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# A preliminary study on the neural oscillatory characteristics of motor preparation prior to dysfluent and fluent utterances in adults who stutter

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## HIGHLIGHTS

- Compared motor preparation for stuttered and fluent speech in adults who stutter
- Motor beta oscillations localized using Magnetoencephalography
- Weak trend for delayed beta suppression in stuttered speech
- Results are preliminary and require further investigation

**ABSTRACT**

**Purpose:** Recent literature on speech production in adults who stutter (AWS) has begun to investigate the neural mechanisms characterizing speech-motor preparation prior to speech onset. Compelling evidence has suggested that stuttering is associated with atypical processing within cortical and sub-cortical motor networks, particularly in the beta frequency range, that is effective before speech production even begins. Due to low stuttering frequency in experimental settings, however, the literature has so far predominantly reported on fluent speech production in AWS. Consequently, we have limited understanding of the way in which fluent speech processing in AWS is disturbed leading to a dysfluency. This preliminary study aims to characterize neural motor preparation prior to stuttered utterances in AWS.

**Methods:** Eight AWS participated in the study. A total of 336 stuttered utterances were compared to the participants' own fluent utterance productions. Beta oscillatory activity was analyzed with magnetoencephalography (MEG) and localized using minimum-variance beamforming.

**Results:** Preparation for speech production induced beta suppression in the bilateral premotor and motor cortex prior to speech onset. Although the data revealed some interesting trends, no significant differences between fluent and stuttered utterances were present. This may be due to a relatively low and variable number of stuttered trials analyzed in individual subjects.

**Conclusion:** While the lack of significant differences may have resulted from the relatively low numbers of stuttered utterances across subjects, the observed trends demonstrated that the proposed methodology and experimental paradigm is a promising approach for future studies aiming to characterize differences between stuttered and fluent speech.