Appendix A

Supplementary Figures for Chapter 2
**Supplementary Figure 1.** Related to Figure 1B. pRF polar angle estimates of the average HCP subject in the three-dimensional volume representation (related to Figure 1B). This figure depicts the three cerebellar clusters (OMV (A), VIIb (B), and VIIIb (C)) in the volume using the 0.5mm MNI brain as anatomical reference. Insets are 200% magnification.
Supplementary Figure 2. Related to Figure 2. pRF polar angle, eccentricity, size and explained variance for different masks. pRF parameters projected onto flattened representations of the cerebellum for the different masking procedures (see Methods). The first column shows all voxels where explained variance is greater than the average participant threshold of 9.8% determined in the original paper (Benson et al., 2018). The white ovals indicate voxels that are removed when deselecting voxels on the border between the cerebellum and cerebrum (the ‘cortical spill’ mask, second
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column). The third column shows voxels included in the final analysis. Here, pRFs that predominantly overlap with the fixation point are deselected ('fixation mask'). dva: degrees of visual angle.
Supplementary Figure 3. Related to Figure 2 and 3. Across and within participant stability of the HCP retinotopy cerebellar results (A) Polar angle on the flattened cerebellar representation and eccentricity-size relations for the top, middle and
bottom 5 participants in the HCP dataset. For participant ranking see Methods. In the top 5 participants, flattened representations of polar angle begin to show features of the maps uncovered in the HCP ‘average participant’, and show positive eccentricity-size relations in most regions. However, results start to break down in the middle and bottom 5 participants. These results outline that retinotopic maps in cerebellar cortex are not easily identified in individual participants with 30 minutes of retinotopic data at 7T. This is possibly the result of the lower BOLD SNR in the cerebellum compared to the cerebrum (Pfaffenrot et al., 2018). Shaded regions in the eccentricity-size relations reflect 95% confidence intervals of linear fit parameters within single participants. (B) Flattened representations of polar angle and eccentricity and eccentricity-size relations for the HCP ‘average participant’ based on split halves of the participants and of the experimental runs. Shaded regions in the eccentricity-size relations reflect 95% confidence intervals of linear fit parameters across voxels within the different HCP average participants. (C) Polar angle visual field coverage for the HCP ‘average participant’ based on split halves of the participants and of the experimental runs. This shows that the topographic principles uncovered in the HCP ‘average participant’ are highly stable both across and within participants. We note that these estimates cluster around the horizontal meridian, which is likely a result of averaging across participants (Amano et al., 2009). (D) Pearson (for eccentricity and size) and circular (for polar angle) correlations of pRF parameters in the HCP ‘average participant’ across split halves of the data along runs and along participants. This shows that pRF parameters are stable both across and within participants. The only non-significant correlation is that of size in OMV. However, pRF sizes here are all exceedingly small resulting in very little variation. Error bars here indicate 95% confidence intervals of the correlation coefficient across voxels. (E) Projections of polar angle and eccentricity on a line in two-dimensional SUIT surface space indicated by the white arrows in the flatmaps in Figure 2 G and H. The different lines reflect the differently split HCP average participants (both across and within subjects). Data line width reflects 95% confidence intervals of the mean across vertices in the different average HCP participants for each decile in the projected vertices. Vertical dashed lines demarcate the point of polar angle reversal. This shows that the polar angle structure of these maps is highly stable both across and within participant splits of the data. In addition, the eccentricity progressions are comparable across splits. dva: degrees of visual angle.
Supplementary Figure 4. Related to Figure 1 and 2. Data from separate 7T experiment. (A) Results for two individual subjects show clear maps in the thalamus and superior colliculus, confirming data quality beyond the visual cortex. (B) Data and pRF fits for two exemplar cerebellar voxels with differing visuospatial preferences. (C, D) Volume views of the cerebellum in the two participants reveal clusters of ipsilateral visuospatial preferences in locations that closely agree with the clusters found in the HCP average participant (including OMV, VIIb and VIIIb). (E) Side-by-side comparison of the pRF results from the Brissenden study (Brissenden et al., 2018), from the HCP average participant, and from the two presently measured participants. This shows that the cluster uncovered in the Brissenden study closely matches our cluster VIIb. (F) Maps of explained variance in the HCP average participant and in the presently measured participants. In the HCP data, the $R^2$ is not a cross validated measure; in our data, $R^2$ is
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computed using a 10-fold cross-validation procedure (see Methods). This shows that
cluster extents are very comparable in individual subjects compared to the HCP
average participant, especially in clusters OMV and VIIb. In addition, the angular
progressions found in the individual subjects match with those in the HCP average
participant, again especially in clusters OMV and VIIb. Yet, the exact location of the
clusters is somewhat different to the HCP average participant. This could be due to
ture individual differences in cluster location. In the cortex, maps are known to vary
substantially between subjects (Wandell et al., 2007). However, this variation in
location could also be the result of differences in spatial alignment between the
individual subject data and the MNI template. The relative dip in pRF explained
variance in area VIIIb could be due to the position of this area, being relatively inferior
and near the fourth ventricle, a region where the B1 field and, hence, SNR is relatively
low, even in the multi-transmit setup.