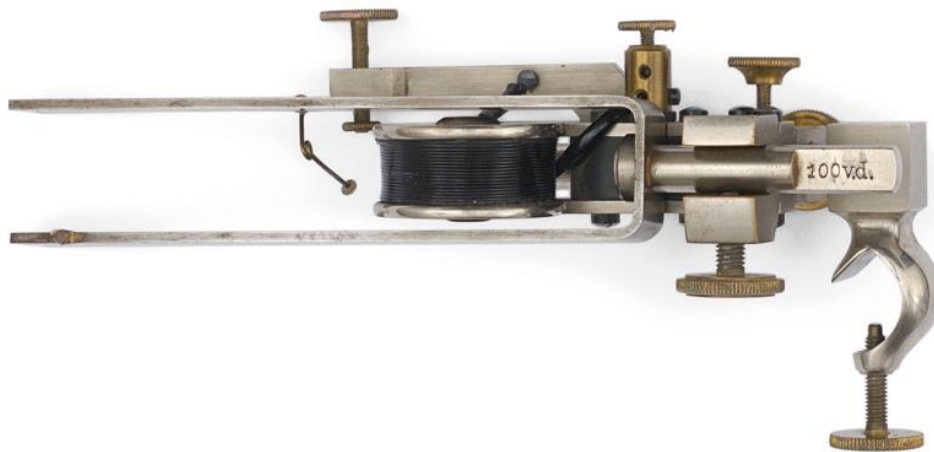


XXVIII SCIENTIFIC CONFERENCE

EMPIRICAL STUDIES IN PSYCHOLOGY

31st MARCH – 3rd APRIL, 2022.

FACULTY OF PHILOSOPHY, UNIVERSITY OF BELGRADE



INSTITUTE OF PSYCHOLOGY
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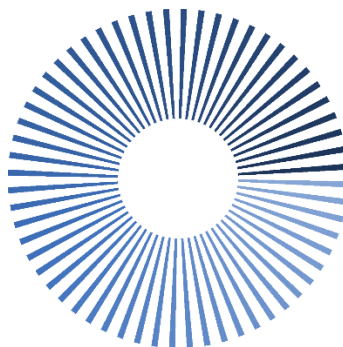
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BELGRADE, 2022

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Electromagnetic tuning fork for direct time recording on kymographic band (E.Zimmermann, Leipzig-Berlin)

From the collection of old scientific instruments of the Laboratory of experimental psychology, Faculty of philosophy, University of Belgrade

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THE USE OF TRANSCRANIAL DIRECT CURRENT STIMULATION (TDCS) IN THE
RESEARCH OF COGNITIVE FUNCTIONS

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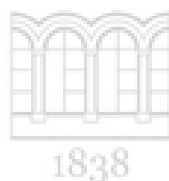
Transcranial electric stimulation (tES) is a set of noninvasive brain stimulation techniques that uses weak electric currents, usually between 1 and 2mA, to promote cognitive and sensorimotor functions. The most utilized among these techniques is transcranial direct current stimulation (tDCS) which modulates neuronal excitability using anodal (positive) or cathodal (negative) stimulation and achieves its effects through depolarization or hyperpolarization of the resting membrane potential. This technique showed promise for noninvasive neuromodulation of a variety of cognitive functions. The brain regions of interest when studying cognitive functions are usually the dorsolateral prefrontal cortex (DLPFC) and posterior parietal cortex (PPC) as central stimulation-available nodes of widely distributed frontoparietal neural network. The lecture will cover different types of tES and their differential modes of action, a brief overview of the state-of-the-art in the field, with special attention to behavioral effects of tDCS applied over different brain loci within the frontoparietal neural network. The focus will be on the results of a series of experiments conducted in our lab that address the effectiveness of tDCS in the modulation of associative memory, executive functions, and higher cognitive functions such as broad visual processing and reasoning. The results will be discussed in the context of reliability and specificity of effects and inconsistent findings often reported in the literature. Furthermore, I will discuss to which degree experimental tDCS studies can address the question of localization of cognitive functions and if the modulation of the shared neural basis of different cognitive functions and abilities can reflect their psychometric relations. Finally, the limitations and the need for further development of tES techniques will be outlined.

Keywords: transcranial direct current stimulation (tDCS); noninvasive brain stimulation (NIBS); cognitive functions; associative memory; executive functions; cognitive abilities

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