**Population receptive field modeling of orientation-contrasted retinotopy**
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**Abstract:**
The abundance of orientation selective neurons throughout early visual cortex is well known. However, in human functional magnetic resonance imaging (fMRI) the assessment of orientation sensitivity is still relatively uncommon. In this experiment, we use fields of oriented Gabor patches as a means to map and characterize properties of the human early visual cortex. Participants in our fMRI experiment viewed arrays of Gabor patches composing a foreground (a bar) and a background. These could only be distinguished on the basis of the difference in orientation of their patches.

In our analyses, we compare the population receptive field (pRF) properties obtained using our new orientation contrast-based retinotopy (OCR) to those obtained using classic luminance contrast- based retinotopy (LCR). Our results show that BOLD responses obtained during OCR were lower than those for LCR.

Nevertheless, visual field maps for LCR and OCR are highly comparable. The explained variance (EV) of the pRF models for OCR was lower than for those based on LCR. Yet, for OCR EV remained constant over eccentricity, while for LCR it tended to drop with increasing eccentricity, which was most marked in visual areas LO1 and LO2. For early visual areas (V1-V4), the eccentricity assigned to a voxel's pRF was comparable for LCR and OCR, yet OCR-based modeling resulted in smaller pRFs. For LO1 and LO2, both pRF eccentricity and size differed substantially between LCR and OCR, with lower eccentricity and smaller sizes estimated for OCR.

We propose that orientation contrast retinotopy, rather than luminance contrast provides a better option for spatial mapping of the human visual cortex in particular for higher order areas, such as those involved in global shape perception. The results inform about the importance of using accurate visual field mapping techniques. This new and flexible method can have a wide application in future experiments.

In this talk, I will discuss why OCR may result in more accurate pRF property estimation and may therefore be the method of choice in particular for characterizing higher order visual areas.