Neural coding of scene volume

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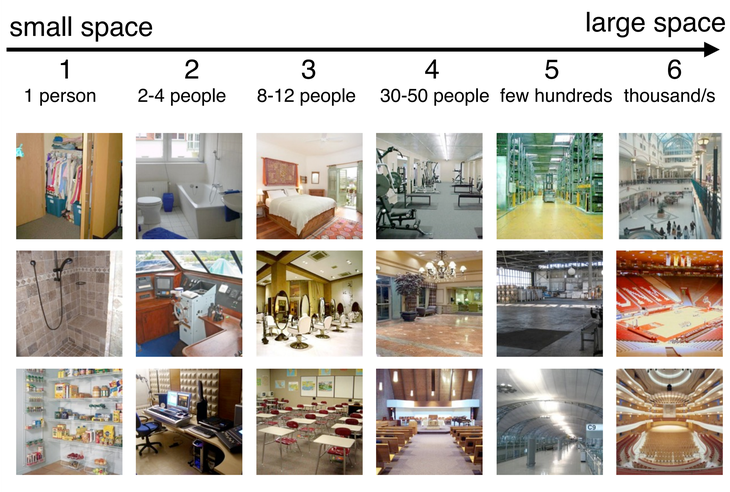
Introduction

- Everyday computation of scene volume guides navigation and interactions with people and objects in space
- Spatial boundary representation of a scene in the PPA, RSC; Content representation in LOC, FFA (Park et al., in revision; VSS 2009; Epstein & Kanwisher, 1998)

How is the spatial volume of a scene represented in the brain?

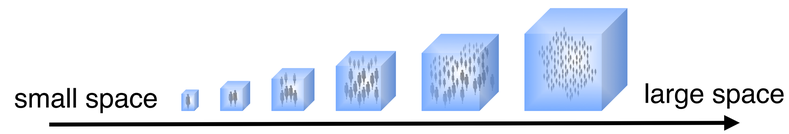
Methods

- **Condition**

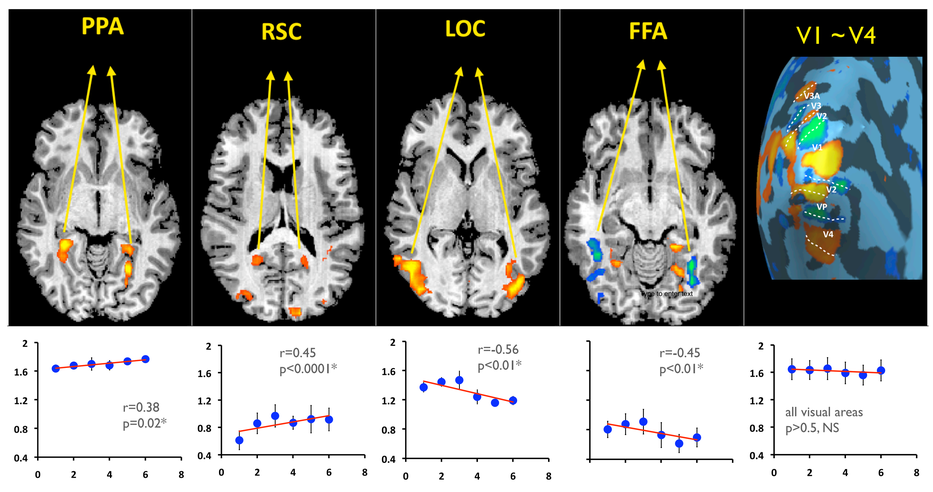


- Blocked design (16 s w/ 16 images per block)
- One back repetition task
- 3T Siemens scanner, TR=2s, 3x3x3 voxels
- No spatial smoothing; Talairach transformation for whole brain group analysis

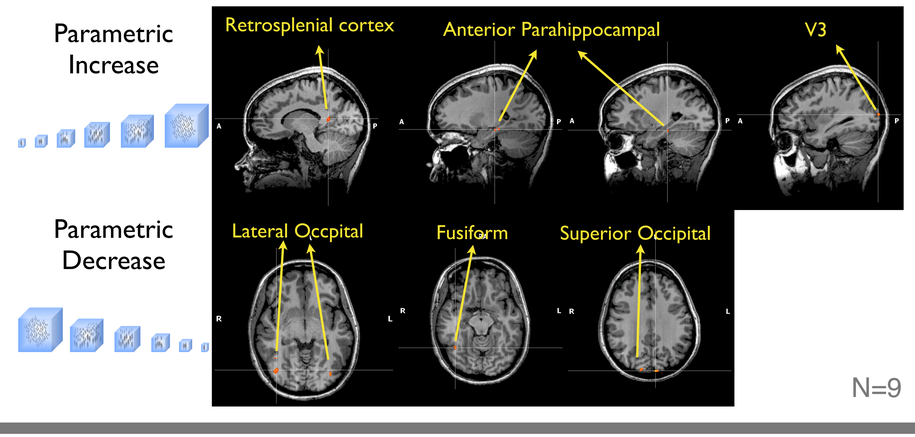
Parametric representation of scene volume



- **ROI analysis:**
  Parametric modulation by scene volume across different visual areas



- **Whole brain group random effects analysis w/ parametric regressors**

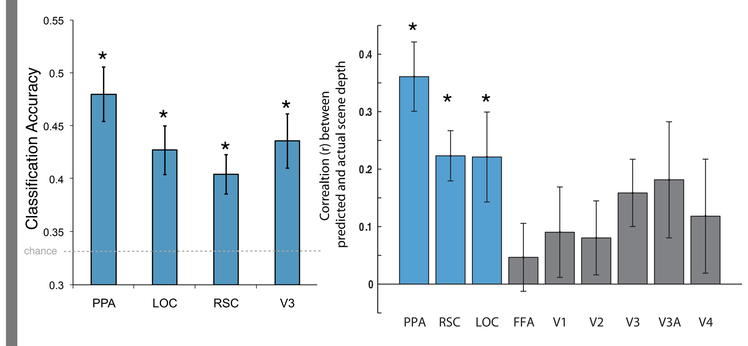


N=9

Pattern analysis

Testing the representation of scene volume information beyond the semantic category

- **Leave one category out classification:**
  - **3-way SVM classification:**
    - classification for small, medium, large volume
    - trained with 5 categories per scene volume & tested on a *completely novel category*
  - **Ridge regression:**
    - using weighted sum of voxels to predict the spatial volume (6 volumes)
    - trained with 2 categories per scene volume & tested on a *completely novel category*



3-way SVM **Ridge regression**

Summary

- **Scene volume is parametrically represented in a range of areas in the visual pathway**
- **Spatial volume of a scene is represented independently of the semantic category of a scene**