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Hemispheric Lateralization In Auditory Cortex For Words Versus Partial Speech Sounds

Recent studies have shown that attention can affect brain activity triggered by speech, but it is still unclear at what level of processing attention changes the event-related potentials in the auditory cortex. Also, the specific regions in the cortex responsible for the various stages of speech processing are still being identified. We used 64-channel encephalography (EEG) to study the time course and source of neural activity triggered by two types of speech sounds: syllables and words. In two conditions, the Words Condition, and the Syllables Condition, participants were asked to respond to the a randomly interspersed "rare" stimulus of the opposite type (words and syllables) as the rest of the stimuli. Regional Dipole Source Analysis traced the difference between the two conditions (the N2b peak occurring at about 300 ms after the onset of each sound), to the left superior temporal gyrus, showing a much larger dipole strength for words than for syllables. As has been suggested recently by similar Functional Magnetic Resonance Imaging (fMRI) studies, this area in the brain may be responsible for differentiating speech sounds. This study supports this concept with the added benefit of greater temporal resolution and clues as to the type of speech sounds differentiated by this region of the brain. Since all subjects were forced to attend to all sounds by the nature of the interactive task, these results also support the possibility that this activity is increased by modulatory attentional mechanisms.