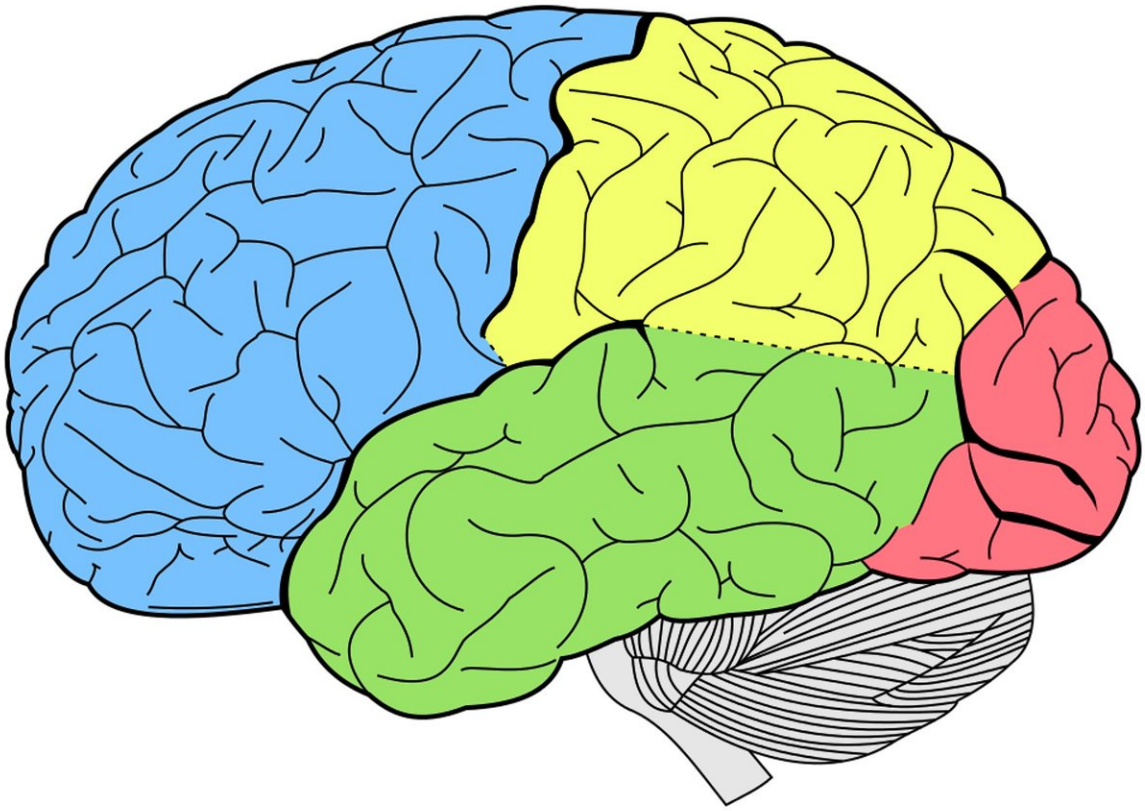
Investigating the impact of auditory beat stimulation on cognition

December 21 2023



Credit: CC0 Public Domain

New research conducted by the Center for BrainHealth at The University of Texas at Dallas investigates the impact of binaural beat

(BB) on language skills. BB is a sound that occurs when two slightly mismatched pure tones are heard. There is a growing interest in using BB as a non-invasive neuromodulation to enhance cognitive performance.

The study, "Neural consequences of binaural beat stimulation on auditory sentence comprehension: an EEG study," was recently published in Cerebral Cortex.

Led by researchers in the Speech, Language and Music (SLAM) Lab, this EEG study investigated the neural correlates of enhanced sentence comprehension by BB stimulation at beta and gamma frequencies as a follow-up of their seminal behavioral work.

The study included 60 participants. Throughout the experiment, electroencephalography (EEG) measures were recorded. Each participant was randomly assigned to one of three listening groups of differing frequencies (18-Hz beta BB, 40-Hz gamma BB, or pure-tone baseline) embedded in music.

Participants first underwent a sentence comprehension practice session, followed by a 10-minute stimulation phase where the frequencies were played.

The stimulation phase was immediately followed by the language comprehension task phase. Results showed that participants exposed to 18-Hz beta binaural beats had significantly higher accuracy and faster response times during the comprehension task, particularly for complex sentences. Moreover, there was increased neural entrainment following the beta frequency, which was thought to reduce the processing burden of the subsequent sentence processing.

Lead investigator Dr. Yune Lee, Assistant Professor at the School of

Behavioral and Brain Sciences and Director of the Speech, Language, and Music (SLAM) Laboratory, stated, "This is the first neuroimaging study that elucidated the effect of BB on language processing at the neural level. Minimal exposure to beta-frequency binaural beats resulted in significantly higher accuracy and faster language response times than control sounds. Furthermore, these results have implications for the potential use of BB in treating developmental language disorders."

More information: Jeahong Kim et al, Neural consequences of binaural beat stimulation on auditory sentence comprehension: an EEG study, *Cerebral Cortex* (2023). DOI: 10.1093/cercor/bhad459

Provided by Center for BrainHealth