
Title: Pinwheel cartography: Novel visual field map cluster within human ventro-lateral occipital cortex

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Abstract: **INTRODUCTION:** The object-selective lateral occipital complex (LOC) in human visual cortex has historically been described as a region that is not retinotopically organized. Recently, however, there has been growing interest in the relationship between retinotopy and object selectivity across this region. Larsson et al. (2006) defined two hemifield maps on the dorsal aspect of lateral visual cortex, LO-1 and LO-2. In addition, Sayres and Grill-Spector (2008) demonstrated evidence for retinotopic modulation in LOC regions inferior to LO-2. Recently, Barton and Brewer (under review) have defined organized hemifield representations across LOC (LO-1 to LO-6) and have proposed that pinwheel clusters of visual field maps represent a general organizing principle across human visual cortex. In this model, sets of radially orthogonal visual field maps are organized into clusters around a discrete, concentric fovea and subserve similar visual computations. Following this new pinwheel cluster paradigm, we have identified additional maps within human LOC, lateral/superior to the VO cluster (Brewer et al., 2005) and the PHC-1 and PHC-2 maps (Arcaro et al., 2009). Here we discuss the organization and properties of the maps within this ventro-lateral occipital (VLO) cluster.

METHODS: We measured angular and eccentric retinotopic organization and population receptive fields across visual cortex using fMRI and population receptive field (pRF) modeling (Dumoulin & Wandell, 2008). We model pRFs as 2-dimensional differences of Gaussians with preferred centers (x, y) and spreads (sigma), convolve the predicted response to the stimuli with the haemodynamic response function, and fit the best population receptive field independently to each voxel via a least-squares method. Retinotopic stimuli consisted of black and white, drifting bar apertures comprised of flickering checkerboards, 11° in radius.

RESULTS/DISCUSSION: Our data reveal a cluster of four maps in VLO cortex that combine into a radially orthogonal set of hemifield representations, reversing from one map to the next around a central, discrete fovea. This VLO cluster is located superior/lateral to the VO cluster and PHC-1 and PHC-2 maps, anterior to the LO-1 to LO-6 maps, and inferior to the inferior temporal occipital (ITO) cluster (Barton and Brewer, under review). These results suggest that the LOC may consist of several pinwheels of visual field map clusters spanning dorsal and ventral sections of lateral occipital cortex. In addition, these measurements support the proposal of pinwheel clusters as an organizing principle spanning human visual cortex.

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