MAX PLANCK INSTITUTE
FOR HUMAN COGNITIVE AND BRAIN SCIENCES

**Tuesday, September 06, 2022,** 11:00 hrs
Stephanstrasse 1A
Wilhelm Wundt Room, 4th Floor, A400

# Guest Lecture

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## Selective facilitation of syntactic processing by transcranial electrical stimulation over the left inferior frontal cortex

Previous neuroimaging studies have demonstrated that neural activation in the left inferior frontal gyrus (IFG) correlates with syntactic processing. However, as previous studies have only tested the correlation between left IFG activation and syntactic processing, the causal relationship has remained unclear. Using transcranial electrical stimulation (tES), a non-invasive brain stimulation technique that modulates brain activation, we examine whether higher activation in the left IFG improves sentence comprehension in a native language (Japanese, Experiment 1) and a non-native language (Spanish, Experiment 2). In Experiment 1, the participants performed a sentence comprehension task using two types of Japanese sentences (active sentences: e.g., *Taro-ga Hanako-o tataita* (Taro hit Hanako); passive sentences: e.g., *Hanako-ga Taro-ni tatakareta*, (Hanako was hit by Taro)). They showed that reaction times for syntactically more complex passive sentences shortened, but not for simpler active sentences. In Experiment 2, the participants who were naïve to Spanish learned verb conjugations in Spanish during tES and performed verb conjugation and short-term memory tasks. We found higher task accuracy and shorter reaction times on the verb conjugation tasks but not on the short-term memory task. These results elucidate a causal relationship between the left IFG and language processing both in native and non-native languages.