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**Contribution of very low modulation frequencies to speech
intelligibility in a competing speech task**

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Vocoder studies have demonstrated that low-rate temporal-envelope cues (below ~ 50 Hz) in a few frequency bands are sufficient for good speech identification in quiet. From the effects of lowpass and highpass filtering of the temporal envelopes extracted from bandpass filtered sentences, Drullman et al. [J. Acoust. Soc. Am. 95:2670-2680 (1994); J. Acoust. Soc. Am. 95:1053-1064 (1994)] argued that modulation frequencies between 4 and 16 Hz are the most important for speech identification in a steady background noise. However, Stone and Moore (JASA, in press) found that modulation frequencies below 2 Hz were also beneficial when the speech signal was processed through an 8-channel (but not a 12-channel) noise vocoder. The present study investigated speech identification for nine normal-hearing listeners using IEEE sentences presented with a competing talker; the mixed signal was processed using a 6-, 9-, or 15-channel noise vocoder. Low-rate temporal-envelope cues were manipulated using a compressor for each channel. Compression speed varied from slow to fast, so as to progressively degrade modulation frequencies below 4 Hz. Independent of the spectral resolution of the vocoder, mean intelligibility decreased as the compression speed increased; even modulation frequencies below 1.3 Hz contributed significantly to speech intelligibility.