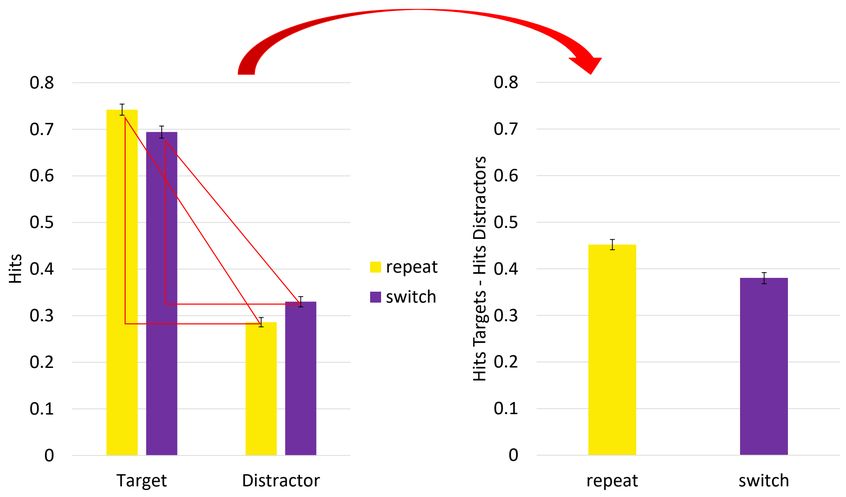
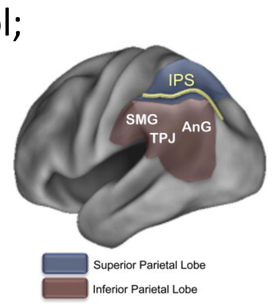
No effect of parietal transcranial direct current stimulation (tDCS) on attention and memory

Switching between two tasks leads to **switch costs** not only for immediate performance but also for memory for task-relevant targets. For task-irrelevant distractors, however, we find a memory benefit.



This reduced **memory selectivity** suggests that on switch trials when the appropriate task set is being reconfigured attention is broadened so that more distractors are encoded at the expense of targets (Richter & Yeung, 2012).

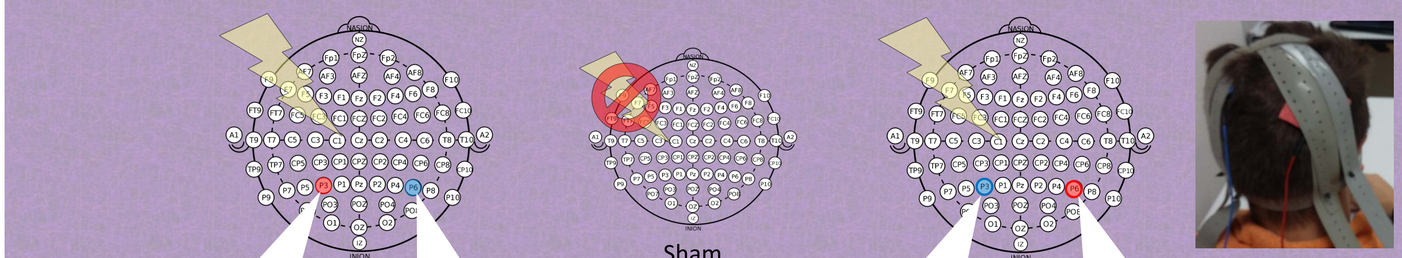
Previous fMRI studies suggest a correspondence between attention control and episodic retrieval in the posterior parietal cortex (Uncapher & Wagner, 2009). Jacobson, Goren, Lavidor, & Levy (2012) modulated episodic memory by **stimulating the brain bihemispherically** targeting two substrates of top-down and bottom-up cognitive control; **left superior parietal lobe (lSPL)** and **right inferior parietal lobe (rIPL),** respectively.

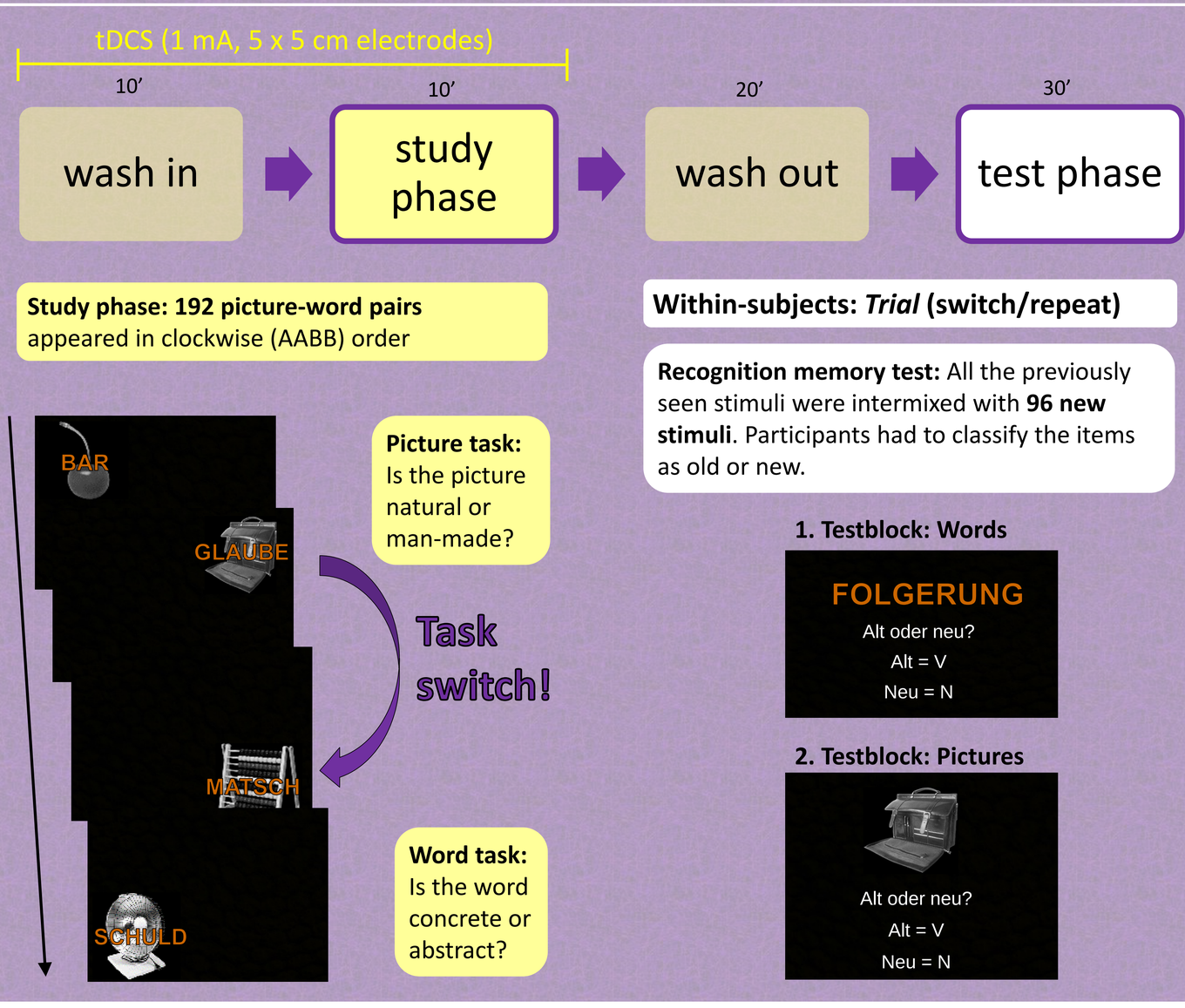


We used the same stimulation protocol to test the **hypothesis** that during task switching top-down cognitive control is exerted in order to attend to the targets and ignore the distractors. By disturbing attentional control, we should find a bigger effect of task switching in the sense of slower reaction times and reduced memory selectivity. By enhancing attentional control in contrast, we should find faster reaction times and higher memory selectivity.

Method

3x2 mixed design (*Simulation* x *Trial*)
60 participants (26 men, *M* age: 22, *SD* = 2) were randomly assigned to one of **3 tDCS stimulation conditions**:



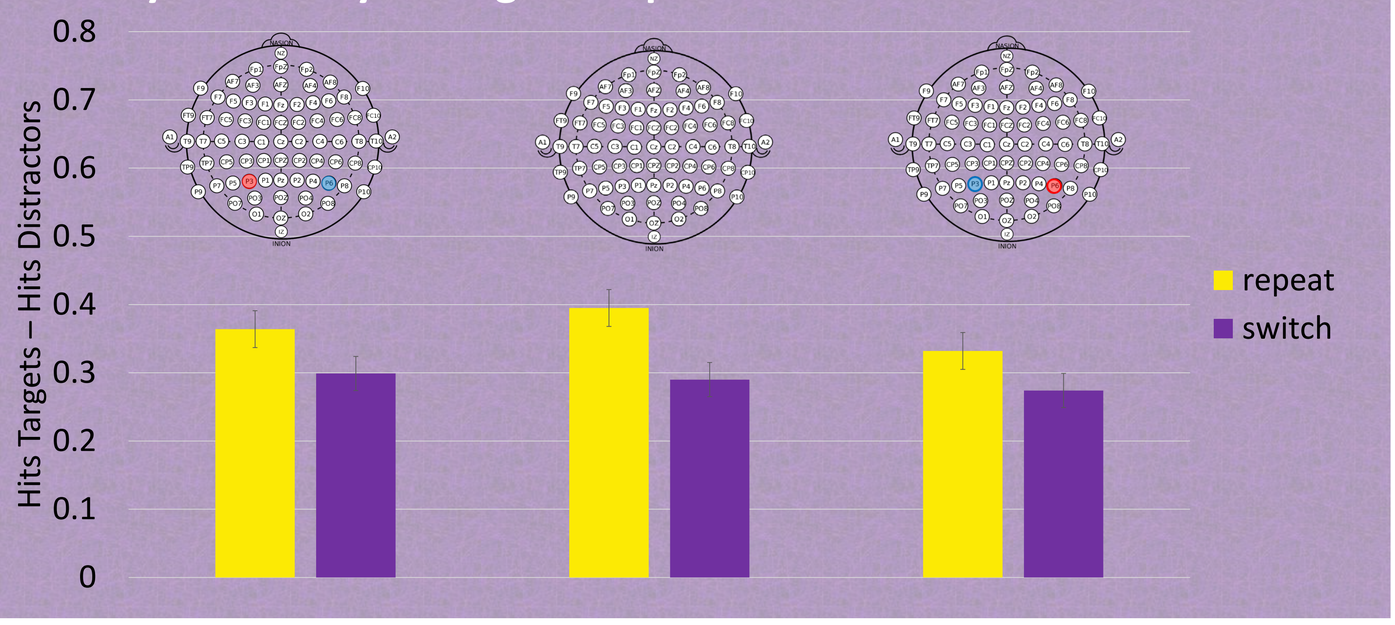


Results

Task switch performance

Switch costs emerged in **all stimulation conditions. No effect of stimulation.**

Memory selectivity: Recognition performance



Summary and Conclusion

(1) No effect of tDCS on reaction times or accuracy rates during task switching.
(2) No effect of tDCS on memory
(3) The results question the effectiveness of the present tDCS-protocol

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Jacobson, L., Goren, N., Lavidor, M., & Levy, D. A. (2012). Oppositional transcranial direct current stimulation (tDCS) of parietal substrates of attention during encoding modulates episodic memory. *Brain Research, 1439*, 66-71.
Richter, F. R. & Yeung, N. (2012). Memory and cognitive control in task switching. *Psychological Science*, *23*(19).
Uncapher, M. R. & Wagner, A. D. (2009). Posterior parietal cortex and episodic encoding: Insights from fMRI subsequent memory effects and dual-attention theory. *Neurobiology of Learning and Memory, 91,* 139-154.