Out of Touch - How a temporary perturbation of the right temporoparietal junction (rTPJ) affects the brain network subserving body awareness.

Published: 30-04-2019
Last updated: 12-04-2024

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Ethical review	Approved WMO
Status	Will not start
Health condition type	Other condition
Study type	Interventional

Summary

ID

NL-OMON48087

Source
ToetsingOnline

Brief title
The brain network subserving body awareness

Condition

- Other condition
- Psychiatric disorders NEC

Synonym
Body Awareness, Self-consciousness

Health condition

Basic brain function in healthy humans

Research involving
Human

Sponsors and support

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

Intervention

Keyword: body awareness, resting-state fMRI, transcranial magnetic stimulation (TMS)

Outcome measures

Primary outcome

For the first objective, changes in brain activation and functional

connectivity will be measured before and after a single session of reptitive

trancranial magnetic stimulation (rTMS) on the right temporo-parietal junction

(rTPJ).

The main study parameter will be changes resting-state fMRI measured in the

BOLD (blood-oxygen-level-dependent) signal prior to and after repetitive TMS.

Secondary outcome

For the second objective concerning the out-of-body illusion, the main study

parameters are

1) The self report questionnaires assessing global self attribution of the

virtual body, anomalous body experiences, and depersonalization experiences;

2) The global self-localization assessed by a documented felt shift of

self-location measured in centimetres in a drawn map of the room.

3) Changes in the heart rate after the threat condition during the behavioural

paradigm. Former studies have shown that participants depict elevated skin

conductance response when the virtual body is artificially attacked with a

hammer. Relatedly, we want to use a threat to the illusory body affects the participants physiology (heart rate) as objective marker to test the illusory body.

Additionally, it will be investigated if certain trait characteristic influence functional connectivity and possibly increase susceptibility to the out-of-body illusion. As such, hallucinatory proneness, alexithymia, depersonalization, and dissociation will be assessed via validated self-report questionnaires. Furthermore, former life events and traumatic experiences will investigated. To control for possible confounding effects, participants will be asked if they have ever suffered from vestibular dysfunctions and out-of-body experiences.

Study description

Background summary

There is good reason to suspect that anomalous body experience, such as the out-of-body (OBE) experiences, arise to a lack in integrative capacity of the brain trying to make sense of ambiguous input. Cognitive neuroscientist suggest that one of the key regions involved in the multisensory integration necessary to establish a coherent sense of body awareness is the temporo-parietal junction (TPJ). Perturbation studies employing transcranial magnetic stimulation to temporarily inhibit a certain brain region indicate that disruptions in TPJ neural activity affected performances in behavioural paradigms such as the rubber hand illusion , mental own-body transformations, or the mirror box illusion. However, causal evidence is scare regarding the question how a temporary inhibition of the TPJ affects the functional connectivity with the brain network involved for an integrated sense of selfhood. Furthermore, little is known about how temporary perturbations at the TPJ relate to out-of-body-experiences (OBE) and if these changes are associated with depersonalization.

Study objective

The first goal is to test whether the temporary disruption of the right TPJ leads to changes in the functional connectivity between brain areas that are related to body awareness.
Second, the study intends to test how temporary inhibition of the TPJ affects the perception of bodily self-consciousness tested by an behavioural paradigm designed to induce out-of body sensations.

Study design

The study will occupy a sham-controlled, randomized, pre-post TMS design. Participants will randomly assigned into either an active TMS condition or a sham TMS condition. All participants will follow the same procedure including answer a set of self-report questionnaires, undergo two fMRI scans, one TMS session, and take part in a OBE illusory behavioural paradigm before and after TMS.

Intervention

The intervention consists of an transmagnetic stimulation protocol (TMS). Participants will receive 600 pulses of continuous theta burst stimulation (duration: 40 seconds) on the right temporoparietal junction (rTPJ). Before and after the stimulation, participants will undergo a behavioural paradigm, namely the out-of-body illusion, to test changes in body awareness, and a resting-state fMRI scan. During the out-of-body illusion paradigm, participants are seated in front of a camera filming their back in real-time. Participants wear a head-mounted device (HDM), which is connected to two cameras corresponding with the left and right eye. Therefore, the participants observe their own back from the perspective of someone sitting behind them. To induce the illusionary experience, the experimenter stands next to the participant and camera and simultaneous strokes the participants chest and the chest of the illusory body with a rod. To test if the manipulation was successful, we ask participants to 1) undergo a "fake" hammer attack in which a hammer will be moved towards the camera to test for a physiological startle response (heart rate), 2) indicate their felt sense of self-location by means of a spatial map of the room, and 3) answer a self-report questionnaire concerning their out-of-body experience. State dissociation will be assessed after each step of the experiment.

Study burden and risks

The experiment will take approximately 105 minutes in total. Participants must undergo one screening session and one experimental session consisting of two fMRI scans, repetitive TMS, a behavioural paradigm, and answering a set of questionnaires. So far, few to none risks have been reported regarding exposure

to these study techniques in healthy participants. Possibly, laying in the scanner, the stimulation or the induction of OBE illusion might create slight discomfort in some participants. Regular check-ups for the participants* well-being and other tools, i.e. in-ear plugs for noise reduction, will be in place to address these issues. Participants do not directly benefit from the experiment, but will be compensated for their participation.

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

In order to be eligible to participate in this study, a subject must meet all of the following criteria:
1) Participants must be 18 years or older
2) Participants must be female

3) Participants must be right-handed
4) Participants must be capable of giving consent
5) Participants must be able to communicate in English

Exclusion criteria

A potential subject who meets any of the following criteria will be excluded from participation in this study:;1) A current diagnosis of a neurological disorder, i.e. epilepsy
2) A current diagnosis of psychiatric disorder
3) Presence of metallic devices, e.g. metal implants, non-removable piercings, or cardiac pacemaker
4) Psychotropic medication intake in the last 6 months
5) Claustrophobia
6) Alcohol or drug abuse
7) Refusal that general practitioner will be informed in the case of incidental findings of structural brain abnormalities
8) Use of medication related with increased epileptic seizure risk
9) Current tinnitus
10) (At risk of being) pregnant

Study design

Design

Study type:	Interventional
Intervention model:	Parallel
Allocation:	Randomized controlled trial
Masking:	Single blinded (masking used)
Control:	Active
Primary purpose:	Basic science

Recruitment

NL

Recruitment status:	Will not start
Enrollment:	52
Type:	Anticipated

Ethics review

Approved WMO Date:	30-04-2019
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

No registrations found.

In other registers

Register	ID
CCMO	NL67897.042.18