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Amplitude modulation shape and speech intelligibility

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Research has demonstrated that low frequency amplitude modulations in speech signals are crucially important to maintaining intelligibility. The current work demonstrates a flexible way of characterising the pulsatile bursts of energy found in the temporal envelopes of sub-band filtered speech. Speech was passed through a 128-filter Gammatone filterbank and the temporal envelope of each filter extracted using the Hilbert transform. Thirty-five raised cosine pulses were fitted to model the envelope of each filter and each pulse was defined by its amplitude, half-duration and centre position. The distribution of these pulses demonstrates that the most commonly found pulse half-duration in speech is around 10 ms and few pulses have half-durations longer than 25 ms. Highly intelligible vocoded speech is generated using the extracted pulses and these measures suggest that the auditory system may signal the position in time of the amplitude modulations rather than representing low-frequency information. This method creates a flexible framework within which to further probe the mechanisms involved and allows the ability to focus on cross-channel information in the time domain.