Another's pain vs my gain: The causal role of the prefrontal cortex in prosocial decision-making

Published: 21-12-2020
Last updated: 08-04-2024

Understanding the specific vs. generalized role of the prefrontal cortex for prosocial decision-making. In particular, we want to investigate whether the prefrontal cortex is recruited during the evaluation of the abstract cost-benefit ratio of one*...

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

Summary

ID

NL-OMON51114

Source
ToetsingOnline

Brief title
PainGain

Condition

- Other condition

Synonym
empathie, feelings

Health condition

The experiment is conducted on healthy participants. In the proposed project we test behaviour during social cognition (e.g. affective sharing) and prosocial behaviour

Research involving
Human

Sponsors and support

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

Intervention

Keyword: empathy, prefrontal cortex, prosocial behavior, TMS

Outcome measures

Primary outcome

The primary outcome of the study will be the participant's performance in our

behavioral task (choice behavior).

Secondary outcome

We will also use other behavioral indicators such as the proportion of

prosocial choices and reaction time as secondary indicators.

Study description

Background summary

Empathy for another*s suffering and harm avoidance for other individuals are fundamental skills in human social behaviour and integral features of social decision making (Shamay-Tsoory & Lamm, 2018; Cutler & Campbell-Meiklejohn, 2019). Especially the dorsolateral part of the prefrontal cortex (dlPFC) has been implicated as a key region in abstract cost-benefit evaluation and self-other decisions. However, while recent years have brought considerable advances in understanding the involvement of the prefrontal cortex, several crucial questions remain unanswered. In particular, experimental evidence allowing for causal conclusions regarding the specific contribution of the dlPFC to prosocial decision-making in the domain of pain is missing (see e.g. Bellucci et al., 2020; Crockett et al., 2017; FeldmanHall et al., 2015; Ong et al., 2018; Plassmann et al., 2007; Reniers et al., 2014; Thirioux et al., 2014; van Veluw & Chance, 2014; but also Liao et al., 2018 for medial prefrontal areas).

Study objective

Understanding the specific vs. generalized role of the prefrontal cortex for prosocial decision-making. In particular, we want to investigate whether the prefrontal cortex is recruited during the evaluation of the abstract cost-benefit ratio of one*s own in relation to another*s benefit.

Study design

Participants will be tested in one single session of 3h. To answer our research question, it is crucial to induce a realistic, effective dilemma where a state of distress shown by another person is weighed against one*s own financial gains. Participants will be told a cover story where he/she will be paired up with another participant (in reality a confederate) and both will draw lots to distribute two roles, one the receiver and one the decider of pain. The participant will always be assigned the role of decider in order to investigate prosocial behaviour. Participant and confederate are then guided into separate rooms for the task. The participant has to make binary choices involving their own financial gain and the pain of that other participant.

Participants will receive active repetitive TMS (6Hz stimulation, 18 pulses/trial) during the decision phase on either the dlPFC or sham stimulation over a control region of similar depth.

As an outcome, we will then measure the effects of dlPFC interference on prosocial behavior (operationalized as the choice behavior in each trial) and compare it with the results in the control condition. The resulting differences in prosocial behaviour will reveal the main function of the dlPFC within the multifaceted process of prosocial decision-making and will yield important insights regarding the complex interplay between potentially conflicting processes such as affect sharing, cost-benefit evaluations, and prosocial behaviour.

Study burden and risks

For repetitive TMS the main issue is the possibility of inducing a mild headache during and minutes after the stimulation. However, risks are minimized by the screening procedure, as we will screen participants for any contraindication regarding neuromodulation and exclude individuals at risk. Experimenters will carefully monitor and document any side effects appearing during the session. Furthermore, the measurement of prosocial behavior requires elements of deception, e.g. a cover story that another person receives painful stimulation as well as encouragement of participants to weigh their own monetary gain against the pain of another person. However, we have extensive experience with the use of such protocols, participants are told that the stimulation that the other person receives is never harmful in any way, and all participants will be debriefed at the end of their respective session.

Contacts

Public
Universiteit van Amsterdam

Meibergdreef 17
Amsterdam 1105 AZ
NL
Scientific
Universiteit van Amsterdam

Meibergdreef 17
Amsterdam 1105 AZ
NL

Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adults (18-64 years)

Inclusion criteria

healthy participants, age 18-35, proficiency with english, right-handedness

Exclusion criteria

Participants without a high proficiency level in the English language will be excluded from the study.

For the TMS part they will be asked to fill a standard questionnaire for neuromodulation studies to exclude any participant with contraindications to brain stimulation.

EXAMPLE OF SAFETY SCREENING

* Have you ever:
o Had an adverse reaction to TMS?
o Had a seizure?
o Had an EEG?
o Had a stroke?
o Had a head injury (include neurosurgery)?
* Do you have any metal in your head (outside of the mouth,) such as shrapnel, surgical clips, or fragments from welding or metalwork? (Metal can be moved or heated by TMS)
* Do you have any implanted devices such as cardiac pacemakers, medical pumps, or intracardiac lines, cochlear implants, implanted brain stimulators, implanted defibrillator? (TMS may interfere with electronics and those with heart conditions are at greater risk in event of seizure)
* Do you suffer from frequent or severe headaches?
* Have you ever had any other brain-related condition?
* Have you ever had any illness that caused brain injury?
* Are you taking any medications? (e.g. Tricyclic anti-depressants, neuroleptic agents, and other drugs that lower the seizure threshold)
* If you are a woman of childbearing age, are you sexually active, and if so, are you not using a reliable method of birth control?
* Does anyone in your family have epilepsy?
* Do you need further explanation of TMS and its associated risks?

Participants will complete the Stress Tolerance Short Questionnaire as an additional screening. If participants score over 50 in this questionnaire, we will advise them not to continue with the study.

Study design

Design

Study type:	Observational invasive
Intervention model:	Other
Allocation:	Non-randomized controlled trial
Masking:	Open (masking not used)
Control:	Active
Primary purpose:	Other

Recruitment

NL

Recruitment status:	Recruitment stopped
Start date (anticipated):	26-10-2021
Enrollment:	60
Type:	Actual

Medical products/devices used

Generic name:	Magstim Rapid2
Registration:	Yes - CE intended use

Ethics review

Approved WMO Date:	21-12-2020
Application type:	First submission
Review commission:	METC Amsterdam UMC
Approved WMO Date:	13-10-2021
Application type:	Amendment
Review commission:	METC Amsterdam UMC

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	NL75254.018.20