readme_general.md

Project title: Temporal tuning of repetition suppression across the visual cortex

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Abstract

One fundamental aspect of vision is processing and combining visual information over time. A phenomenon related to this aspect is neural repetition suppression - a reduction in neural responses to repeated compared to non-repeated visual input. While neural repetition suppression has been extensively studied and employed as a tool to investigate neuronal selectivity using fMRI, the temporal dynamics of repetition suppression have received less attention. An intriguing possibility is that the timescale over which repetition suppression occurs across the visual hierarchy is tuned to the temporal statistics of visual features. While previous studies indeed suggest that repetition suppression acts over increasingly longer timescales in anterior compared to posterior visual areas, a systematic investigation is lacking so far. Therefore, in the current experiment we aim to systematically study the influence of the temporal lag between successive visual stimuli on repetition suppression along the visual hierarchy using fMRI. In particular, we characterize BOLD responses to pairs of repeated and non-repeated natural images with inter-stimulus intervals ranging from milliseconds to a second, and quantify both the general temporal tuning of repetition suppression as well as inter-regional differences along the anterior-posterior axis of the visual system. We hope that this study will provide important insights into how the visual system combines visual information over time, as well as providing insights into the appropriate choice of fMRI repetition time lag when targeting specific brain areas.

Experiment Information

In this study 16 subjects were scanned with anatomical and task fMRI sequences, while they performed three different tasks (main repetition suppression task, retinotopic localizer, functional localizer). In the first three sessions participants performed the main repetition suppression task (4 runs in each session), in which they were presented with natural images while performing a 1-back task on a stream of centrally presented digits (NOTE: The first two subjects performed a different task, namely detecting a flicker of the fixation dot. For the first two subjects images were presented for 200 instead of 500ms). In the fourth session, participants first performed the functional localizer task (3 blocks), while doing a 1-back task on the presented images. Afterwards, they performed the retinotopic localizer task (6 blocks of rotating wedges, 1 block of expanding rings) while detecting color changes of the fixation cross. All tasks were implemented in Psychtoolbox. The dimcom files from the scanner were automatically streamed to the "raw" folder. The "logfile" folder contains behavioural log files and eyetracker data. The "participants" folder contains the exported CastorEDC files with all lab notes. The "scripts" folder contains the presentation scripts (Matlab, Psychtoolbox) for the three tasks. The "stimuli" folder contains the stimuli for the main task and functional localizer task.

```
DAC:.
    PPM_Fritsche_13JULY2017.pdf
    readme_general.md
    task-main_instruction.pdf

├───participants
        field_options.csv
        study_variablelist.csv
        participants.csv

├───logfiles
        readme_logfiles.md

    ├───subj-01
    ├───subj-02
    ├───subj-03
        ├───eye
                S3_R1_B1.edf
                S3_R1_B1.asc
                S3_R1_B2.edf
                S3_R1_B2.asc
                S3_R1_B3.edf
                S3_R1_B3.asc
                S3_R1_B4.edf
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                        3_09-Nov-2017_fLoc_1back_run1.mat
                        3_09-Nov-2017_fLoc_1back_run2.mat
                        3_09-Nov-2017_fLoc_1back_run3.mat
                        script_fLoc_1back_run1_09-Nov-2017.par
                        script_fLoc_1back_run2_09-Nov-2017.par
                        script_fLoc_1back_run3_09-Nov-2017.par

            ├───task-main
                    main_task_S3_Session1_Block1.mat
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                            main_task_S3_Session1_Block3.mat
                            main_task_S3_Session1_Block4.mat
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                            main_task_S3_Session2_Block2.mat
                            main_task_S3_Session2_Block3.mat
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                            schedule_S3_Session1_Block2.mat
                            schedule_S3_Session1_Block3.mat
                            schedule_S3_Session1_Block4.mat
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                            schedule_S3_Session3_Block3.mat
                            schedule_S3_Session3_Block4.mat
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                            Retinotopy_wedges_S3_Run2.mat
                            Retinotopy_wedges_S3_Run3.mat
                            Retinotopy_wedges_S3_Run5.mat
                            Retinotopy_wedges_S3_Run6.mat
                            Retinotopy_wedges_S3_Run7.mat
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        ├──subj-06
        ├──subj-07
        ├──subj-08
        ├──subj-09
        ├──subj-10
        ├──subj-11
        ├──subj-12
        ├──subj-13
        ├──subj-14
        ├──subj-15
        └──subj-16

├──raw
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    ├──sub-002
    ├──sub-003
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        ├──ses-mri02
        ├──ses-mri03
```

```
            └──ses-mri04

    ├──sub-004
    ├──sub-005
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    ├──sub-007
    ├──sub-008
    ├──sub-009
    ├──sub-010
    ├──sub-011
    ├──sub-012
    ├──sub-013
    ├──sub-014
    ├──sub-015
    └──sub-016

├──scripts
│      readme_scripts.md
│
│   ├──task-floc
│   ├──task-main
│   └──task-retinotopy
│
└──stimuli
       readme_stimuli.md

    ├──task-floc
    └──task-main
```