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### Feeling the Beat, in Rhythm and in Speech: Oscillatory Entertainment in Beat and Speech Perception

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# FEELING THE BEAT, IN RHYTHM AND IN SPEECH: OSCILLATORY ENTRAINMENT IN BEAT AND SPEECH PERCEPTION

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We have a natural tendency to time our movements with the various sounds and rhythms of the outside world. These actions require some perception of pulse in order to match movements to various external stimuli—we term this entrainment. Neural models of this phenomenon have focused on the role of cross-frequency coupling in auditory cortex, advocating for a hierarchical oscillatory organization that can rapidly adjust and phase-lock to the temporal regularities of auditory stimuli. A growing body of evidence advocates for the role of this synchronization in speech, with studies suggesting that entrainment occurs for metered speech, such as nursery rhymes. However, the literature has not yet examined whether these regularities persist for normal, non-rhythmic speech.

In this study, we administered a speech entrainment task as a behavioral assessment of intrinsic oscillatory responses to speech. In addition, we collected cognitive measures of short-term working memory and beat reproduction tasks from 19 adults in order to see if cognitive and rhythmic abilities were positively correlated with tapping regularity. Raster plot analysis was used to visualize consistencies in speech tapping across subjects. Our data show evidence for nonrandom tapping to speech stimuli that tended to cluster around particular, regularly occurring time points within the sentence. Because elements of regularity in speech have been shown to inform listeners' expectations about the incoming speech signal, these expectations may be used to detect regularity or entrain to underlying temporal cues of a given acoustic stimulus. Our results are consistent with the notion that resting oscillations are in essence, "reset" by the incoming speech signal and modulate to match its corresponding amplitude envelope. Ultimately, our findings support existing research that advocates for the role of the synchronizing oscillations, which characterize much of brain-wide activity and auditory processing in particular.