Manipulating top-down and bottom-up processing in amodal completion: A transcranial direct current stimulation study

Published: 16-05-2017
Last updated: 12-04-2024

To disentangle the role of knowledge and structure on amodal completion using online transcranial direct current stimulation (tDCS).

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

Summary

ID

NL-OMON45327

Source
ToetsingOnline

Brief title
tDCS and amodal completion

Condition

- Other condition

Synonym
n.a.

Health condition

Onderzoek bij gezonde vrijwilligers

Research involving
Human

Sponsors and support

Primary sponsor: Radboud Universiteit Nijmegen
Source(s) of monetary or material Support: Ministerie van OC&W

Intervention

Keyword: Brain, Cognition, Perception, Transcranial direct current stimulation

Outcome measures

Primary outcome

Due to tDCS stimulation we expect to see a modulation of the ERPs related to

the amodal completion process.

Secondary outcome

n.a.

Study description

Background summary

We perceive objects in the world as complete objects, even if they are partly occluded, either by themselves or by other objects. This filling-in of the occluded parts by the brain is called amodal completion. Brain research indicates involvement of both top-down (knowledge) en bottom-up (stimulus properties) processes. However, the exact contribution of both processes remains unclear and the existing evidence is correlational of nature. In the current study we will deploy transcranial direct current stimulation and electroencephalogram recordings to directly manipulate these processes and read-out the effects using EEG to determine their contributions and at what moment in (neural) time.

Study objective

To disentangle the role of knowledge and structure on amodal completion using online transcranial direct current stimulation (tDCS).

Study design

Placebo-controlled double-blind within-subjects design with healthy volunteers.

Intervention

Transcranial direct current stimulation (tDCS) will be delivered by a battery-driven electric current stimulator (Eldith DC Stimulator (CE 0118), Ilmenau) using three electrodes.

Two cathodes to left and right parietal cortex (4x3 cm); One anode over the vertex (9x5 cm).

Active stimulation
Duration: 25 minutes
Intensity: 1 mA

Placebo stimulation
Duration: 25 minutes
Intensity: 1 mA

Study burden and risks

Participants will not directly benefit from their participation in the study, except for a compensatory (financial) incentive. Transcranial current stimulation (tCS) is a widely used non-invasive brain stimulation technique, applying weak direct/alternating currents (tDCS/tACS) via conductive rubber/sponge electrodes to the scalp. These weak currents can slightly shift the neurons* membrane potential and thereby increase or decrease spontaneous neuronal activity in the stimulated cortex, but (unlike TMS) they do not evoke action potentials. During the stimulation, participants may transiently experience light tingling, itching or burning sensations on the skin underlying the electrodes, which can be unpleasant. The most common side effects are a light transient headache and a feeling of fatigue. In the current study, healthy participants will be stimulated with a protocol that is considered safe with respect to the latest published safety guidelines. All subjects are screened for their relevant medical history and other tCS safety aspects (e.g. metal parts in the head, skin allergies). In summary, because the risk is negligible and the burden associated with participation can be considered minimal, we do not expect serious adverse events during the project.

Contacts

Public
Radboud Universiteit Nijmegen

Montessorilaan 3
Nijmegen 6525HR

NL
Scientific
Radboud Universiteit Nijmegen

Montessorilaan 3
Nijmegen 6525HR
NL

Trial sites

Listed location countries

Netherlands

Eligibility criteria

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

Inclusion criteria

Between 18-35 years of age years; Right-handed; Non-smoking; Normal or corrected-to-normal vision; Willingness and ability to give written informed consent and willingness and ability to understand the nature and content, to participate and to comply with the study requirements.

Exclusion criteria

1) Average use of more than 3 alcoholic beverages daily; (2) Use of psychotropic medication or recreational drugs; (3) Skin disease; (4) Pregnancy; (5) Serious head trauma or brain surgery; (6) Neurological or psychiatric disorders; (7) Large or ferromagnetic metal parts in the head (except for a dental wire); (8) Implanted cardiac pacemaker or neurostimulator; (9) Participation in a NBS study in the past 28 days; (10) Previous participation in 10 or more NBS studies.

Study design

Design

Study type:	Interventional
Intervention model:	Parallel
Allocation:	Randomized controlled trial
Masking:	Double blinded (masking used)
Control:	Placebo
Primary purpose:	Other

Recruitment

NL

Recruitment status:	Recruitment stopped
Start date (anticipated):	28-06-2017
Enrollment:	24
Type:	Actual

Ethics review

Approved WMO

Date:	16-05-2017
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	NL60946.091.17

Study results

Date completed: 01-01-2018

Actual enrolment: 24

Summary results
Trial is onging in other countries