

## 185. The effects of anodal tDCS of the frontoparietal network on higher cognitive functions

Marko Živanović<sup>1</sup>, Jovana Bjekić<sup>2</sup>, Saša R. Filipović<sup>2</sup>

<sup>1</sup>Faculty of Philosophy, University of Belgrade, <sup>2</sup>Institute for Medical Research, University of Belgrade

185. Previous studies have found that anodal tDCS of prefrontal and parietal regions has the potential to promote executive functions and other building blocks of higher cognition. However, little is known on whether these effects can be translated to more complex cognitive functions. The present study explored the effects of anodal tDCS over dorsolateral prefrontal cortex (dlPFC) and posterior parietal cortex (PPC) on higher cognitive functions, namely, fluid reasoning (Gf) and crystallized abilities (Gc), visual processing (Gv), and cognitive speed (Gs). Forty-eight right-handed volunteers (20-35 years, 50% females) participated in the sham-controlled cross-over experiment with two parallel groups (left and right hemisphere). Participants underwent four experimental sessions (at least two weeks apart) in which they received unilateral tDCS (1.8mA) over dlPFC, PPC, simultaneous stimulation of dlPFC and PPC (0.9mA per loci), or sham. In each session, the reference electrode was placed on the contralateral cheek. The tDCS was applied for 20min (30s ramp-up and ramp-down periods), while in the sham condition, the current was delivered only at the beginning and at the end in a 30s rump up/down fashion. For the assessment of cognitive performance, parallel forms of the tests were used. Each cognitive factor was assessed using two tests half of which were verbal and the other half nonverbal. In comparison to sham, stimulation of the left dlPFC resulted in facilitation of cognitive speed in the verbal domain, while both right dlPFC and PPC tDCS increased visual processing. Interestingly, a domain-specific disruption of nonverbal fluid reasoning was observed following right dlPFC stimulation and the same trend was observed for right PPC stimulation. Finally, simultaneous tDCS of dlPFC and PPC did not induce modulatory effects on any cognitive test. Results indicate that the performance on complex cognitive tasks can be modulated by tDCS but that the effects may vary depending on the stimulation site, laterality as well as cognitive tasks that are used as outcome measures. A possibility that the observed effects are mediated by modulation of lower-level executive processes will be discussed.