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**The effects of discrimination type and setting
on the electrophysiology of speech processing in humans**

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Background: Speech discrimination is based on both spectral and temporal acoustic cues. In non-speech auditory stimuli these cues are processed differently in the brain but they have not yet been studied in relation to speech perception.

The electrophysiology and spatiotemporal distribution of speech processing in humans were used to compare processing of consonants discriminated by spectral and temporal cues.

Results: Subjects were presented with series of vowel-consonant-vowel (VCV) stimuli comprised of different stimuli along a temporal continuum between clearly distinguished /

ubu/ and /upu/, with 3 ambiguously distinguished VCV stimuli with intermediate closure durations to determine processing of temporal cues. A series of stimuli along a spectral continuum between clear /ubu/ and /udu/, with 3 intermediate ambiguous VCVs were presented to study processing of spectral cues. Brain potentials include an onset P1, N1, P2 complex and sustained negativity lasting hundreds of msec. While responses to the onset vowel were the same across settings, the consonant-evoked latencies were sensitive to voice-onset time. The sustained negativity was larger in spectral than temporal discrimination and largest in the mixed setting.

Spatiotemporal distributions of brain activity associated with processing consonants vary between spectral and temporal discrimination, and depend on the context in which discrimination is performed, i.e., in temporal, spectral or mixed settings.

Conclusions: Brain activity to speech VCV discriminations is sensitive to spectral and temporal acoustic cues, is associated with different distribution in the brain and is modulated by listening circumstances.