

Trait Related Internal Modeling Deficits in People Who Stutter During Spontaneous Fluency

David Jenson, Tim Saltuklaroglu, Kevin J Reilly, Ashley W Harkrider, David Thornton

The purpose of this study was to identify and describe sensorimotor μ activity from people who stutter (PWS) and fluent controls (TFS) during spontaneously fluent overt and covert speech to describe trait-related differences in motor to sensory and sensory to motor transformations. Time-frequency decomposition of the sensorimotor μ rhythm has been proposed as a metric of internal modeling, with β (~20 Hz) activity representing motor to sensory forward models and α (~10 Hz) activity indexing sensory to motor feedback. Independent Component Analysis of 68 channel EEG data identified bilateral μ components from matched PWS and TFS over PMC. Time-frequency analysis revealed weaker α and β activity in PWS in the left hemisphere during both overt and covert speech production, with no group differences observed in the right hemisphere. Results were interpreted to suggest that weak forward modeling and deficient feedback estimation and implementation characterizes the pathophysiology of stuttering. This reduced capacity for updating internal models on the basis of reafference is proposed to constitute a trait-related sensorimotor instability that predisposes the speech of PWS to breakdown.