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

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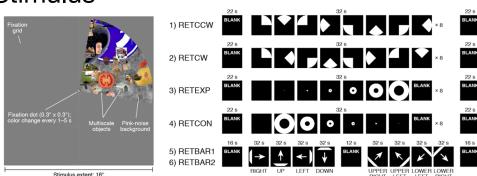[6]Department of Radiology, University of Minnesota

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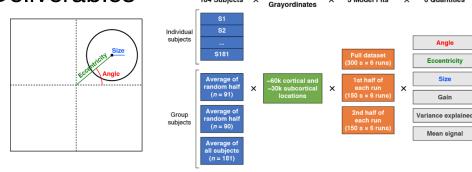## Introduction

- 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
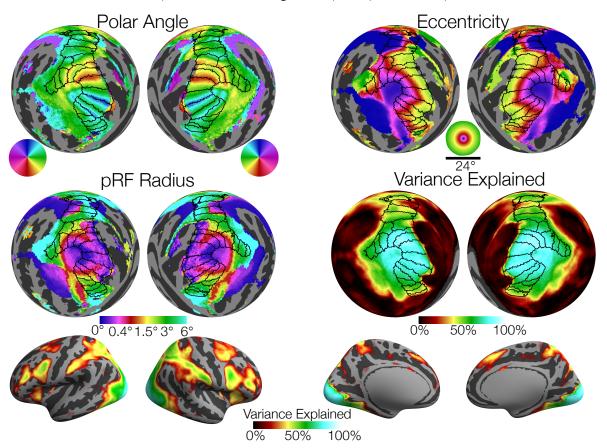
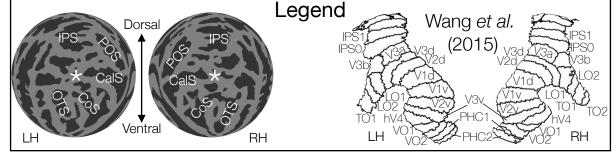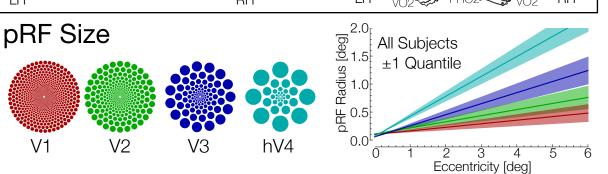## Stimulus

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

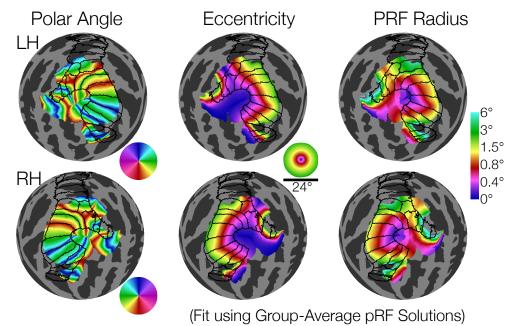(Shown with Wang et al. (2015) atlas lines)

Polar Angle

Eccentricity

pRF Radius

0° 0.4° 1.5° 3° 6°

Variance Explained

0% 50% 100%

Variance Explained
0% 50% 100%

Legend

Wang *et al.* (2015)

pRF Size

V1 V2 V3 hV4

All Subjects ±1 Quantile

Derived Retinotopic Atlas

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

Polar Angle Eccentricity PRF Radius
LH

RH

(Fit using Group-Average pRF Solutions)

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°).

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