Prestimulus Periodic and Aperiodic Neural Activity Shapes McGurk Perception

Vinsea A V Singh
National Brain Research Centre, Gurugram, Haryana, India

Vinodh G. Kumar
Penn State College of Medicine, Hershey, Pennsylvania, United States

Dr. Arpan Banerjee
National Brain Research Centre (NBRC), Gurugram, Haryana, India

Dr. Dipanjan Roy
Indian Institute of Technology Jodhpur, Jodhpur, Rajasthan, India

Abstract

Studies have reported that prestimulus brain oscillations guide perceptual experiences during AV speech perception. However, 'what' features in such oscillations drive perception remains unknown. In this EEG study (n=18), we investigated how prestimulus periodic oscillations and aperiodic components influence the perception of the McGurk illusion on a trial-by-trial basis. Using logistic mixed-effect models, we determined the topology of spectral markers that predict the brain response to illusory perception. We found lower levels of alpha (8-12 Hz) and beta (15-30 Hz) band oscillations over parieto-occipital sensors, lower aperiodic offset values over parietal-temporal sensors, and a lower global effect of exponent over the scalp that predicted the response to McGurk illusion. We conclude that the predominant source of variations in the prestimulus oscillatory state is manifested by aperiodic background activity and that variations in these oscillations and aperiodic activity, account for inter-trial and inter-individual variability in perception of the McGurk illusion.

In L. K. Samuelson, S. L. Frank, M. Toneva, A. Mackey, & E. Hazeltine (Eds.), *Proceedings of the 46th Annual Conference of the Cognitive Science Society.*