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Discrimination of stochastic patterns of frequency modulation relevant to speech perception

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Recent work has suggested involvement of temporal fine structure (TFS) information in speech perception, especially in adverse listening conditions. However, little is known regarding discrimination of pattern of TFS modulation, an ability that would underlie robust contribution to speech processing. The present study evaluated the ability to discriminate among stochastic patterns of frequency modulation (FM). Contrasting modulators were different samples of lowpass noise that shared a common bandwidth and resulted in the same maximum frequency excursion. Performance levels declined in an orderly manner with modulator bandwidth, similar to results obtained when lowpass noise is used to modulate amplitude (i.e., AM) rather than fine structure. Modeling, however, indicated that the similarity was not simply a result of FM-to-AM conversion at the output of auditory filters. In additional conditions, discrimination of stochastic FM was measured in the presence of wideband noise which in some cases was sinusoidally amplitude modulated at either 4 or 20 Hz. With both unmodulated and modulated maskers, little effect on performance was noted, even with a signal carrier level as low as 15-20 dB above detection threshold. Absence of a substantial masking effect indicates availability of TFS cues for speech perception in noise. [Work supported by NIH.]