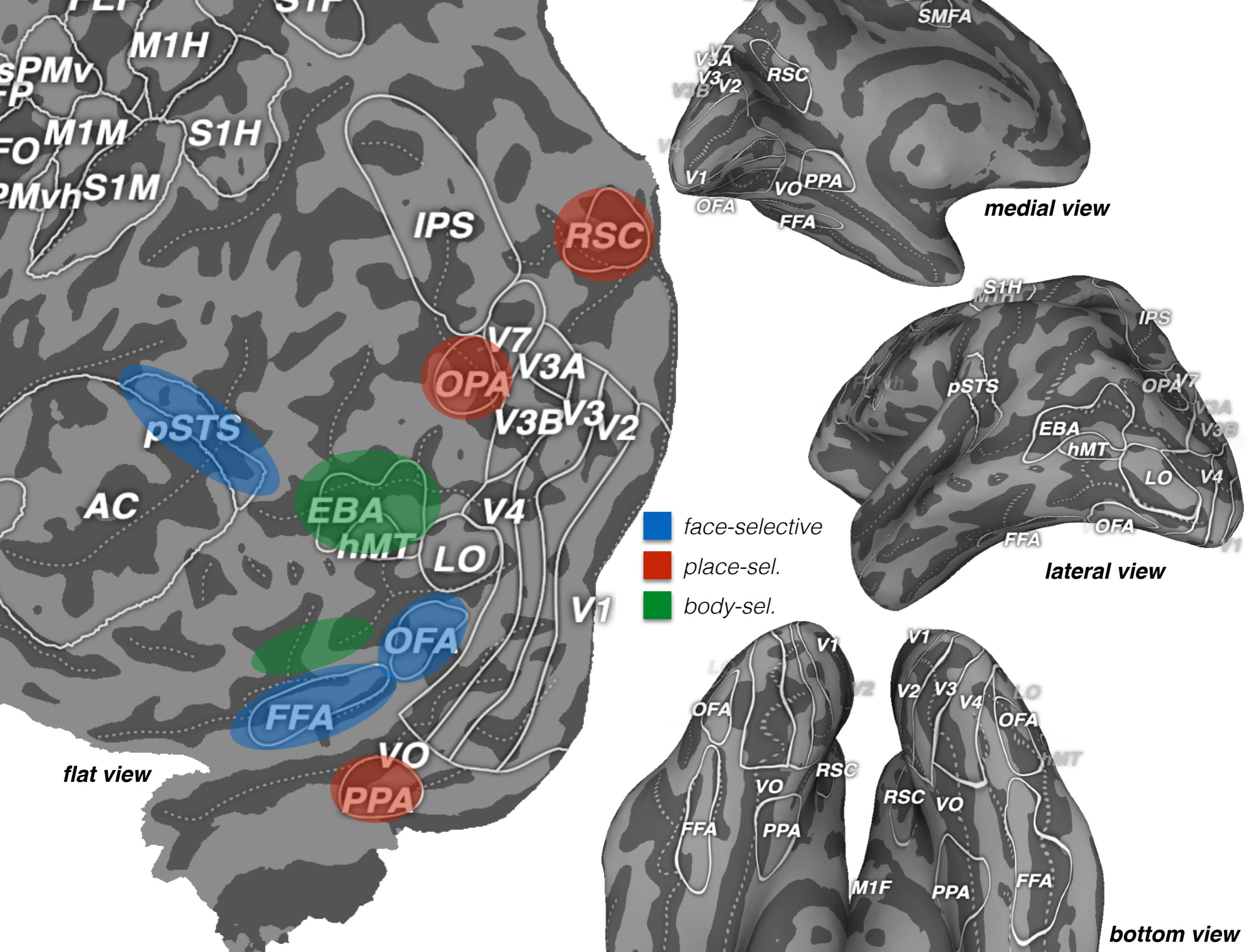


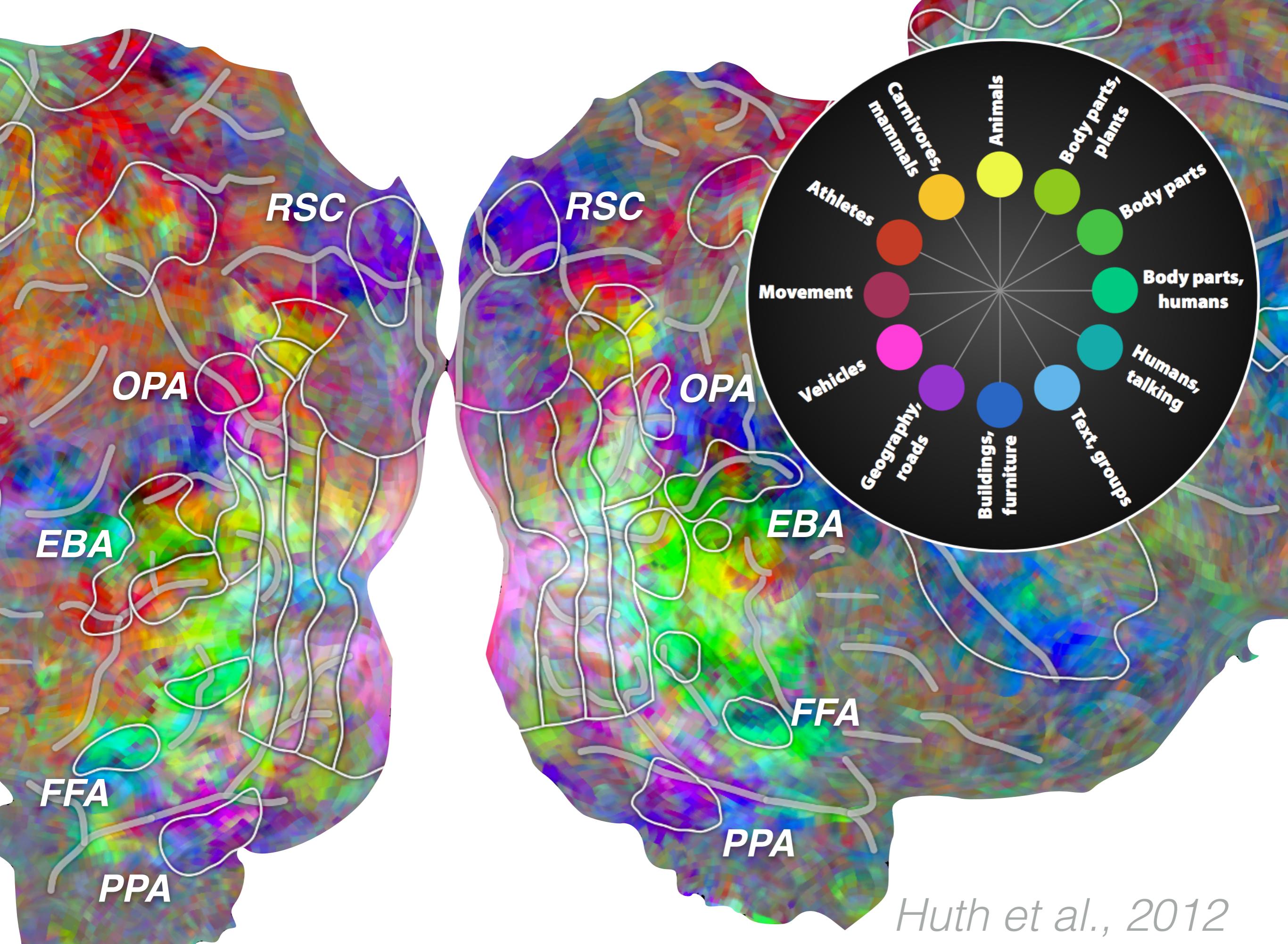
MAPPING HUMAN CORTEX

Prof. Alexander Huth
10.1.2020

WHEREFORES

- * We've been talking a lot about how visual cortex is organized
- * i.e. **what are** the different areas, & **what role** does each area play in visual perception





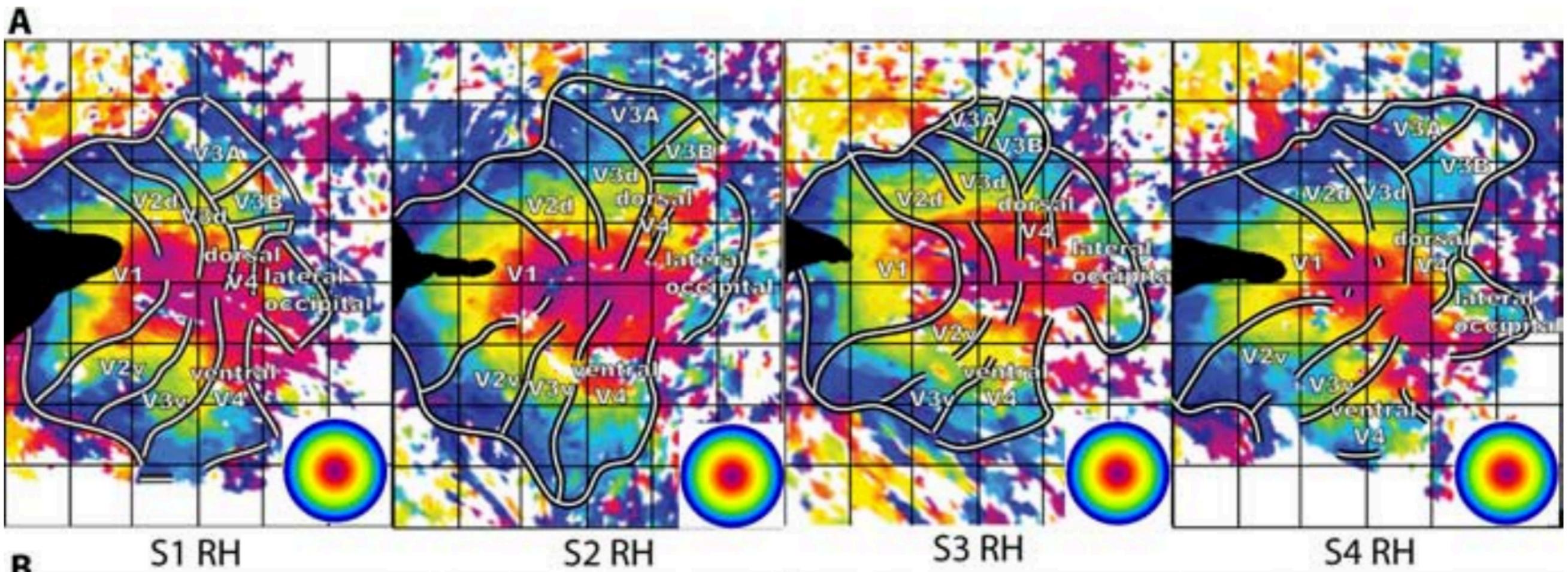
WHEREFORES

- * We've been talking about **how** visual cortex is organized
 - * ... but **why** is it organized that way?

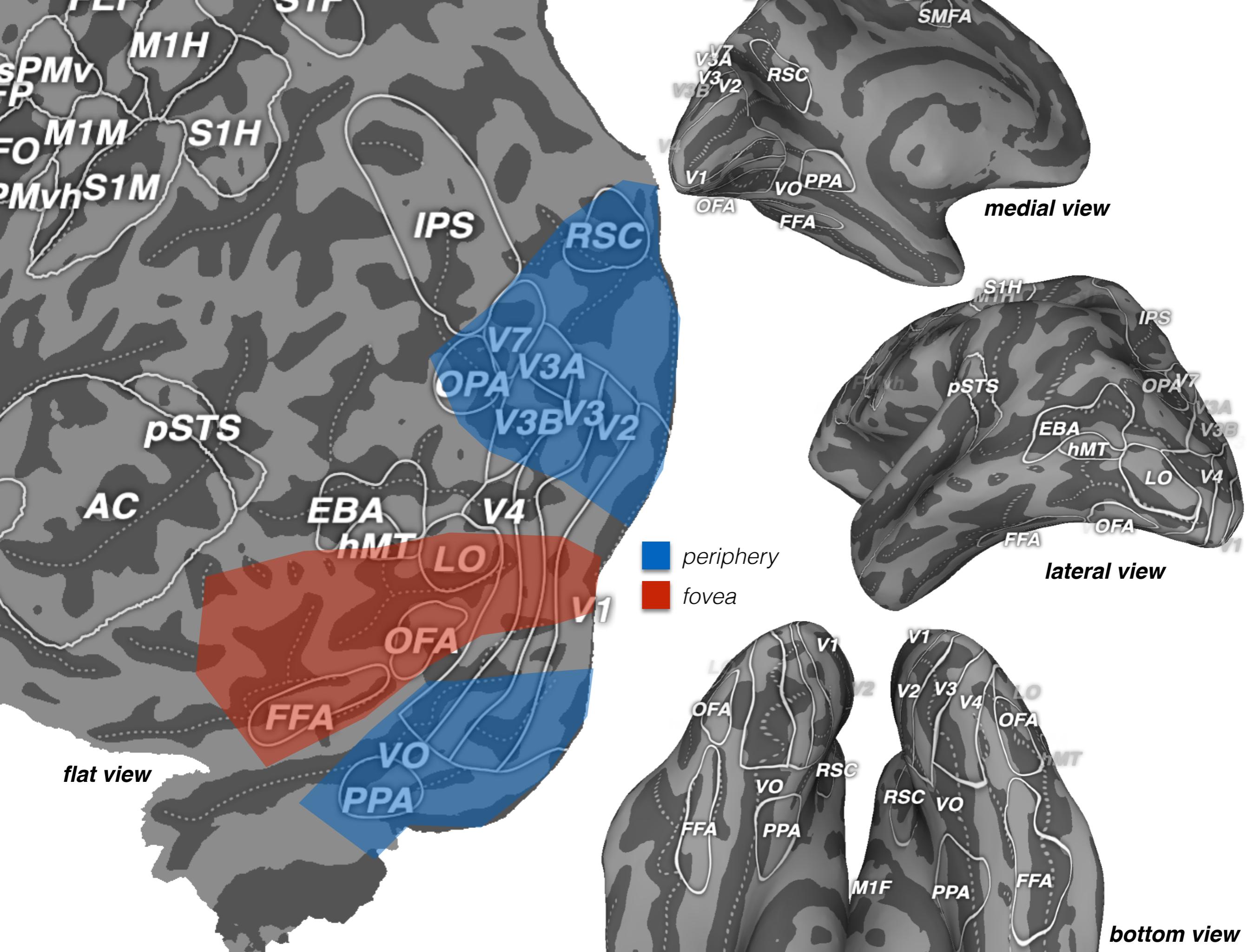
THEORY: ECCENTRICITY

- * If a specific category is mostly experienced in some particular position within the visual field
 - * e.g. faces are usual “foveal”, because we look directly at them
 - * & buildings/rooms/environments are usual “peripheral”
- * Then maybe brain areas for that category are close to retinotopic areas for the corresponding location?

RETINOTOPIC MAPS



Hansen, Kay, Gallant (2007)



THEORY: ECCENTRICITY

- * This works for **faces** & **places**. What about other categories?
 - * **Text** - the visual word form area (VWFA) is almost overlapping with FFA - makes sense!
 - * What else?

MAKING PREDICTIONS

- * What if there was a category that was experienced **VERY SPECIFICALLY** in one part of the visual field by only some people?
- * Can we predict where that category will be represented?

Article | Published: 06 May 2019

Extensive childhood experience with Pokémon suggests eccentricity drives organization of visual cortex

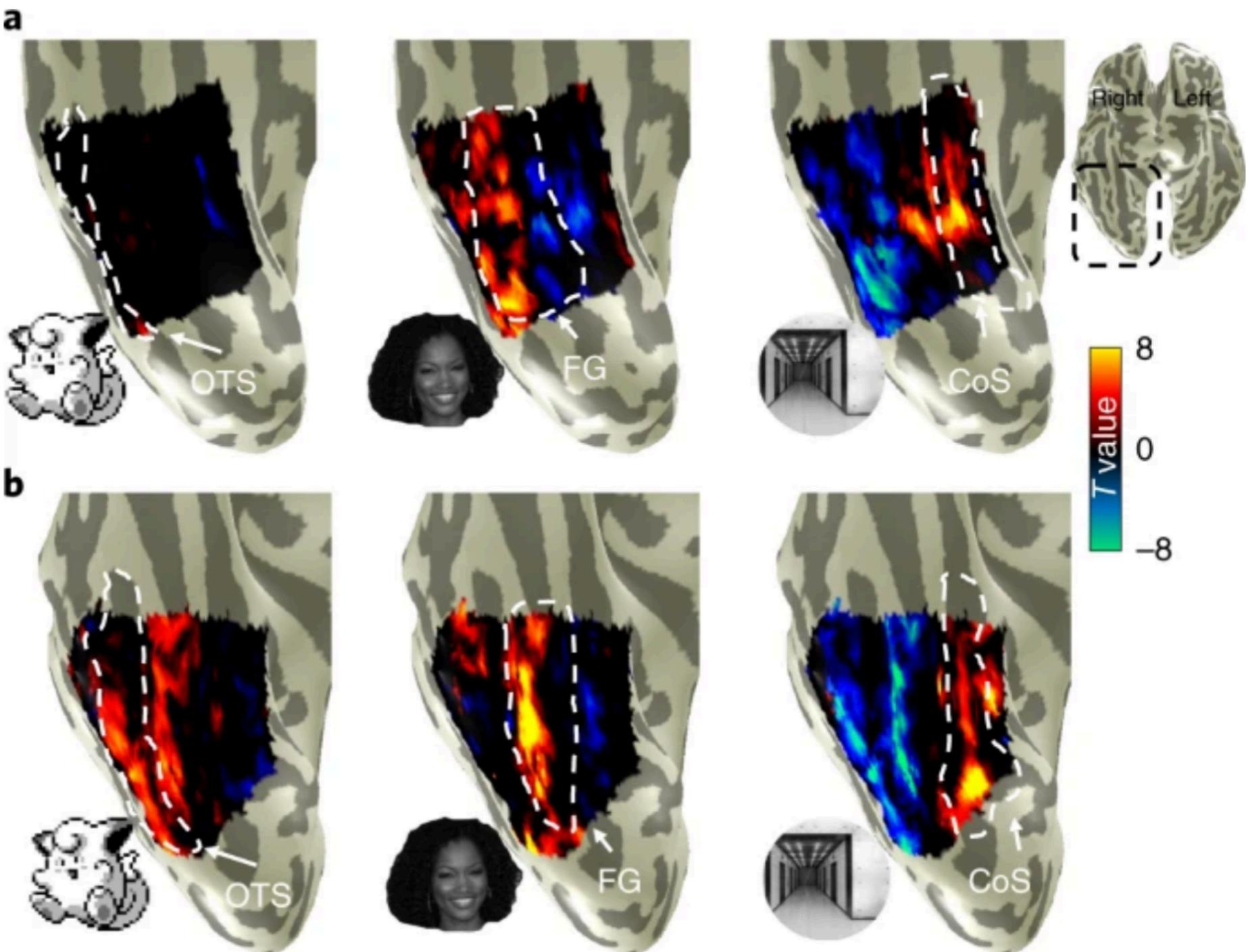
Jesse Gomez , Michael Barnett & Kalanit Grill-Spector

Nature Human Behaviour 3, 611–624(2019) | Cite this article

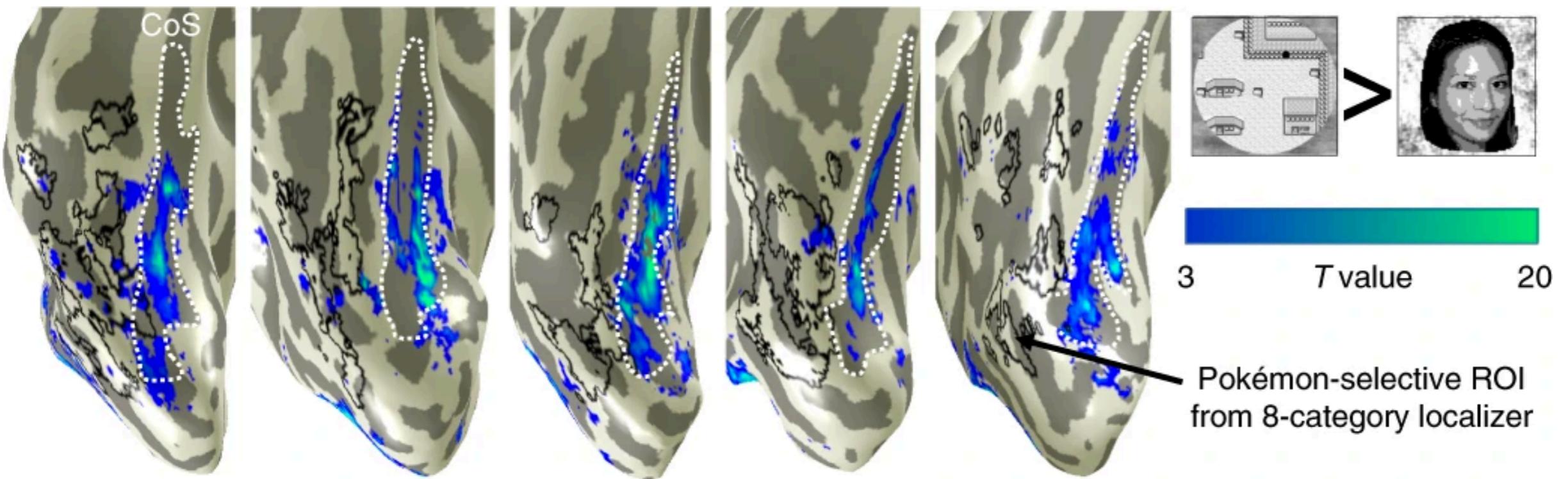
10k Accesses | 9 Citations | 1253 Altmetric | Metrics

<https://www.nature.com/articles/s41562-019-0592-8>

Pokemon
naive:

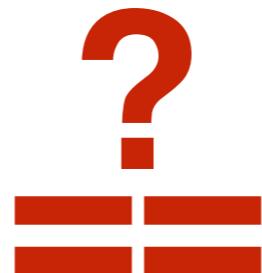
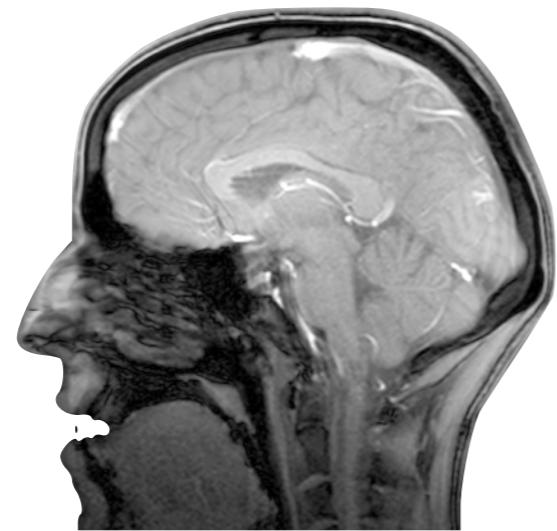
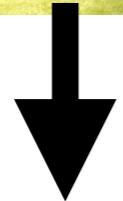


Pokemon
experienced:

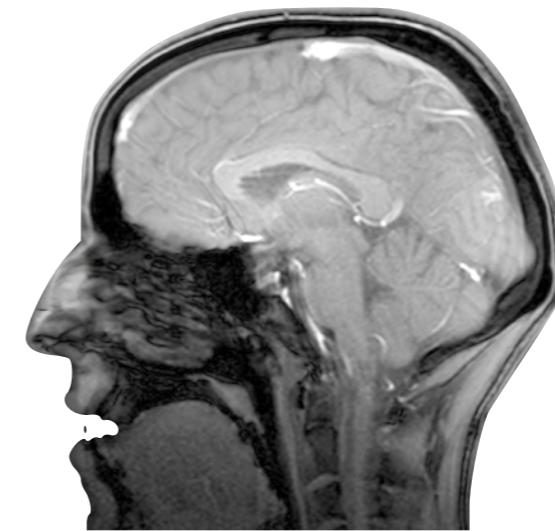


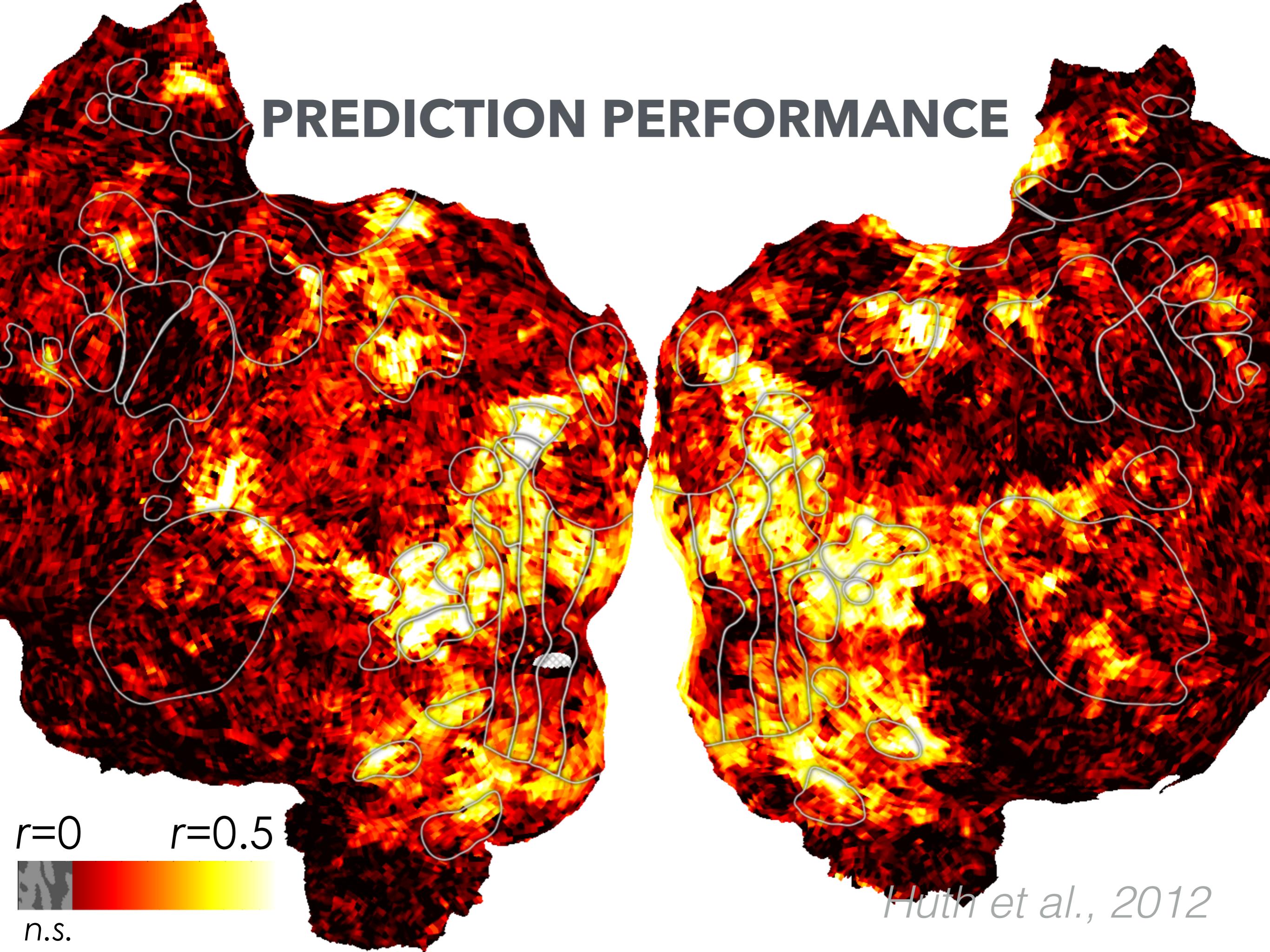
Control: ***places*** from Pokemon elicit
responses in place areas (PPA)!

LANGUAGE v. VISION



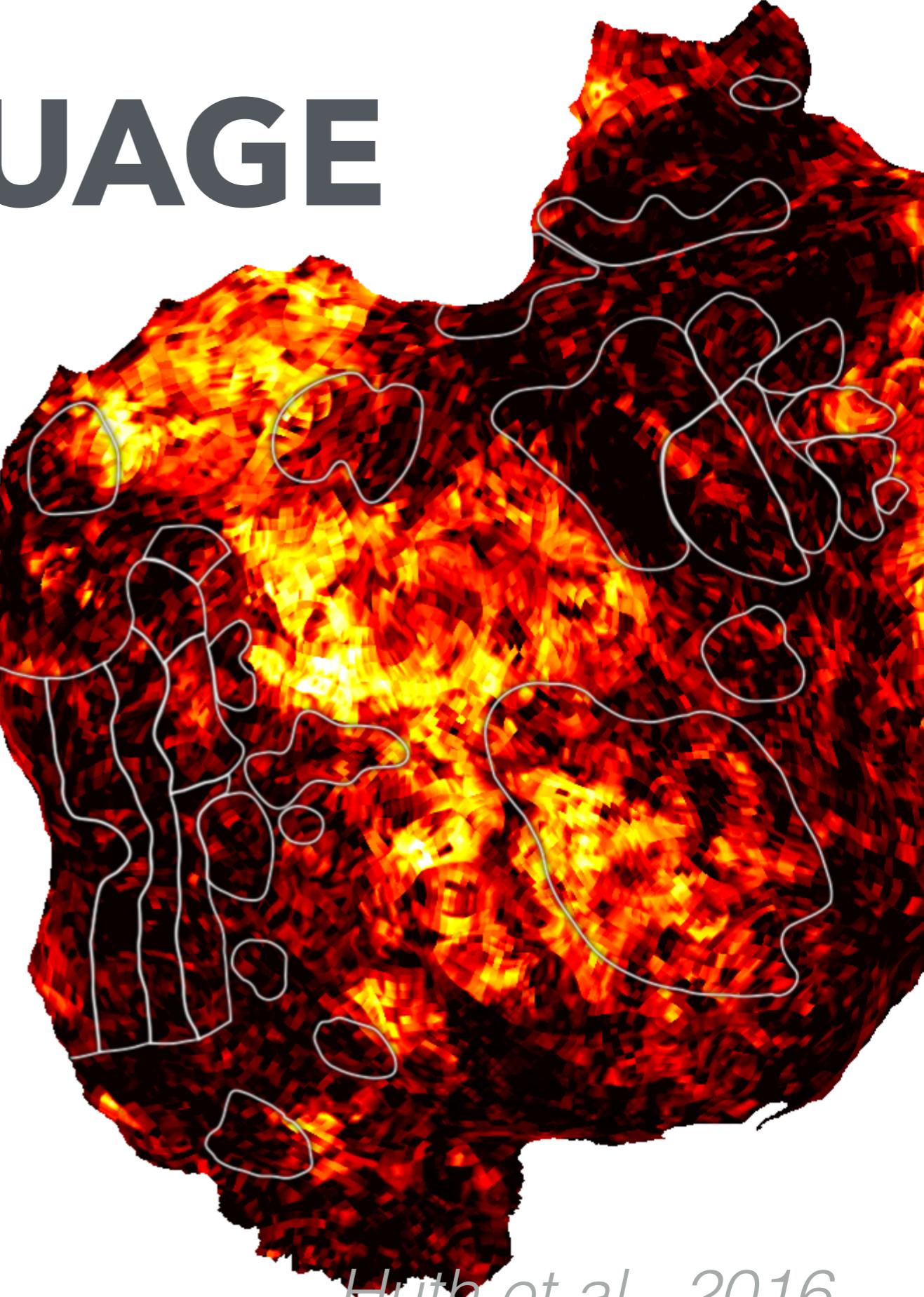
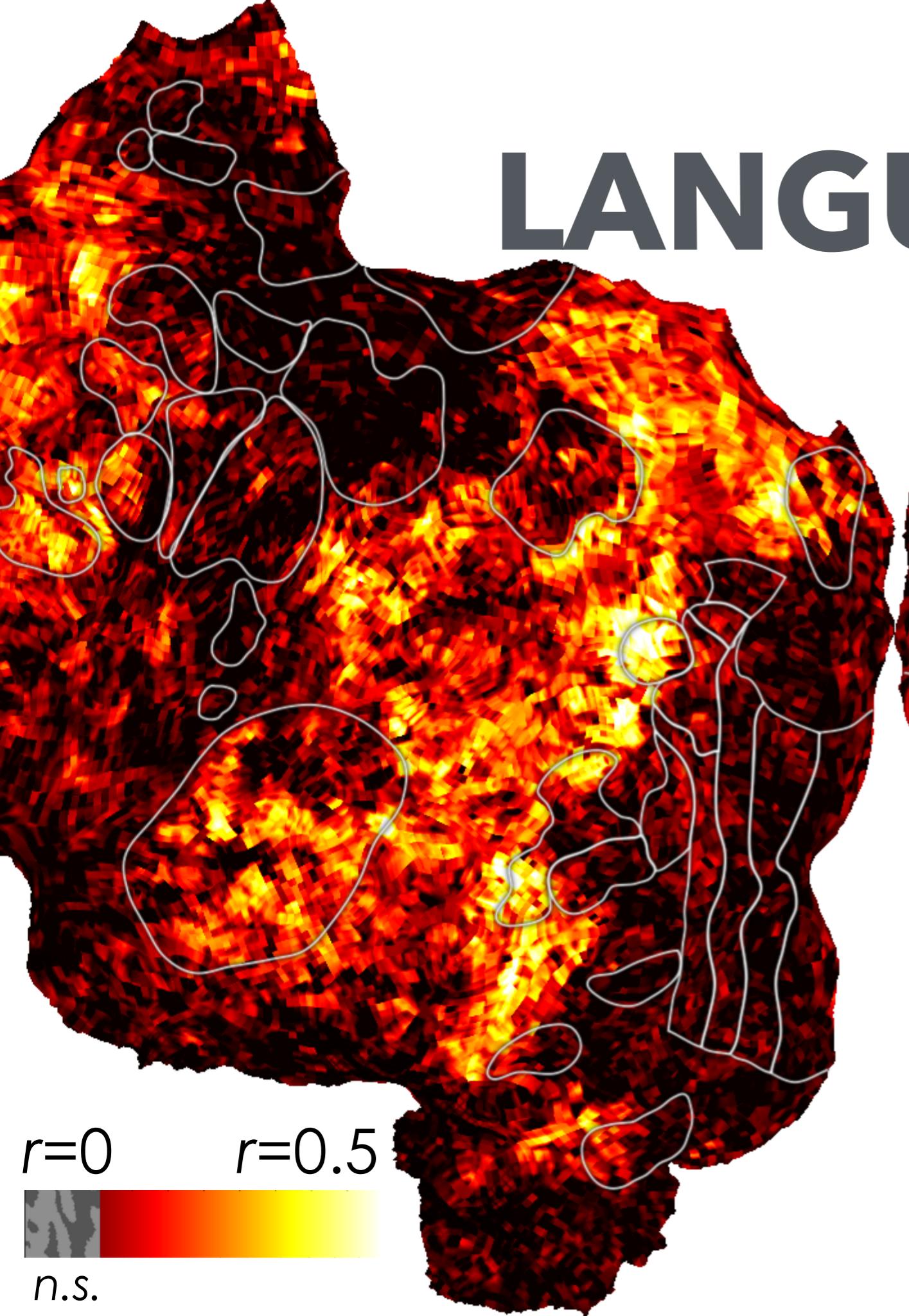
“Dog”





Huth et al., 2012

LANGUAGE



Huth et al., 2016

EXPERIMENTS

Visual fMRI data

2h natural movies from
Hollywood movie trailers



Language fMRI data

2.5h narrative stories from
The Moth Radio Hour

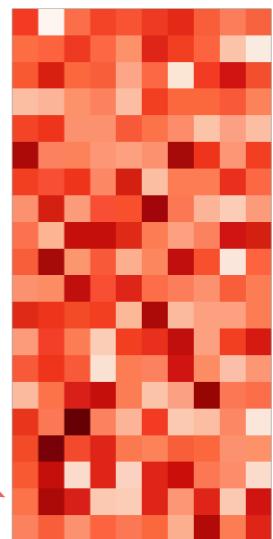


*...she was removing photographs
from the walls and placing them in
little piles around the house...*

5 subjects,
~15h MRI /
subject

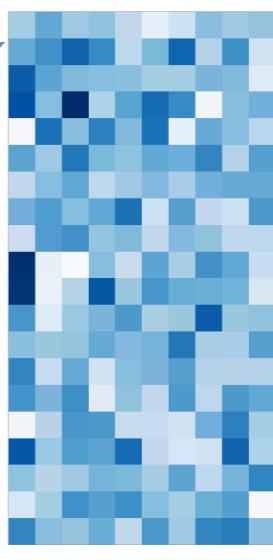
month	month	week	hour	park	building	location	woman	boy	child
week		week	hour						
hour			hour						
park				park	building	location			
building					building	location			
location						location			
woman							woman	boy	child
boy								boy	child
child									child

985 features



Visual semantic
models

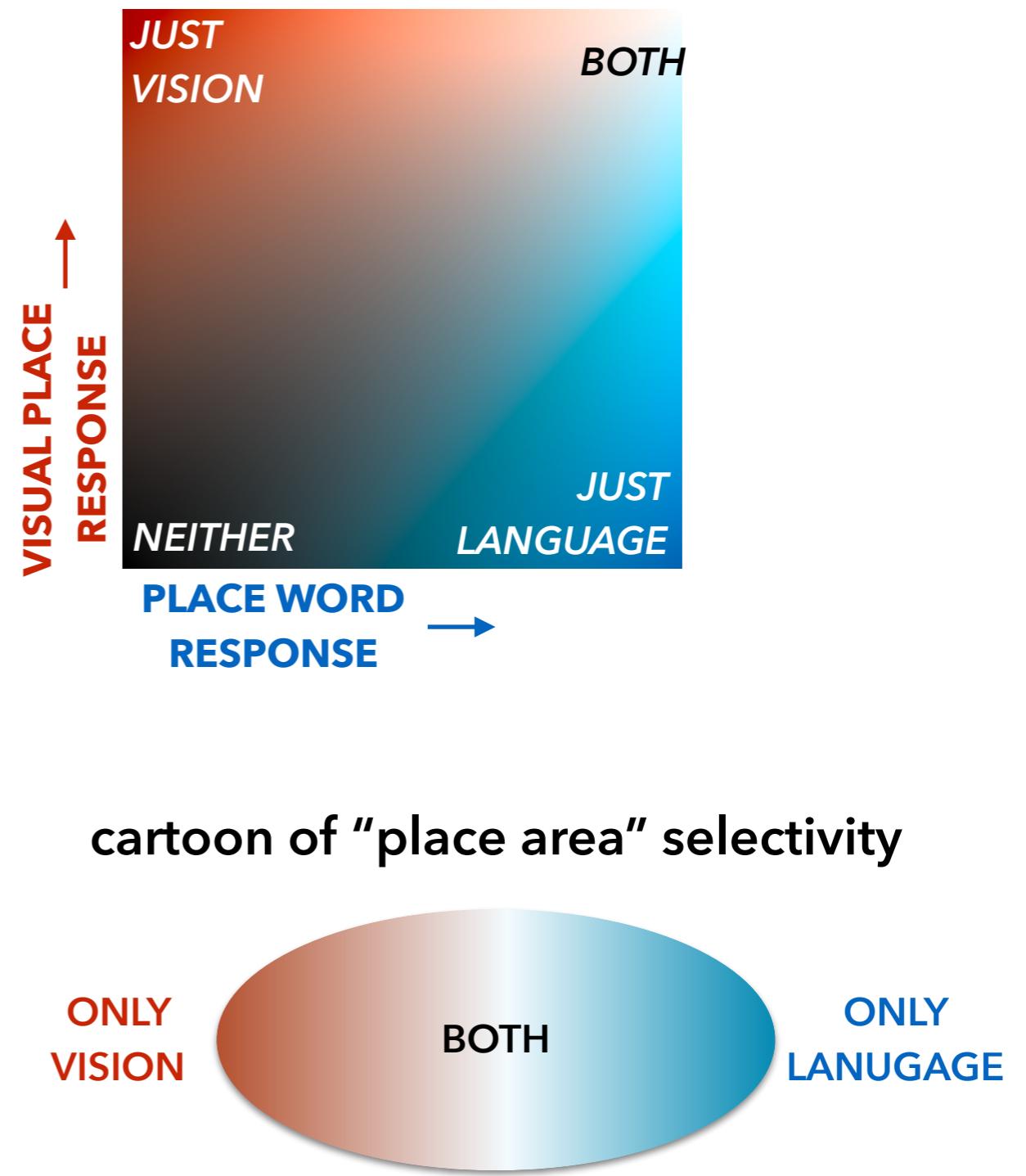
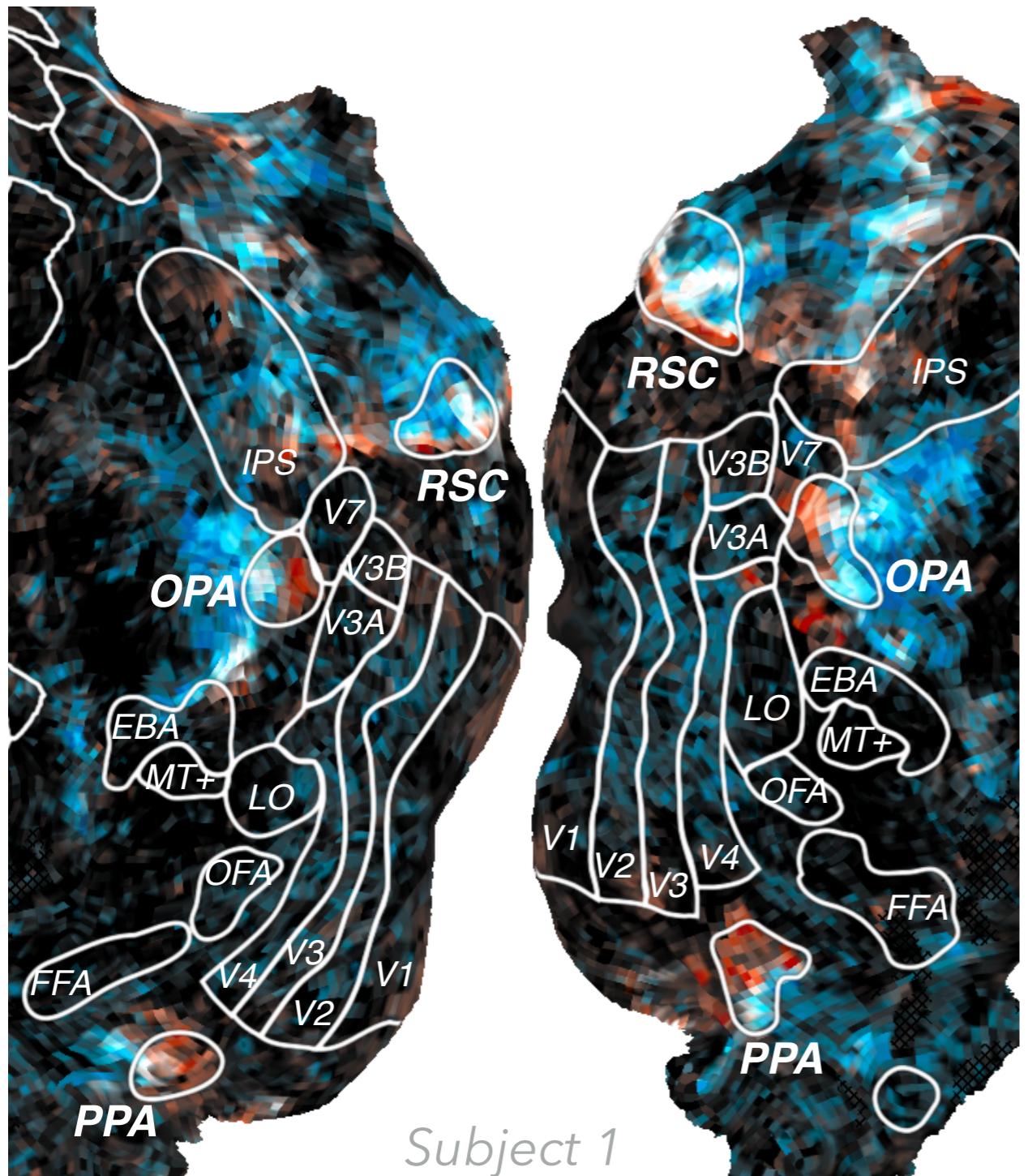
~80k voxels / subj.



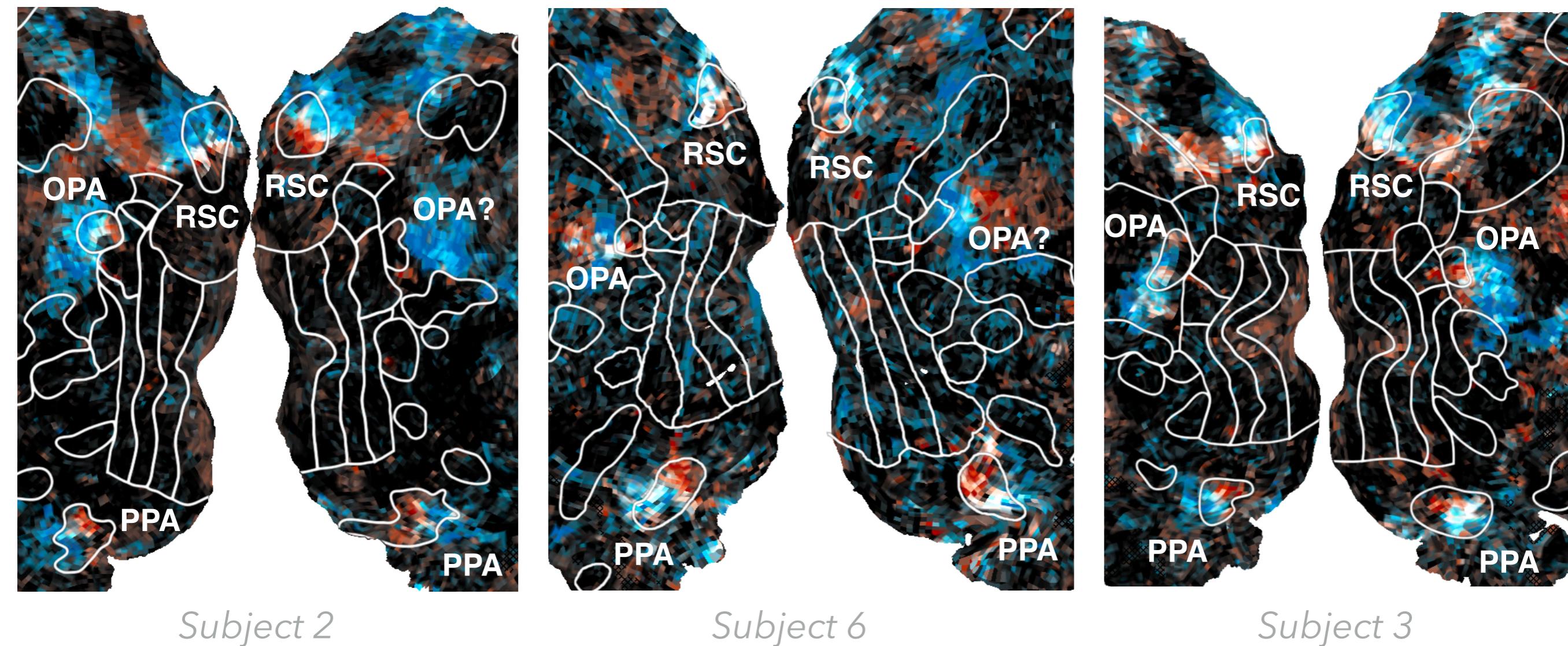
Language semantic
models

985 features

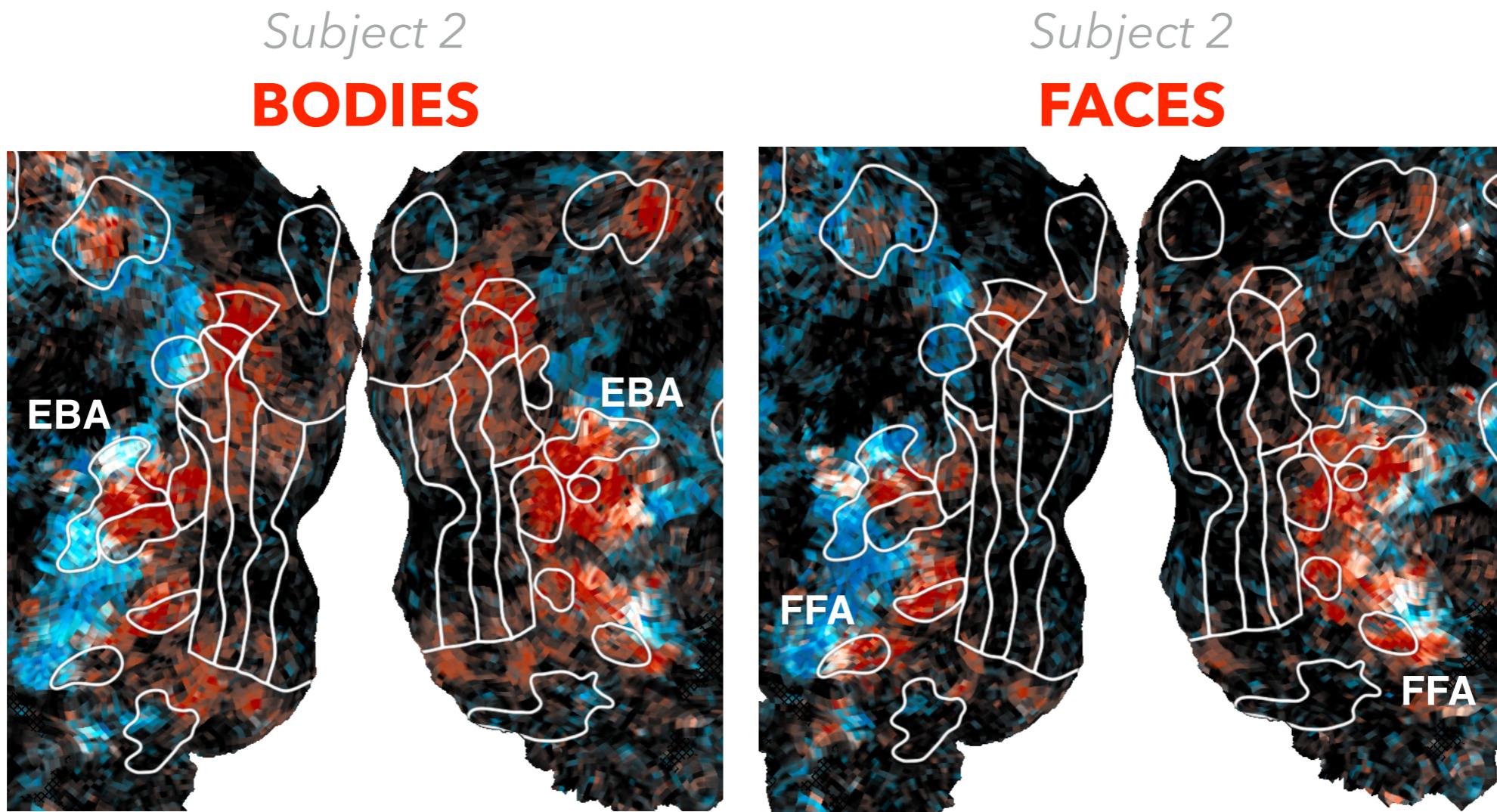
ONE CATEGORY: PLACES



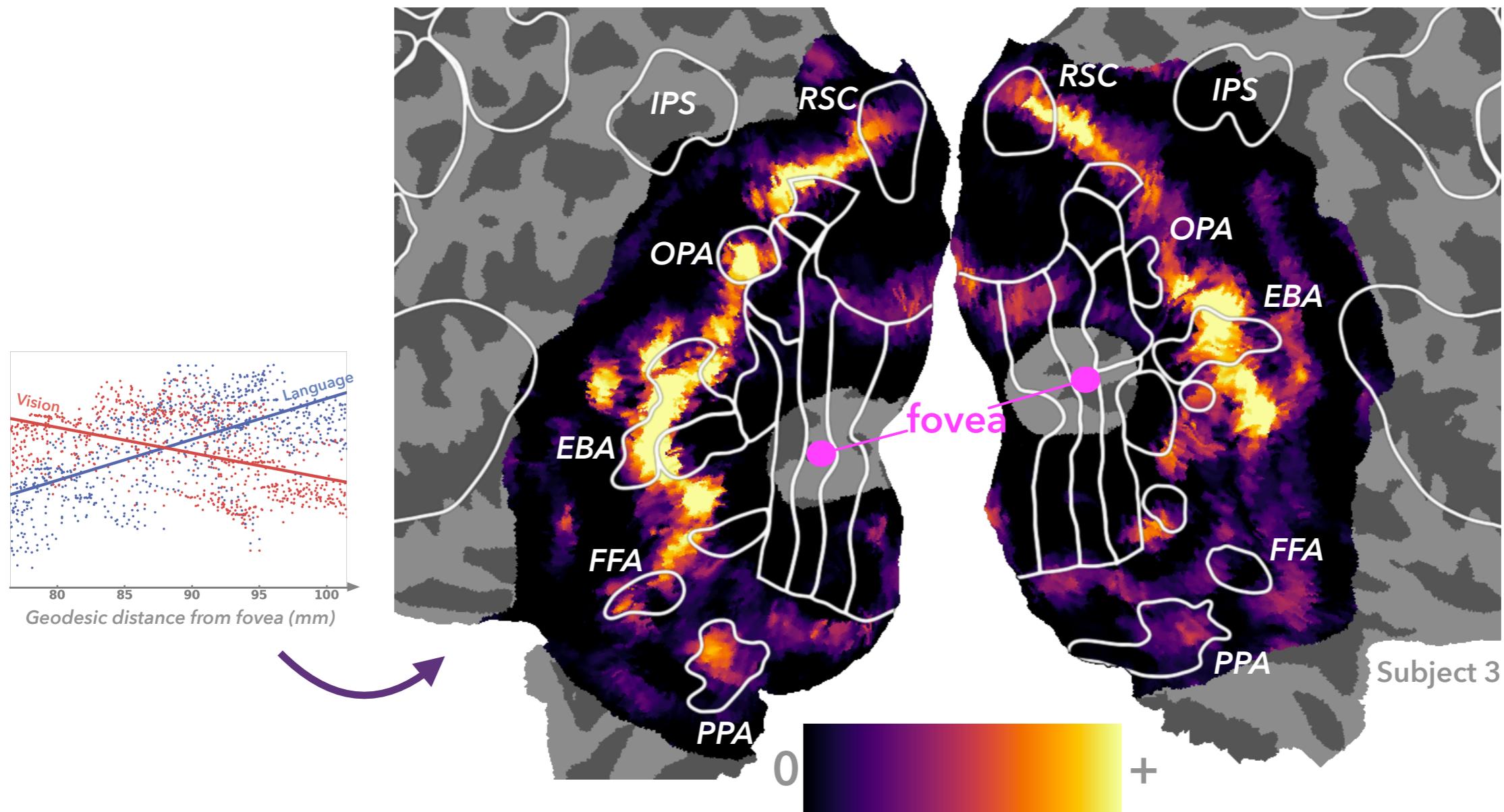
ONE CATEGORY: PLACES



GRADIENTS ALSO APPEAR FOR OTHER CATEGORIES



GENERAL PROPERTY!



Sara Popham



slope(Language) – slope(Visual)

UNTIL

NEXT

TIME