Effects of transcranial direct current stimulation (tDCS) of brain area V5 on smooth pursuit performance

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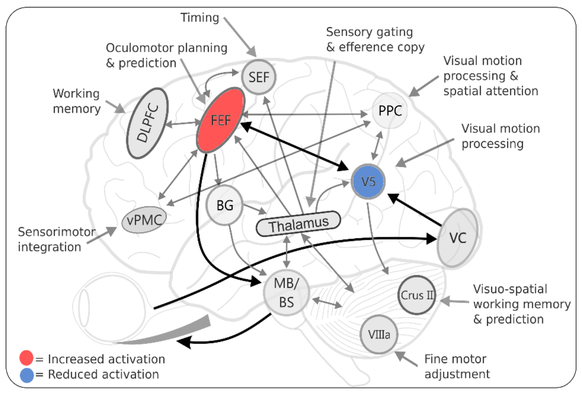
Background

In daily life we need smooth pursuit to fixate moving objects with our eyes.

V5 (blue area) is a core area in the **pursuit network**.

tDCS is a non-invasive method to change the membrane polarization.

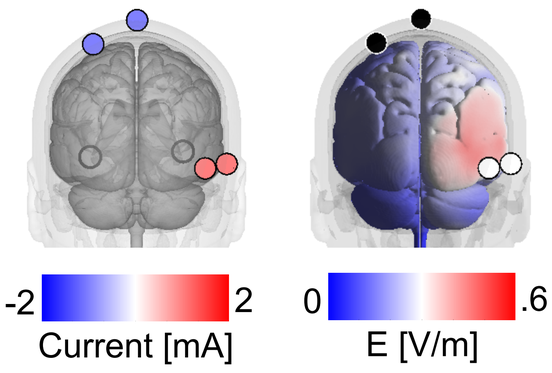


Smooth pursuit network

To gain more information about the pursuit network, we examine eye movements under tDCS.

Method

Eleven healthy participants ($\bar{x}$ =25.08 years) underwent three sessions of **normative tDCS** conditions of V5.

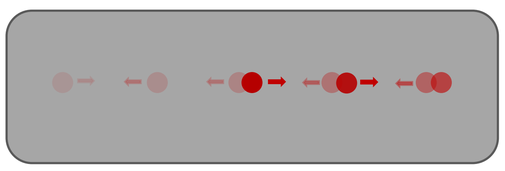


Field simulation of anodal tDCS (PO8-P8-Cz-CP1; 0.5775 V/m))

Pursuit task

Triangle pursuit (3x8 sweeps; velocity = 18.7°/s, +/- 12°)

Target movement on monitor



Target position over time

Pursuit tasks were presented at 4 different time points:

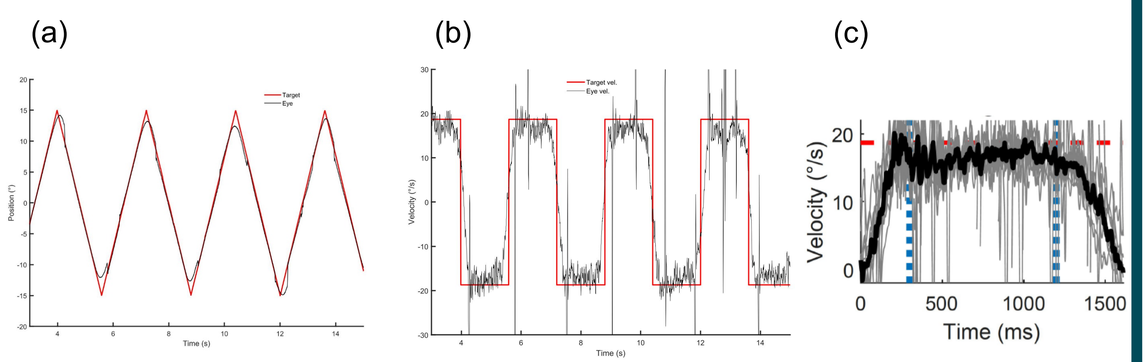
1. Pre-stimulation
2. tDCS (2mA; 20 min.; sham, anodal, cathodal)
3. Post 1 stimulation
4. Post 2 stimulation

Eye movements recorded with video-based eyetracker (Eyelink 1000).

rm ANOVA to test for main effects of direction, tDCS condition, time point (2x3x4) and their interactions.

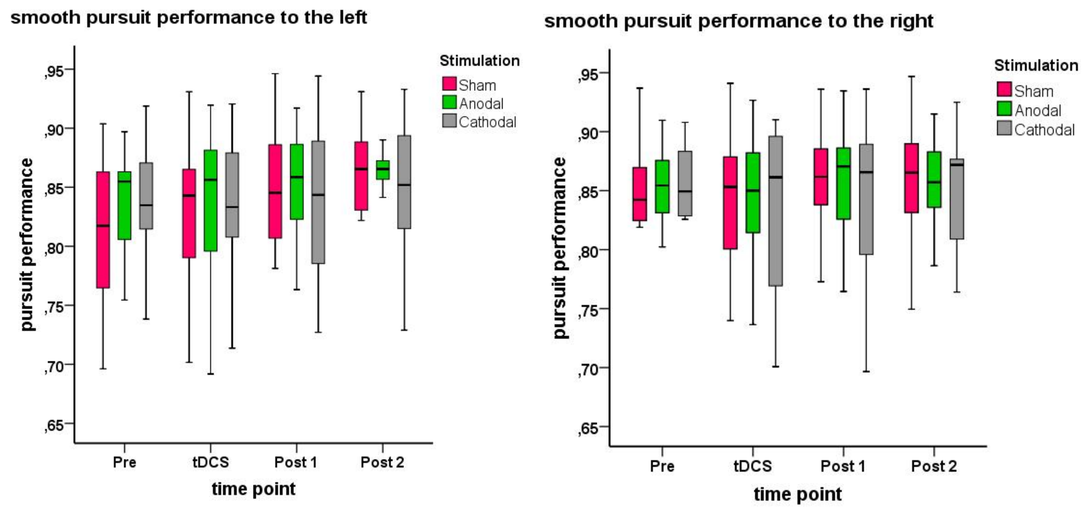
Preliminary results for pursuit tasks

Single subject



(a) Trace of **eye position over time**, (b) **eye velocity** trace over time,
(c) **eye velocity** plot with median performance gain over time, blue vertical lines indicate interval for gain calculations

Group statistics



- Main effect time point ($F_{3, 26}$ = 3.335, p = .039)
- Post hoc analysis revealed a performance increase from pre stimulation to post 2 (M_1= .832, SE_1= .014; M_4= .854, SE_4= .012; p= .046), but no specific effect of stimulation condition

Conclusion

- At the present point no specific stimulation effect is detected
- Training effects must be considered in future analysis

➢ Acquire more participants
➢ Analyses of additional performance parameters and tasks
➢ Survey existing data for extreme values

Take Home

Standard tDCS is marked by small effect sizes
larger sample size needed

High interindividual variability may be reduced by personalized tDCS
see poster by Radecke et al. (# 58)

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