

# Parietal tACS coupled with a visuo-attentional training improves lexical access and working memory in dyslexia

Monday, September 23, 2024 4:00 PM (10 minutes)

Developmental Dyslexia (DD) is a neurodevelopmental disorder characterized by both auditory-phonological and visual-attentional deficits. This study aimed at investigating the cumulative impact of transcranial alternating current stimulation (tACS) and visual-attentional reading training. tACS was applied to parietal sites, bilaterally at beta frequency (18 Hz), to improve the magnocellular-dorsal (M-D) stream functionality and the capability of ventral stream areas of identifying visual word structures.

All participants were adults with DD diagnosis. They were divided into three groups (N = 37). The first group completed 12 sessions of a reading acceleration training (RAP) while receiving tACS stimulation; the second and third groups underwent a sham stimulation in combination with RAP and phonological training, respectively. Before and after the training sessions, participants were asked to judge the lexicality of written words and pseudo-words while EEG was recorded.

N400 and P600 ERP components were modulated in all groups as a function of the session. Specifically, when comparing groups that underwent RAP training, ERPs reflect a less effortful lexical and semantic categorization post training in the tACS group. Coherently, we observed an improvement in working memory capacity, as assessed by the digit span test only in the tACS group. As for time-frequency data, we expect a decrease in frontal theta band, reflecting working memory load and a decrease in alpha power in temporoparietal regions, reflecting semantic encoding. Taken together, our results suggest that combining tACS and visual-attentional reading training leads toward a more efficient lexical/semantic categorization, supported by a general improvement in working memory.

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