Population Receptive Field (pRF) mapping during reaching and saccades

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Ethical review	Approved WMO
Status	Pending
Health condition type	Other condition
Study type	Observational non invasive

Summary

ID

NL-OMON48811

Source
ToetsingOnline

Brief title
pRF during reaching and saccades

Condition

- Other condition

Synonym
not applicable

Health condition

the research does not addresses any medical condition

Research involving
Human

Sponsors and support

Primary sponsor: Rijksuniversiteit Groningen
Source(s) of monetary or material Support: Ministerie van OC&W

Intervention

Keyword: MRI, population receptive field mapping, reaching, saccades

Outcome measures

Primary outcome

The study parameter from the MRI scanner is the blood oxygen level dependent signal (BOLD), representing an indirect measure of the brain activity during the various conditions of the task.

Secondary outcome

During both experiments, the coordinate of the eye movements will be recorded, reflecting the eye position during the various conditions of the task.

Study description

Background summary

To plan and execute directed movements, such as reaching for a cup or looking at a traffic light, our brain needs to compute the exact location of the target and transform it into the appropriate movement trajectory. The target position is initially coded relative to the eyes, and then transformed into the coordinates system of the effector (eyes or hand) (Andersen and Buneo, 2002). Numerous topographical maps representing the spatial location of the target have been reported in human parietal cortex for eye (Sereno et al., 2001; Konen and Kastner, 2008) and hand movements (Hagler et al., (2007); Levy et al, 2007). The neurons in these maps carry out the transformations necessary to plan the direction of the movement of the specific effector. However, the precise role of each map, and the exact computations taking place are not well understood yet.

Study objective

This project aims at identifying and characterizing these maps and their properties and roles in the human brain.
To this end, we will employ pRF mapping (Dumoulin and Wandell 2008) which provides a biologically plausible means to characterize the spatial and non-spatial properties of the neuronal populations in each voxel. Recently, the pRF modelling has been applied to map the selectivity of visual neurons to orientation contrasts by Prof. Cornelissen*s lab (Yildirim, Carvalho and Cornelissen 2018).
The pRF modelling approach will allow us to measure the visual field map, the size of the RF and RF tuning characteristics for both eye and hand movements. Indeed, a previous study by the applicant found different strengths of selectivity for the direction of the reaching movements across brain regions, by comparing the width of their tuning functions (Fabbri et al., 2010). The pRF approach will allow assessing such properties in much greater details. Additionally, we will use the connective field modeling (Haak et al. 2013) to measure the connections between identified maps. Overall, this project will greatly improve our understanding of the functional contribution of different cortical (and subcortical) areas to the planning and generation of hand and eye movements.

Study design

The study consists of two fMRI experiments that will be collected in a 3Tesla MRI scanner. Both experiments will consist in a localizer block, to measure the retinotopic maps in the brain, and in rapid event related blocks during which participants are asked to perform the task (saccade task in Experiment 1 and reaching task in Experiment 2). During both tasks, eye movements will be recorded using an MR-compatible eye tracker.
During the scanning session, participants are asked to lie as still as possible to prevent head movements. in between the blocks, an anatomical scan will be collected, during which participants can close their eyes and rest.

Study burden and risks

In the MRI scanner, participants will be exposed to a field strength of 3 Testa and to scanner noise. There is no evidence that suggest that exposing human to a magnetic field of this strength has negative consequences for participant's health. The scanner noise will be minimized by providing participants with hear plugs. Participants will not directly benefit for their participation to the study, but their participation will contribute to improve the current understanding of the existence of spatial maps in the human brain.

Contacts

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adults (18-64 years)
Elderly (65 years and older)

Inclusion criteria

Normal or corrected vision
Right handed

Exclusion criteria

implant not MR-compatible
tattoo with red(iron) pigments
claustrophobia
not willing to be notified by his/her clinician in case of clinical abnormalities

Study design

Design

Study type: Observational non invasive

Masking:	Open (masking not used)
Control:	Uncontrolled
Primary purpose:	Other

Recruitment

NL

Recruitment status:	Pending
Start date (anticipated):	01-10-2019
Enrollment:	40
Type:	Anticipated

Ethics review

Approved WMO

Date:	09-09-2019
Application type:	First submission
Review commission:	METC Universitair Medisch Centrum Groningen (Groningen)

Study registrations

Followed up by the following (possibly more current) registration

No registrations found.

Other (possibly less up-to-date) registrations in this register

ID: 24211
Source: NTR
Title:

In other registers

Register	ID
Other	ID NL7548
CCMO	NL66874.042.19
OMON	NL-OMON24211