

Testing the role of the beta band and the inferior frontal gyrus in linguistic prediction with HD-tACS

Thursday, September 11, 2025 2:10 PM (20 minutes)

Introduction: Language comprehension is thought to rely on the pre-activation of linguistic representations based on context, facilitating the processing of upcoming input. Prediction-by-production models propose that linguistic prediction draws on processes and representations shared with language production. To test this proposal, we applied high-density transcranial alternating current stimulation (HD-tACS) targeting a brain oscillatory band and a brain region both known to be involved in language production, namely the beta band (13-30 Hz) and the left inferior frontal gyrus (LIIFG).

Methods: Participants performed a lexical decision task in which target words were either predictable or non-predictable based on sentence context, across two separate sessions. In one session, participants received active HD-tACS at 20 Hz; in the other session, they received sham stimulation. In the first study (N = 19), stimulation was applied during task performance; in the second study (N = 18) the stimulation was administered prior to the task (20 min, 1.25 mA intensity).

Results: Across both studies, we did not observe stimulation effects on lexical decision response times.

Conclusion: Our findings do not support the involvement of beta-band activity within the LIIFG in predictive processes. However, null results should be interpreted with caution: improvements in stimulation parameters (intensity, duration, number of repetitions, use of individualized peak frequencies) may yield more robust effects.

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