Roles of left and right Dorsolateral Prefrontal Cortex during spatial and cognitive processing

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Ethical review	Approved WMO
Status	Recruitment stopped
Health condition type	Other condition
Study type	Interventional

Summary

ID

NL-OMON45424

Source
ToetsingOnline

Brief title
Spatial and cognitive control in frontal cortex

Condition

- Other condition

Synonym
brain

Health condition

Neuroscience research (basic science)

Research involving
Human

Sponsors and support

Primary sponsor: Radboud Universiteit Nijmegen
Source(s) of monetary or material Support: NWO MaGW

Intervention

Keyword: eye movements, Transcranial Magnetic Stimulation

Outcome measures

Primary outcome

The differences in eye movement behaviours (e.g., reaction times, error

rates,and saccade amplitudes) depending on TMS site

Secondary outcome

Effect of time on primary outcome measures

Study description

Background summary

The dorsolateral prefrontal cortex (DLPFC) is important to cognitive and spatial control, such that one key function of the DLPFC is thought to be the inhibition against distracting information in order to guide attention to another location in space. In a typical laboratory task to assess this function, the anti-saccade task, subjects must look away from a visual stimulus and generate an accurate eye-movement to another location. It is thought that the DLPFC is crucial to inhibiting a reflexive eye-movement towards the stimulus, and generating the voluntary anti-saccade. However, whether each hemisphere (left/right) contributes similarly to these functions, whether each hemisphere processes predominantly one side of space, or whether there are distinct lateralizations (where only one hemisphere is critical) needs to be assessed. This is important, because the DLPFC is a brain region investigated in many brain stimulation studies of cognitive control, attention, and spatial memory processes, but researchers typically only examine the influence of brain stimulation on left or right DLPFC, but not both.

Study objective

We aim to better dissociate the roles of the left and right DLPFC in cognitive

control and spatial processing, using a commonly used saccadic eye-movement task. Future studies will then have better information with regards to the influence of brain stimulation on left or right DLPFC.

Study design

A counter-balanced design, where we will apply 40s of inhibitory transcranial magnetic stimulation (continuous theta-burst stimulation) cTBS to the right or left DLPFC (or vertex control region) prior to performing the task.

Intervention

Single-pulse transcranial magnetic stimulation (TMS) and continuous theta burst stimulation (cTBS).

Study burden and risks

Each participant will receive no direct benefit from participating in the study, but will receive a compensatory (financial) incentive. Transcranial magnetic stimulation (TMS) is a widely used non-invasive brain stimulation technique, based on the principle of electromagnetic induction. During stimulation the participant will likely hear the clicks of the TMS pulses and experience stimulation of nerves and muscles of the head. The most common side effect is a light transient headache (2-4% occurrence). A severe headache is uncommon (0.3-0.5% occurrence). In TMS studies of patient populations (e.g. epilepsy) or that exceeded the standard protocols (e.g. in intensity or frequency) epileptic seizures have been reported in rare cases. In the current study all participants will be stimulated with protocols that fall within the safety guidelines. All subjects are screened for their relevant medical history and other TMS safety aspects (e.g. presence of metal parts in the head). In summary, because the risk and burden associated with participation can be considered negligible-to-minimal, we do not expect serious adverse events during the project.

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

• Healthy
• Between 18-30 years of age years;
• Right-handed;
• Normal or corrected-to-normal vision (no glasses);
• Willingness and ability to give written informed consent and ability to understand the nature and content of the study to participate and to comply with the study requirements.

Exclusion criteria

Large or ferromagnetic metal parts in the head
Skin diseases at intended electrode sites (EMG, EEG, tDCS/tACS)
History of epilepsy or seizure (or familial history)
Any exclusion as per TMS screening form
History or current presence of any neurological, psychological or psychiatric disorder (e.g., depression)
Any prescribed medication that can alter cortical excitability (e.g. antiepileptics, tricyclic anti-depressives or benzodiazepines) or can have an influence on the participant*s vigilance or cognitive performance within two weeks prior to participation
Pregnancy

Study design

Design

Study type: Interventional

Masking:	Single blinded (masking used)
Control:	Uncontrolled
Primary purpose:	Other

Recruitment

NL

Recruitment status:	Recruitment stopped
Start date (anticipated):	08-05-2017
Enrollment:	30
Type:	Actual

Ethics review

Approved WMO

Date:	20-04-2017
Application type:	First submission
Review commission:	CMO regio Arnhem-Nijmegen (Nijmegen)

Study registrations

Followed up by the following (possibly more current) registration

No registrations found.

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

No registrations found.

In other registers

Register	ID
CCMO	NL59958.091.17