# The role of working memory in language comprehension and production: A transcranial direct current stimulation study

Published: 03-05-2017
Last updated: 12-04-2024

To investigate the direct role of DLPFC suppression in language comprehension and production performance

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

## Summary

### ID

NL-OMON45314

**Source**
ToetsingOnline

**Brief title**
Working memory and language

### Condition

- Other condition

**Synonym**
not applicable

**Health condition**

Onderzoek bij gezonde vrijwillgers

**Research involving**
Human

## Sponsors and support

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

## Intervention

**Keyword:** language processing, tDCS, working memory

## Outcome measures

### Primary outcome

Performance on a semantic judgment (i.e., language comprehension) and a picture

naming task (i.e., language production) as measured by reaction times/naming

latencies and error rates.

### Secondary outcome

not applicable

# Study description

### Background summary

Over the past decades, a functional link between language comprehension and verbal working memory has been established. The role of working memory in language production, however, has not been explored in detail. By selectively suppressing activity in the DLPFC, which has been related to working memory function, the proposed study aims at investigating the causal link between verbal working memory and language processing. We expect a performance decrease in both language components as reflected by longer reaction times and/or higher error rates.

### Study objective

To investigate the direct role of DLPFC suppression in language comprehension and production performance

### Study design

Sham-controlled double-blind within-subjects design.

### Intervention

Transcranial direct current stimulation (tDCS) will be delivered by a battery-driven electric current stimulator (Eldith DC Stimulator (CE 0118), Ilmenau) using two electrodes over left and right DLPFC (5x3 cm each). Stimulation will be applied for 30 minutes at an intensity of 2 mA (current density for each electrode: 0.133 mA/cm$^2$), including 30 seconds of ramp-up and 30 seconds of ramp-down. This stimulation condition will be compared to a sham condition in which no current is induced.

### Study burden and risks

The currently proposed tDCS 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 tDCS are 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 interaction between working memory and language processing in the human brain.

## 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): | 08-05-2017 |
| Enrollment: | 32 |
| Type: | Actual |

## Ethics review

Approved WMO

| | |
|---|---|
| Date: | 03-05-2017 |
| 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 | NL60867.091.17 |

## Study results

| | |
|---|---|
| Date completed: | 13-07-2017 |
| Actual enrolment: | 33 |

**Summary results**

Trial is onging in other countries