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Relative importance of E and TFS speech cues in low and high-frequency channels

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Previous studies have shown that perfect speech identification in quiet could be obtained for broadband speech processed using the Hilbert transform to preserve either temporal envelope (E) or temporal fine structure (TFS) cues only in narrow frequency bands. However, little is known regarding the respective contribution of each cue to speech intelligibility in low and high frequency bands. The goal of the present study was to assess the contribution of E and TFS cues of the low- and high-frequency channels to consonant identification. Vowel-consonant-vowel stimuli were split into an array of 16 analysis bands spanning the range 80-8,020 Hz and processed using the Hilbert transform to keep either E or TFS cues only within each band. Identification scores were measured for low-pass and high-pass filtering of the processed stimuli for a group of normal-hearing listeners. Results will be discussed in light of phase-locking properties to E and TFS. In most mammals, phase-locking of auditory-nerve fibers begins to decline above 1 kHz and disappears above 4-5 kHz. TFS-coded speech intelligibility should therefore drop when stimuli are high-pass filtered above 1 kHz and be at chance level for high-pass filtering above 5 kHz. No such drop should be expected for E-coded speech.