

The HCP 7T Retinotopy Dataset: A new resource for investigating the organization of human visual cortex



Noah C. Benson¹, Keith W. Jamison², An T. Vu^{3,4}, Jonathan Winawer^{1,5}, Kendrick Kay⁶

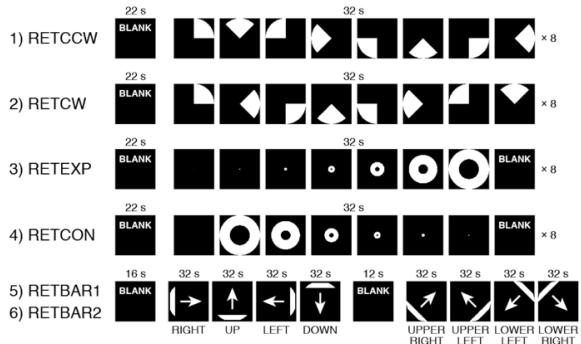
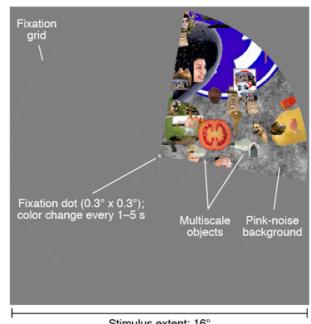
¹Department of Psychology and ⁵Center for Neural Science, New York University
³Center for Imaging Neurodegenerative Diseases, University of California San Francisco
⁶Department of Radiology, University of Minnesota



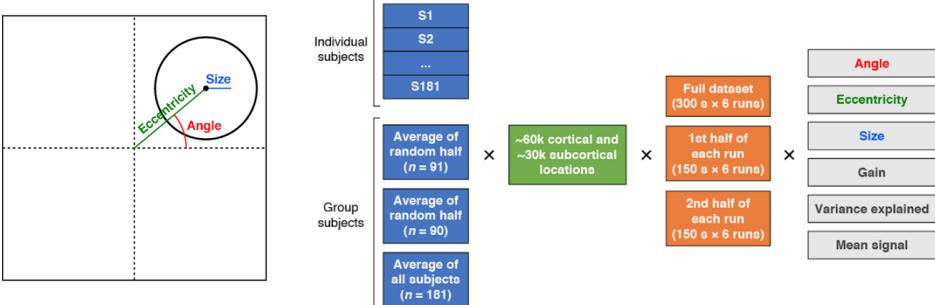
Introduction

- The Human Connectome Project includes **181 subjects** who participated in retinotopic mapping experiments in a 7T scanner.
 - We have solved and published the population receptive field (pRF) models for these 181 subjects.
 - The dataset has been described thoroughly:
Benson NC, Jamison KW, Arcaro MJ, Vu AT, Glasser MF, Coalson TS, Van Essen DV, Yacoub E, Ugurbil K, Winawer J, Kay K (**2018**)
The HCP 7T Retinotopy Dataset. *bioRxiv* doi:10.1101/308247

Stimulus



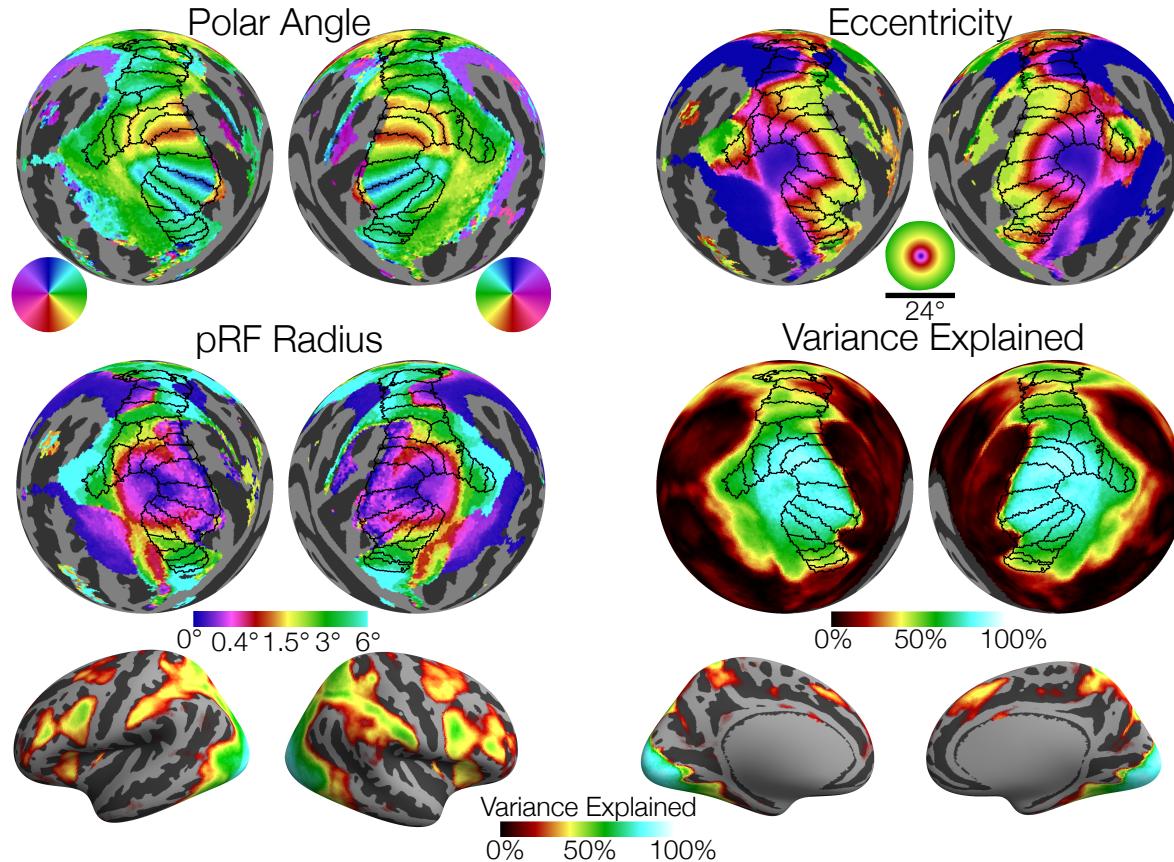
Deliverables



- Data were fit by a compressive spatial summation model (Kay *et al.*, 2013) using analyzePRF (<http://kendrickkay.net/analyzePRF/>).
 - Data were additionally split into two halves and solved separately to assess reliability.
 - 3 group-average subjects (full dataset, half1, half2) were also included by averaging the time-series across subjects.

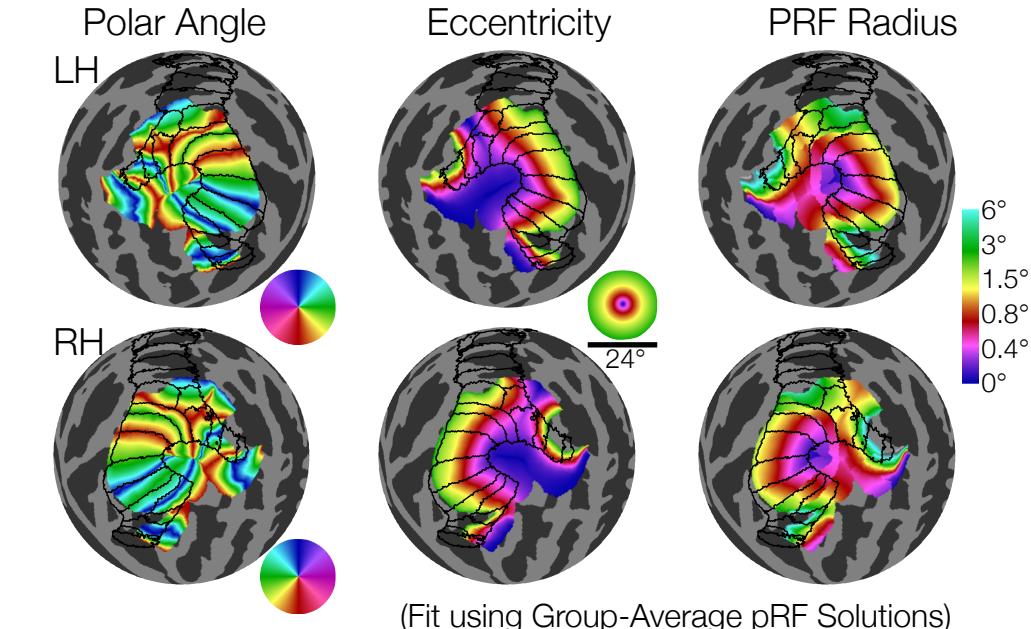
Group-average pRF Solutions

(Shown with Wang et al. (2015) atlas lines)



Derived Retinotopic Atlas

(Shown with Wang et al. (2015) atlas lines)



Conclusions

- The HCP 7T Retinotopy Dataset is the largest dataset of its kind and is freely available (osf.io/bw9ec).
 - The Dataset can be used for map discovery, for quantifying individual differences between subjects, or for comparison to other HCP metrics.
 - A new retinotopic atlas has been fit using this dataset and is freely available (github.com/noahbenson/neuropythy).
 - Group-average analysis indicates that ~41% of cortex is visually active ($r^2 > 10\%$) and ~50% of visually active cortex is foveal (eccentricity $< 1^\circ$).

For Further Details



tinyurl.com/hcp7tret

References

- Van Essen DC *et al.* (2013) The WU-Minn Human Connectome Project: An overview. *NeuroImage* **80**:62-79.
 - Kay KN, Winawer J., Mezer A, Wandell BA (2013) Compressive spatial summation in human visual cortex. *J Neurophysiol* **110**:481-94.
 - Wang L, Mruczek RE, Arcaro MJ, Kastner S (2015) Probabilistic Maps of Visual Topography in Human Cortex. *Cereb Cortex* **5**:3911-31.
 - Benson NC, *et al.* (2018) The HCP 7T Retinotopy Dataset. *bioRxiv* doi: 10.1101/308247

