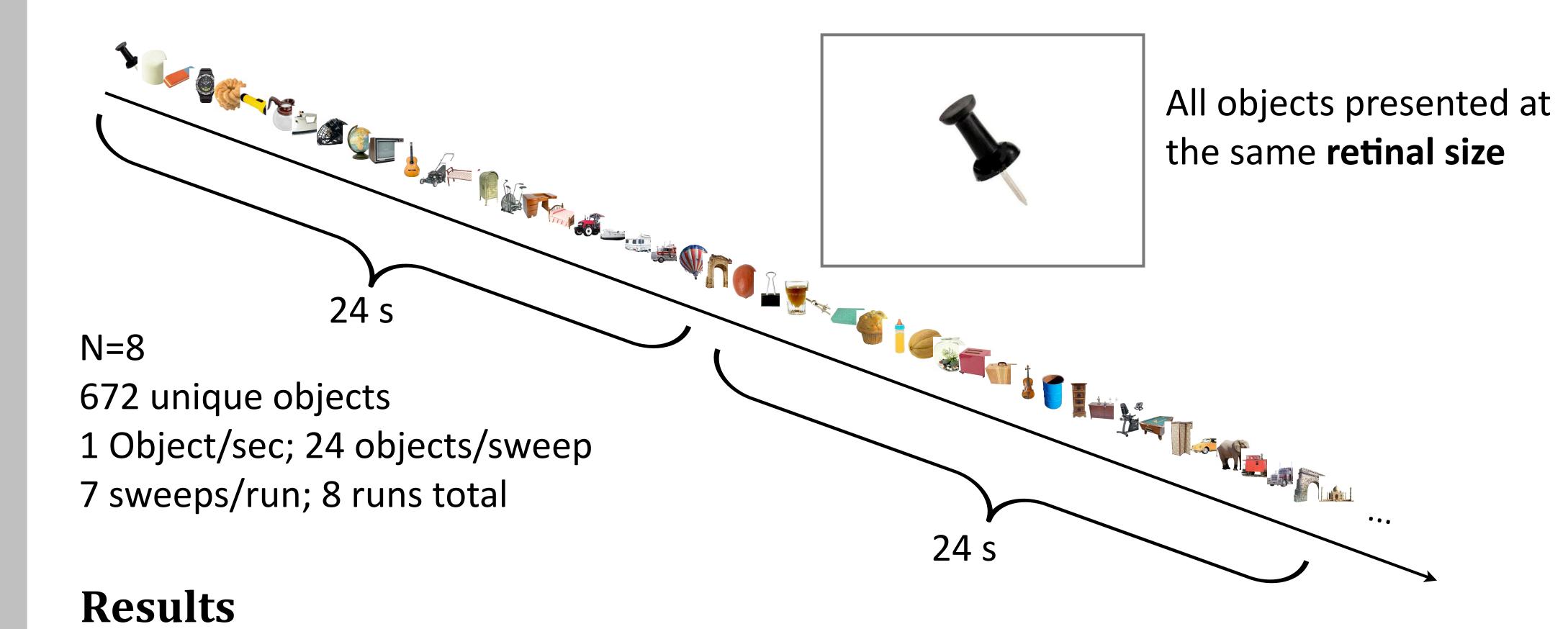


Small Objects > Big Objects Contrast Lateral Surface **SmallP** Ventral Surface **BigD**

Konkle & Oliva, VSS 2010

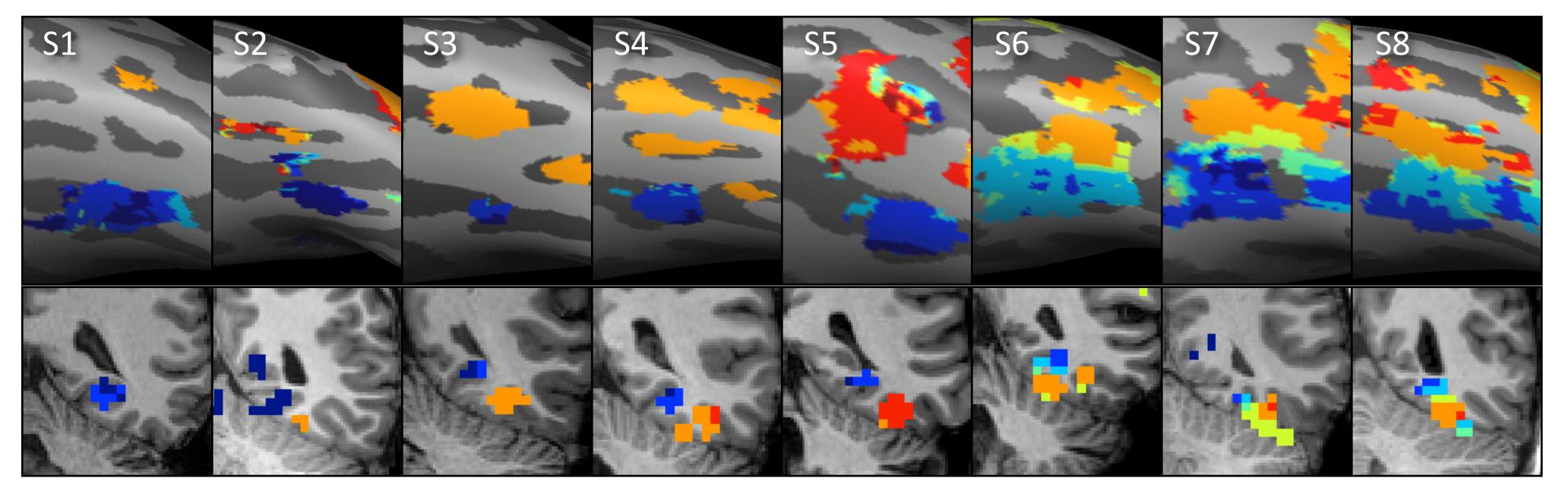
Is there a sizeotopic map of object representations?

Expt 1: Phase-Encoding

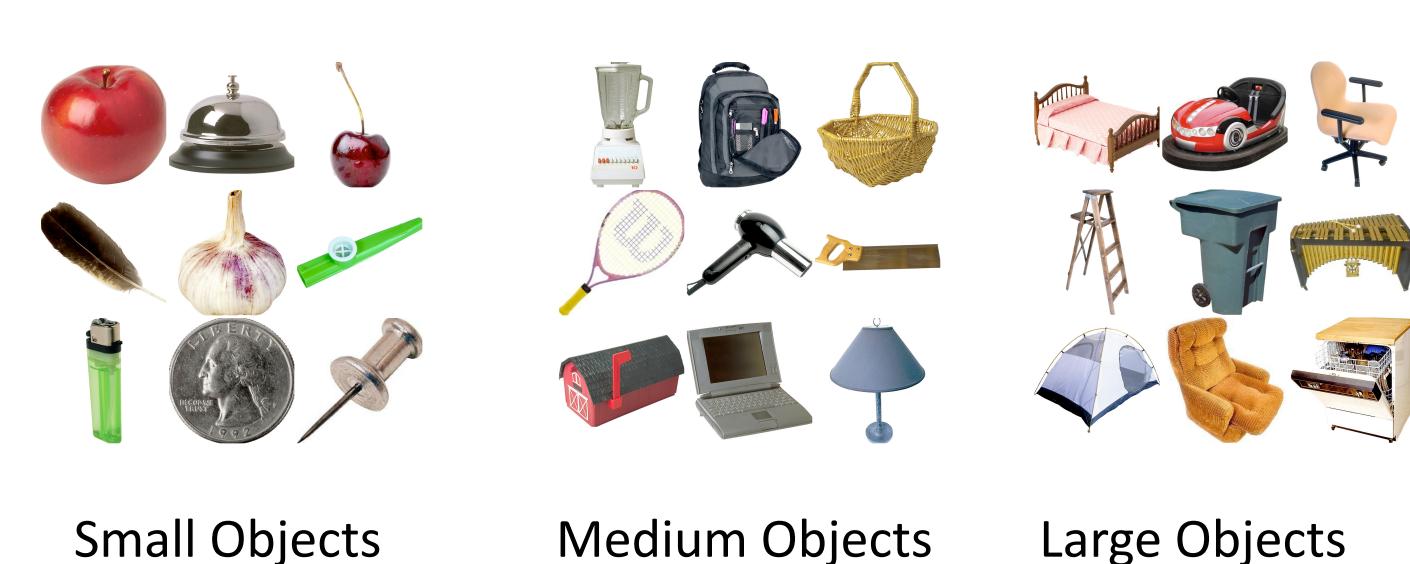


Small Objects

Some subjects show a gradient of selectivity; others show two poles



Expt 2: Blocked Design



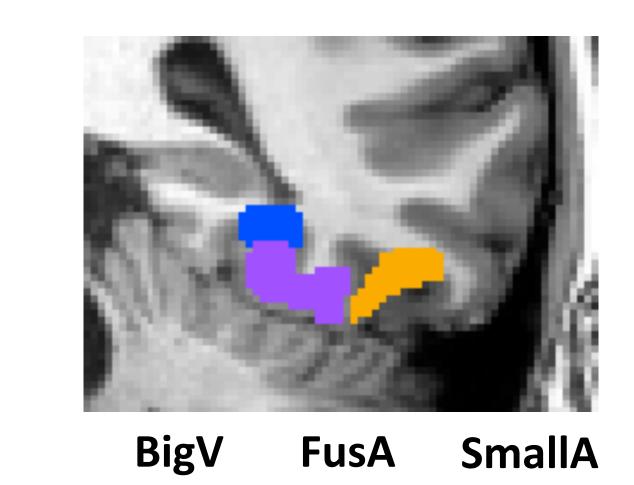
Medium Objects Large Objects

16s stimulus blocks 18 images/block 650ms per image

24 blocks/condition over 7 runs

N=6

Results



medium-object selective areas BigV and SmallA regions of interest localized from an

localized BigV and SmallA Regions

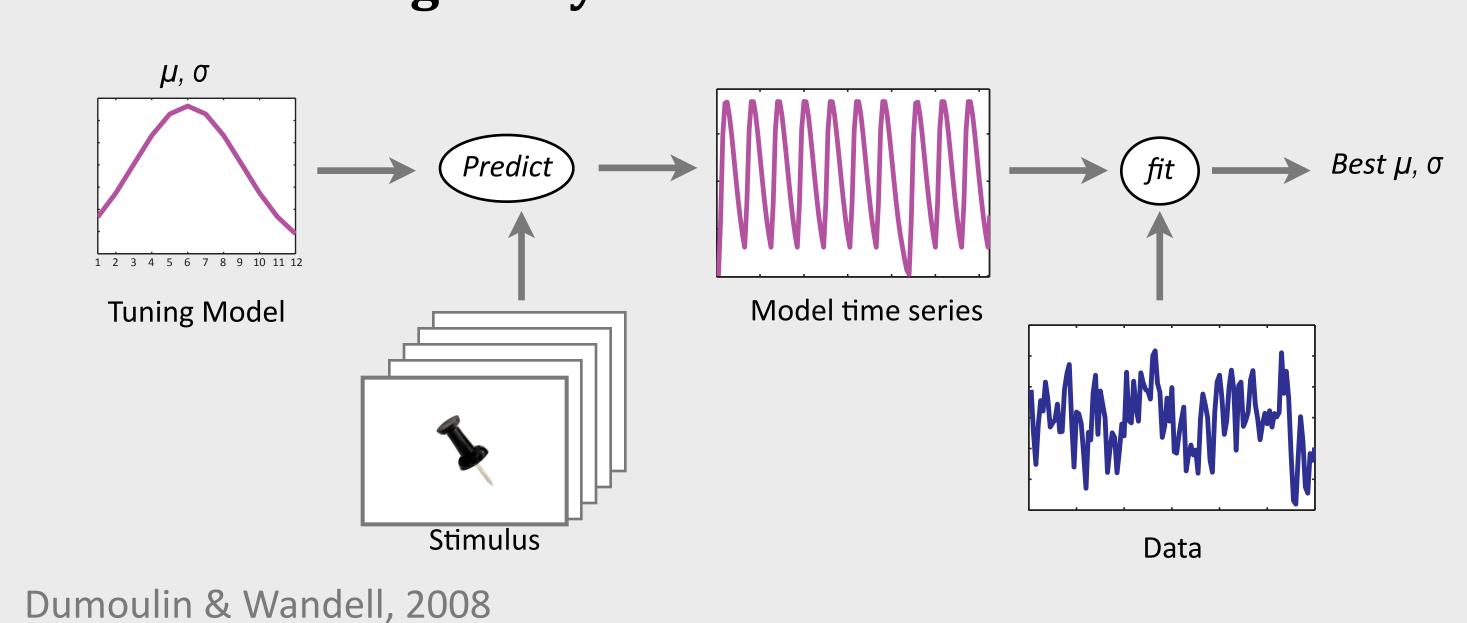
Whole-brain contrasts revealed no

independent localizer for each subject FusA region drawn anatomically between functionally

FusA BigV SmallA Anterior fusiform is active to large, peta 1.0 medium, and small objects **Small Objects Medium Objects Large Objects** Coarse "MVPA": 2.0 Peak of activation across cortex shifts

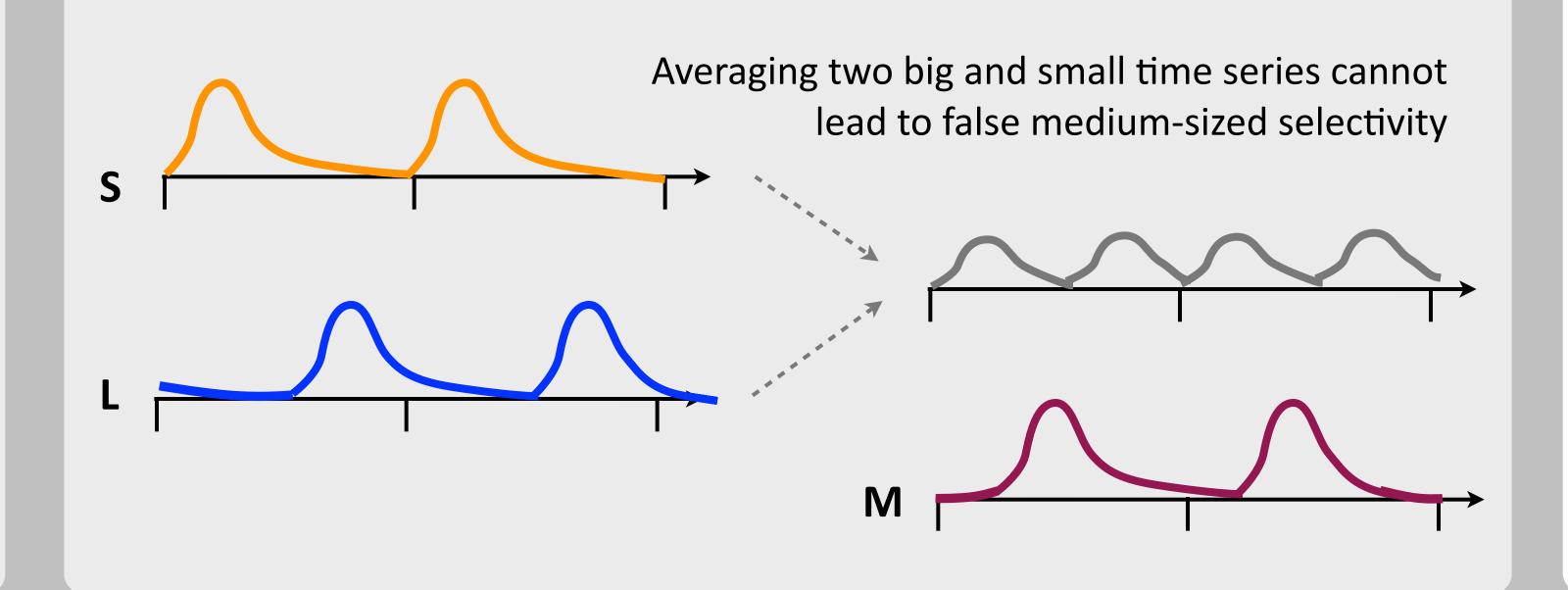
BigV FusA SmallA

Phase-Encoding Analysis Method

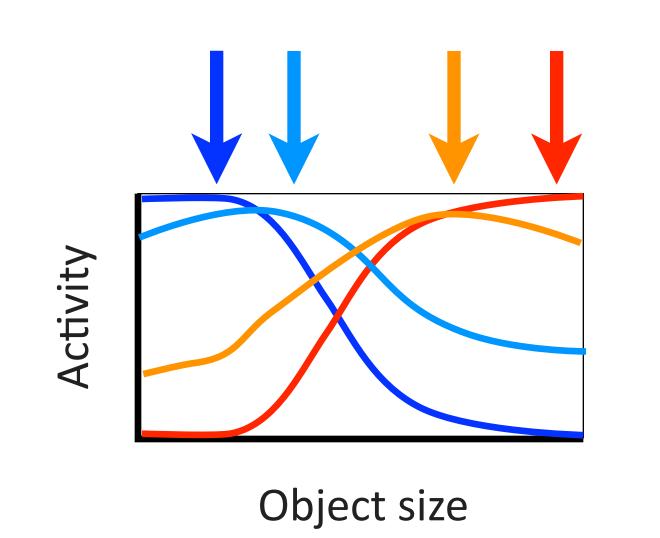


Movement/Smoothing cannot lead to false maps

Subject 7



Conclusions



Big Objects

1) Sizeotopic Organization?

BigV FusA SmallA

Reliable big and small poles but only a mild preference for medium objects in between

2) Reliable Large-Scale Patterns

BigV FusA SmallA

with object size

Peak of activity shifts across cortex with increasing object size