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The ability of temporally integrating acoustic waveforms is associated with release of speech from informational masking under reverberant conditions

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Perceptual integration of the sound wave directly emanating from the source with reflections of the source needs both bridging temporal gaps and calculating correlations between sound waves. In this study, we examined whether the temporal integration of source/reflection signals is frequency dependent and associated with speech unmasking under simulated reverberant conditions. In Experiment 1, a break in correlation (BIC) between correlated wideband or narrowband noises at the two ears was detectable even when an interaural interval (IAI) was introduced. The longest IAI varied markedly across listeners. In wideband noise, it could be up to 21 ms; in narrowband noise, it decreased as the center frequency was increased. In Experiment 2, when the interval between target speech and its single-reflection simulation (inter-target interval, ITI) was reduced from 64 to 0 ms, intelligibility of target speech was markedly improved under the speech-masking condition but not the noise-masking condition. The longest effective ITI under the speech-masking condition significantly correlated with the longest IAI for detecting the BIC in low-frequency (< or = 400 Hz) narrowband noises. Thus the frequency-dependent temporal integration of sound-waveform signals is critical for releasing speech from informational masking in reverberant environments. Supported by the National Natural Science Foundation of China.