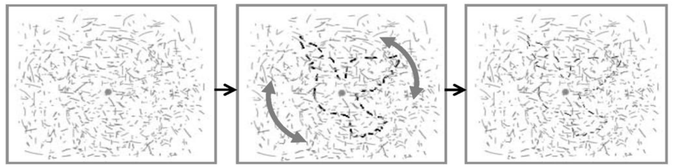
The persistence of global form (Part II): *Figure-specific fMRI activity in V1*

Cheryl Lavell, Lars Strother, and Tutis Vilis

***University of Western Ontario, Centre for Brain & Mind* - London, Ontario CANADA**

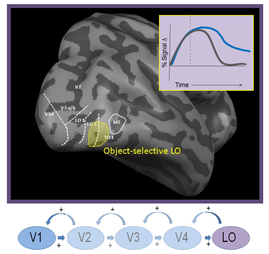
Introduction

Persistence of global form refers to a type of brief perceptual memory.



camouflaged (form not visible) → **visible** (e.g. form-from-motion) → ***persist*** / ***vanish***

Persistence-related fMRI activity is observed in object-selective **lateral occipital cortex** (LO). This is evident in sustained positive fMRI signal for ***persist*** versus ***vanish*** conditions [1-4].

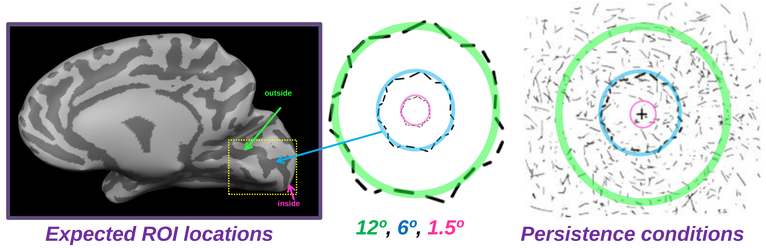


V1 also shows persistence-related fMRI activity, some of which may be due to feedback from LO ([ref. 1]; see Part I companion poster).

Question: Does all of V1 show the same pattern of figure-related fMRI activity as LO or is this pattern restricted to the portion of V1 corresponding to the size/eccentricity of the figure?

Methods

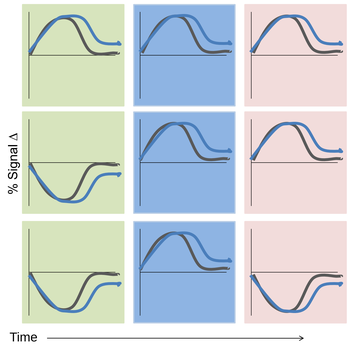
*We identified three **eccentricity-based** regions of interest (**ROIs**) in V1*



*We then measured fMRI **persistence-related responses** in each ROI for three ring figures (matched by size to the ROI localizer stimuli).*

We performed additional fMRI localizer scans to identify **LO** (object-selective) and **MT** (motion-selective) and obtained retinotopic maps.

Predictions: Mid-sized Figure/Background



(A) **Positive** persistence-related activity in **all** ROIs

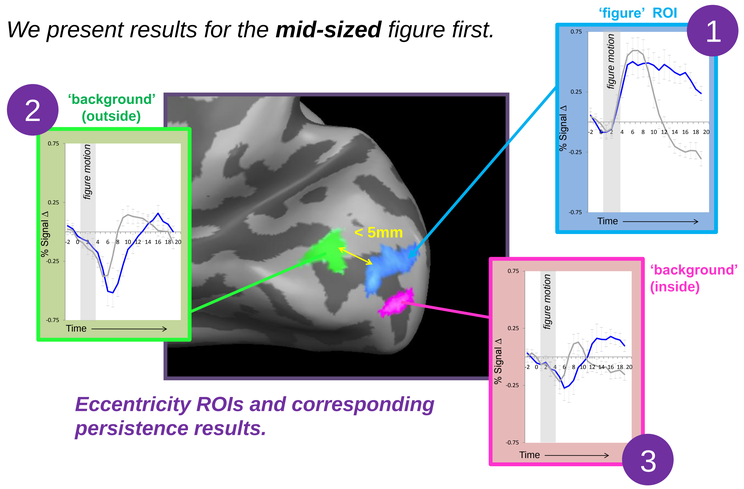
(B) **Negative** in peripheral ROI (i.e. outside of the figure) and **Positive** inside of figure

(C) **Positive** in figure ROI, **Negative** <u>both</u> inside and outside of figure

Results: Mid-sized Figure/Background

Using our three **eccentricity-based ROIs** (large, medium, small), we obtained event-related averages for our persistence experiments.

*We present results for the **mid-sized** figure first.*



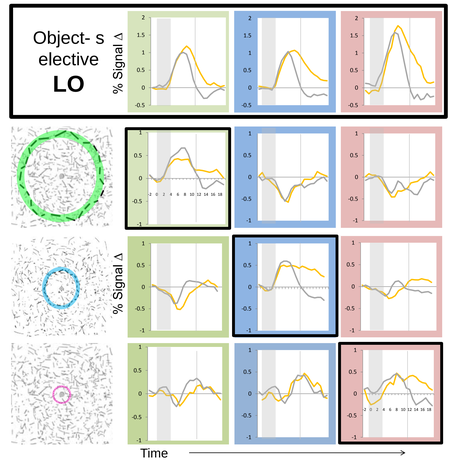
Eccentricity ROIs and corresponding persistence results.

1 **Figure ROI (medium):** We observed sustained <u>POSITIVE</u> fMRI responses to 'persist' in the mid-size ROI.

2,3 We observed predominantly <u>NEGATIVE</u> fMRI responses in our two **Background ROIs** (**large**=outside of figure; **small**=inside). These time courses **returned to baseline earlier** than those observed in our ring figure ROI.

Results: All conditions & ROIs

*For each figure size, we compared responses in the **V1 'figure'** and **'background' ROIs** and compared these to those in **LO**.*



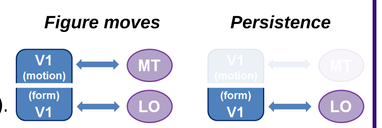
Persistence-related fMRI activity in **LO** was similar to that in previous studies [1-4].

Only the ***figure-related fMRI responses* in V1** (graphs along diagonal) resembled those in LO.

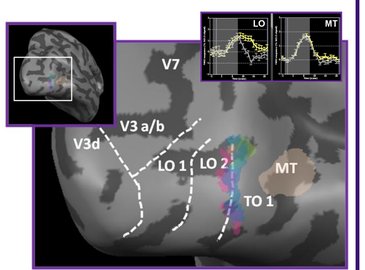
fMRI signal in 'background' ROIs was predominantly negative during the motion phase, suggesting suppression during figure-ground segregation (but not to the same degree during persistence).

Conclusions

(1) Persistence-related fMRI activity in V1 is similar to that in LO, in the **'figure' region of V1** (but not 'background' V1).



(2) Implication: V1 interacts with *both* LO and MT during form-from-motion. Only the **V1↔ LO** remains active during persistence, and is thus independent from the **V1↔ MT** circuit. ***Form and motion pathways are segregated as early as V1*** during persistence (both MT and LO receive input from V1 but only **V1↔ LO** shows persistence).



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