

Stereomotion processing in the non-human primate brain

Yseult Héjja-Brichard^{1,2}, Samy Rima^{1,2}, Emilie Rapha^{1,2}, Jean-Baptiste Durand^{1,2}, Benoit R. Cottetereau^{1,2}

¹ Université de Toulouse, Centre de Recherche Cerveau et Cognition, Toulouse, France

² Centre National de la Recherche Scientifique, Toulouse, France

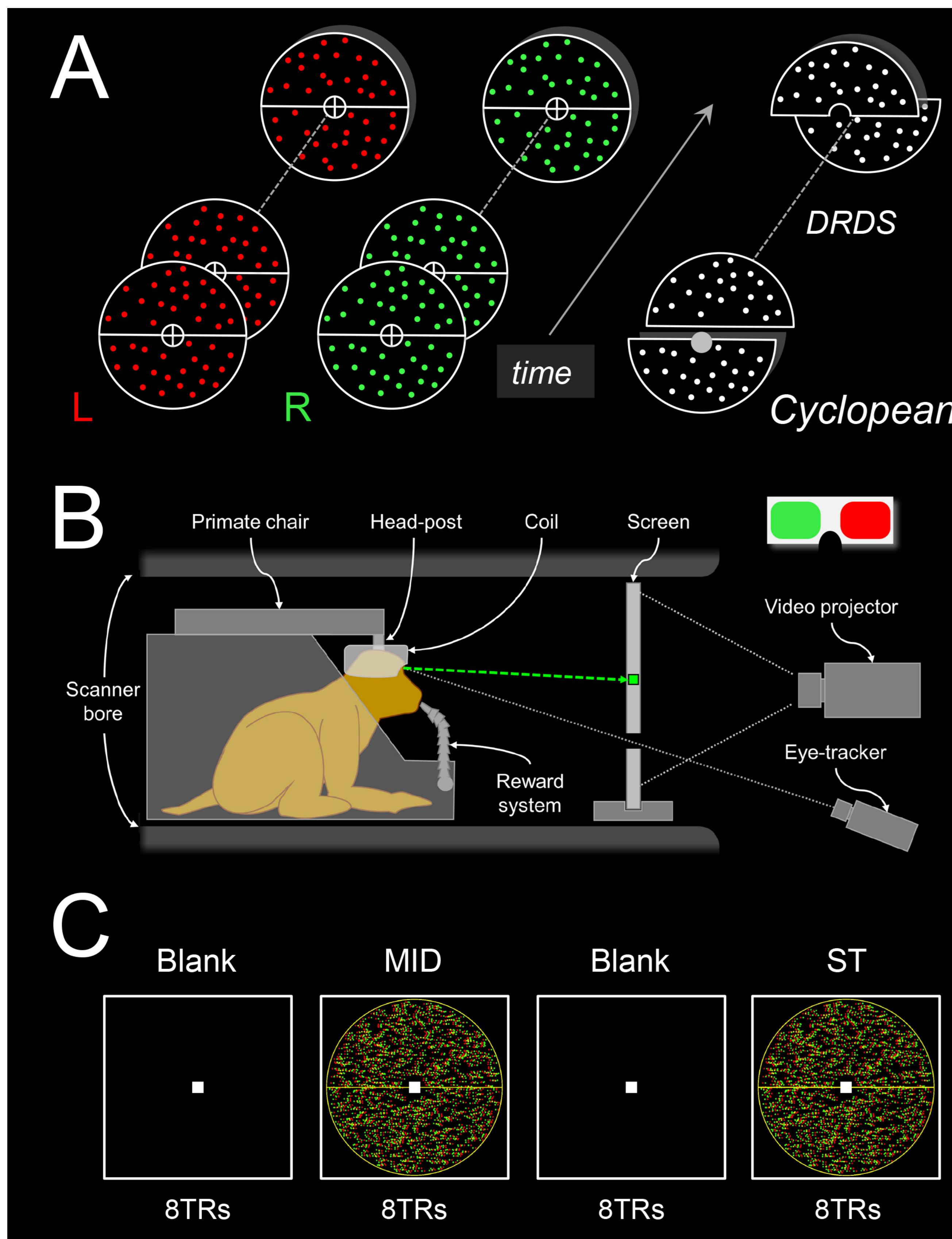
Contact: yseult.hejja@cnrs.fr

Overview

Motion perception is a fundamental property of the visual system in most animal species. Although numerous studies examined how the primate brain processes 2D motion, much less is known about how it encodes 3D motion. A few neuroimaging investigations in human found that stereomotion is processed within the hMT+ complex and/or its neighbourhood (Rokers, Cormack & Huk, 2007; Likova & Tyler, 2007). Here, we extend this work to non-human primate, using fMRI.

Methods

Fixation task: only runs with >85% fixation were further analysed (43 and 47 runs in total for M01 and M02, resp.)



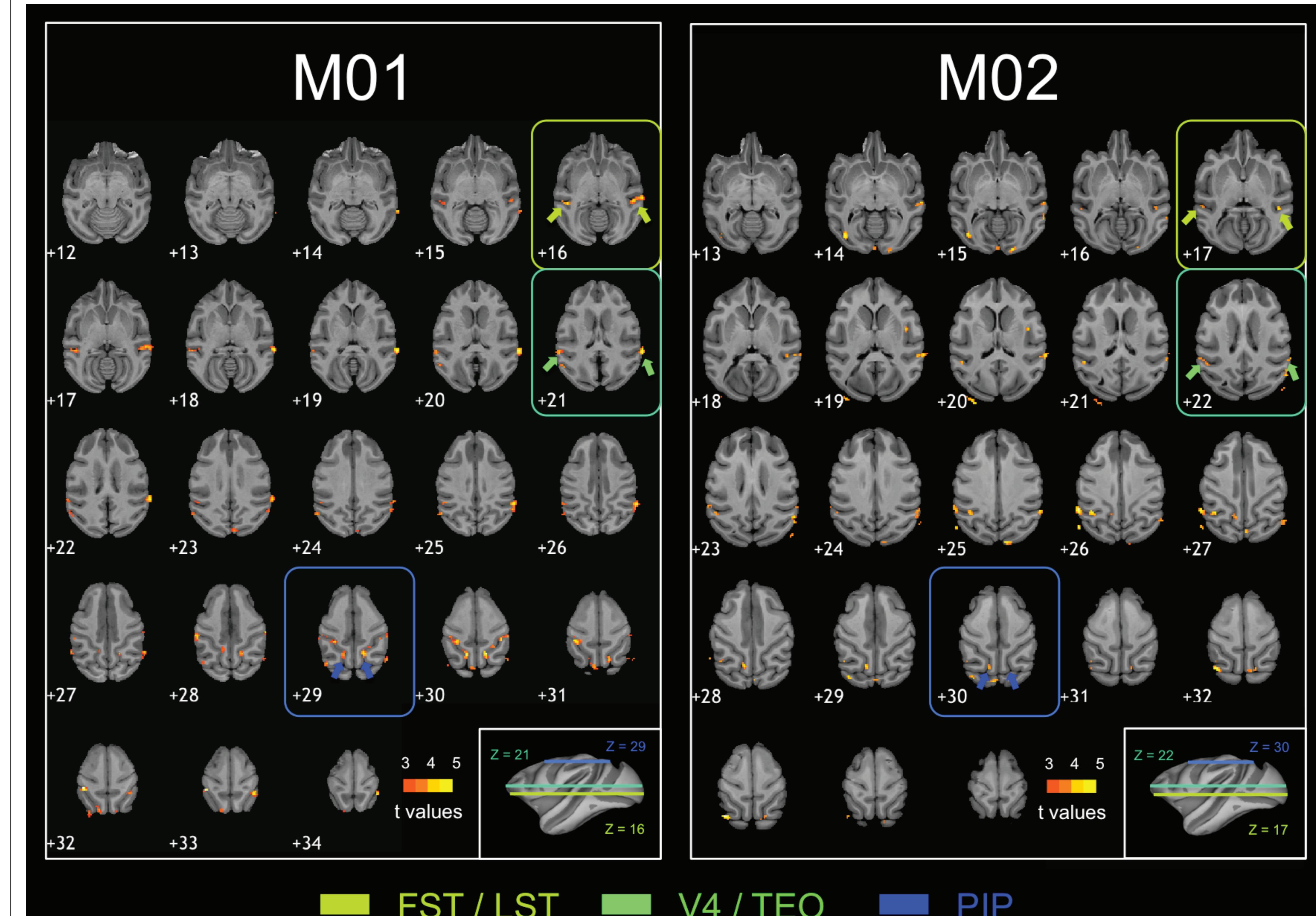
Preprocessing of the data

- slice-timing correction
- mean EPI template coregistration
- normalisation
- smoothing

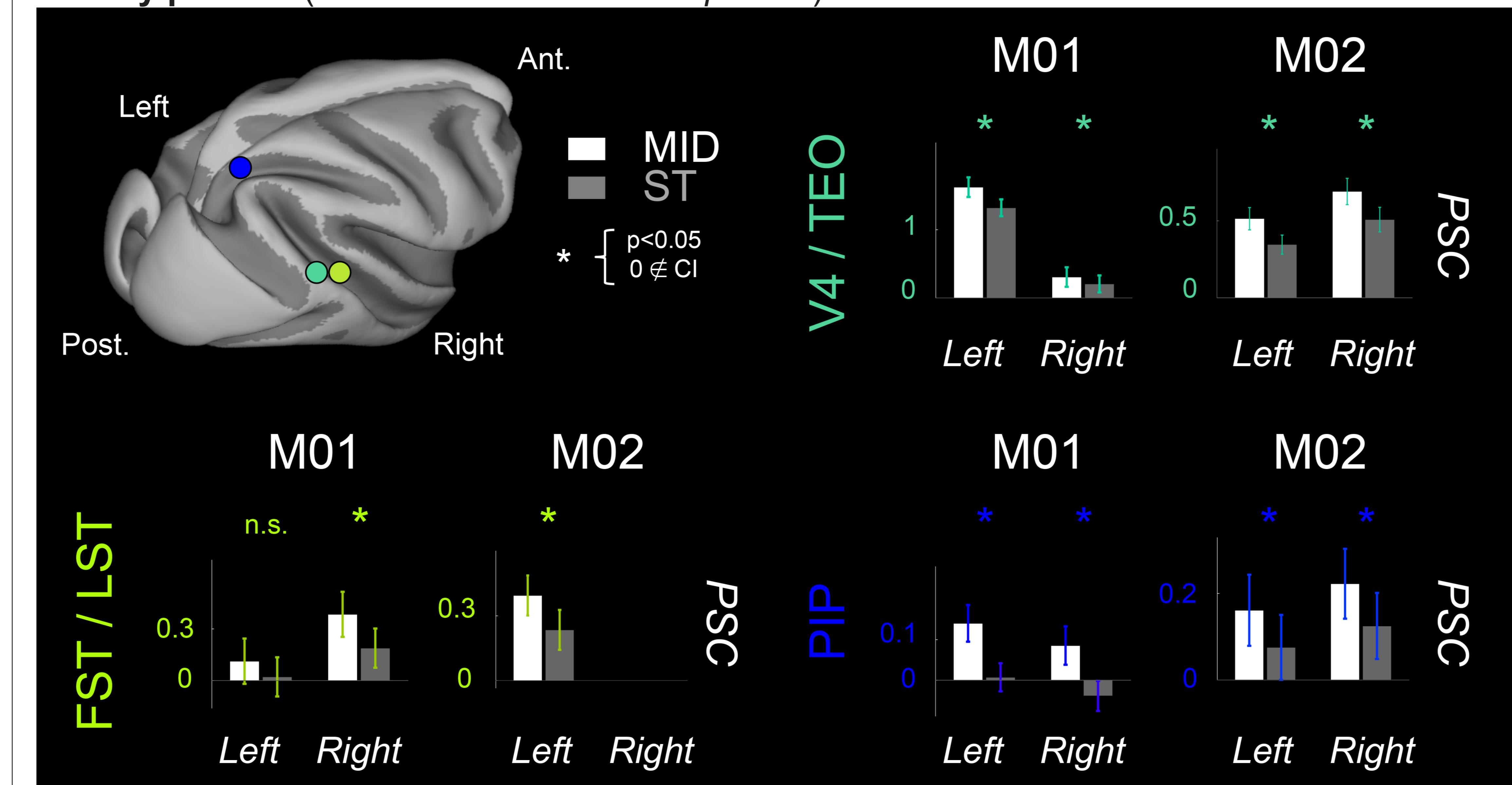
GLM analysis

- regressors of non-interest based on saccade detection and an adaptative PCA performed outside the brain

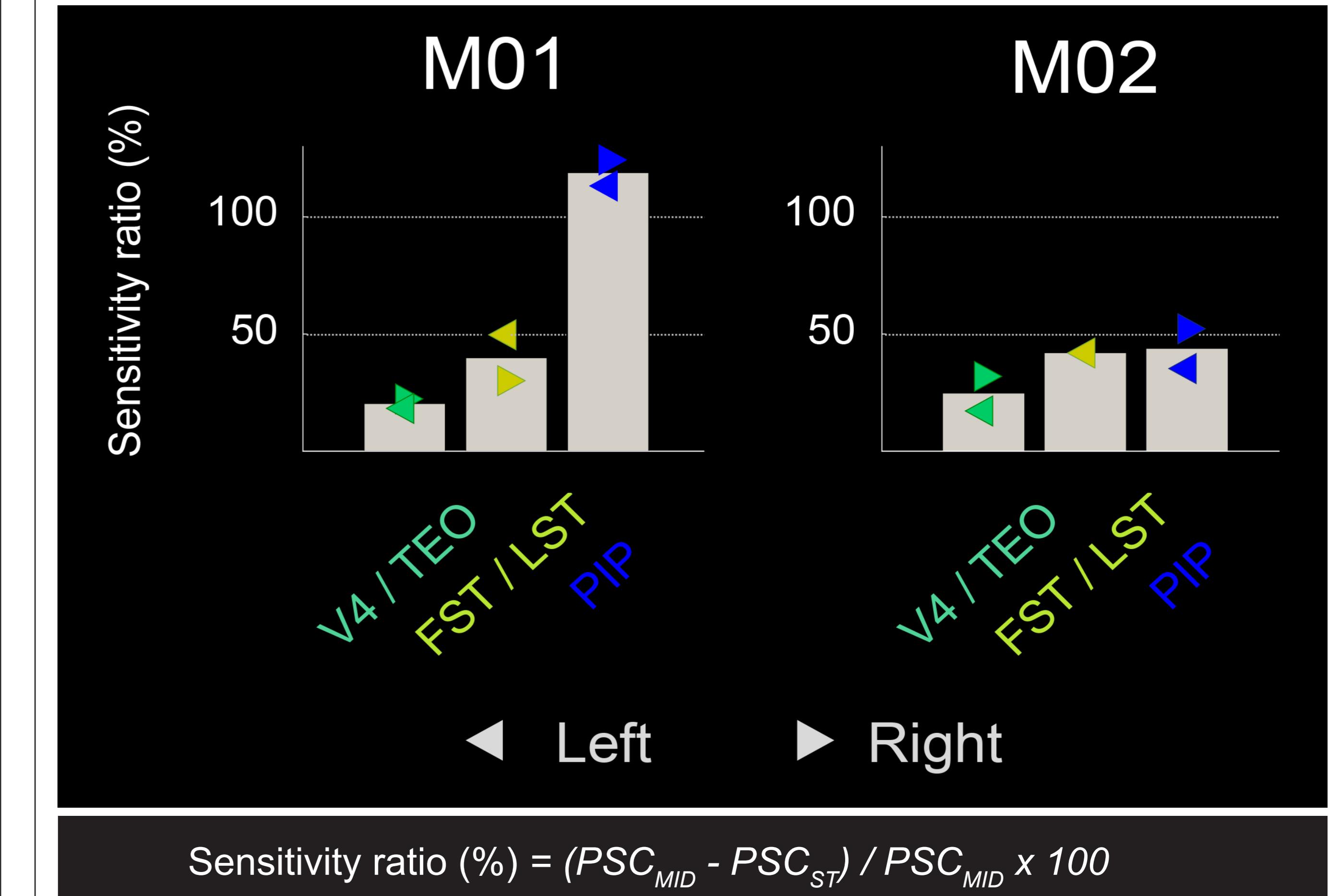
MID > ST contrast



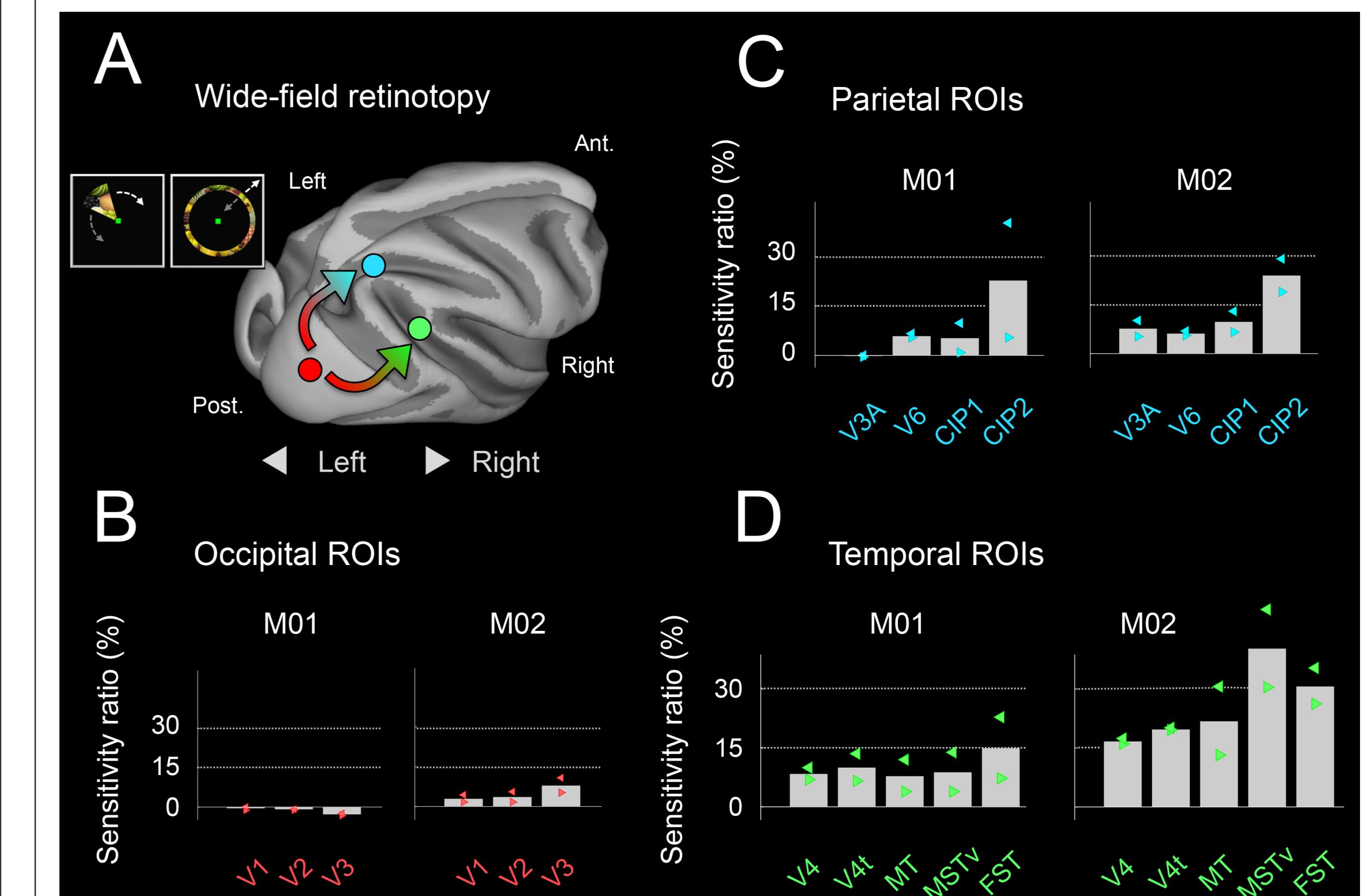
Activity profiles (in areas found in 4 hemispheres)



Contrast specificity



Retinotopic analysis



Take-home

In macaque, stereomotion is processed in both the temporal and the parietal cortex where areas V4/TEO and PIP showed robust and consistent activations in our two animals.

Bibliography

- Cottetereau, B.R., Smith, A.T., Rima, S., Fize, D., Héjja-Brichard, Y., Renaud, L., ... & Durand, J.B. (2017). Processing of egomotion-consistent optic flow in the rhesus macaque cortex. *Cerebral Cortex*, 27(1), 330-343.
- Likova, L.T. & Tyler, C.W. (2007). Stereomotion processing in the human occipital cortex. *Neuroimage*, 38(2), 293-305.
- Nelissen, K., Vanduffel, W., & Orban, G.A. (2006). Charting the lower superior temporal region, a new motion-sensitive region in monkey superior temporal sulcus. *Journal of Neuroscience*, 26(22), 5929-5947.
- Rokers, B., Cormack, L. K., & Huk, A. C. (2009). Disparity- and velocity-based signals for three-dimensional motion perception in human MT+. *Nature Neuroscience*, 12(8), 1050-1055.