The role of theta/delta activity during decision making: a transcranial alternating current study

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To influence social conformity and its neural correlates by entraining orbitofrontal cortex by using transcranial alternating current stimulation.

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

Summary

ID

NL-OMON42345

Source
ToetsingOnline

Brief title
Theta/delta tACS

Condition

- Other condition

Synonym
Niet van toepassing

Health condition

Niet van toepassing - 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: Orbitofrontal cortex, Social conformity, Transcranial alternating current stimulation

Outcome measures

Primary outcome

Primary research outcome: Conformity to different social cues during a decision task with fictitious monetary reward and punishment after application of tACS.

Secondary outcome

Secondary research outcome: (1) TACS-induced behavioural changes in the decision task will be correlated with participants' scores on the BIS/BAS inventory. (2) Change in the rest electroencephalogram (EEG) after tACS. (3) the effect of reward and punishment on feedback related negativity (FRN) and late positive potential (LPP).

Study description

Background summary

Orbitofrontal cortex (OFC) has shown to be involved in reinforcement-guided decision making. However, recently it has been shown that social information that is relevant for decision making is encoded in OFC as well. Previous studies have shown the importance of intrinsic delta and theta oscillations during such tasks. Therefore, the present study will further investigate the relevance and necessity of these oscillations by applying exogenous oscillating electrical potentials by applying transcranial alternating current stimulation (tACS). The effects of tACS on behaviour and electroencephalography (EEG) activity will be investigated.

Study objective

To influence social conformity and its neural correlates by entraining orbitofrontal cortex by using transcranial alternating current stimulation.

Study design

Placebo controlled double-blind within subjects design.

Intervention

Transcranial alternating current stimulation (tACS) will be delivered by a battery-driven electric current stimulator (Eldith DC Stimulator (CE 0118), Ilmenau) using a pair of electrodes: (1) active electrode over the frontal part of the head (35 cm^2); (2) reference electrode over the central part of the head (100 cm^2). Stimulation will be delivered for 12 minutes before a social conformity task. Stimulation comprises either: (1) active delta tACS (2 Hz; 1 mA); (2) active theta tACS (5 Hz; 1 mA); or (3) placebo (sham) tACS (0 mA).

Study burden and risks

The currently proposed tACS procedure and experiment does not carry any significant risks. Stimulation will be performed in line with the Standard Operating Procedure Non-Invasive Brain Stimulation of the Donders Institute for Brain, Cognition and Behaviour. Potential side-effects of tACS are perception of phosphenes, light tingling, itching or burning sensations on the under the electrodes, light headache and/or fatigue. These are mild discomforts that respond promptly to common analgesics. Volunteers can withdraw from the study at any given time and there are no direct benefits for the participants. The novel insights will broaden our fundamental understanding of the brain. tACS offers the unique ability to determine the causal role of brain oscillation rhythms.

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

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):	01-02-2016
Enrollment:	25
Type:	Actual

Ethics review

Approved WMO

Date:	04-08-2015
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	NL54014.091.15