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The role of compression in forward masking by Schroeder-phase complexes

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Waveforms with flat temporal envelopes can produce more forward masking than waveforms with more modulated, or peakier, temporal envelopes after auditory filtering, even when the rms amplitude of the two waveforms is equal. This has been explained in terms of basilar-membrane nonlinearity, which can result in a higher rms amplitude for the flatter than for the peakier temporal waveform after compression. Here, forward masking was measured as a function of the phase curvature of two Schroeder-phase complexes, one with components around the signal frequency (on-frequency masker) and the other with components well below the signal frequency (off-frequency masker). The experiment tested the hypothesis that since the basilar-membrane response to the off-frequency complex at the signal-frequency place is presumably linear, masking should not depend on the phase curvature of the complex, whereas compression of the on-frequency masker should produce phase-dependent thresholds, with the minimum corresponding to the peakiest internal representation of the masker. The results replicate prominent phase effects using on-frequency maskers, but also show some phase effects with off-frequency maskers, which are not predicted by our current understanding of basilar-membrane compression. Other possible influences, such as efferent effects and neural compression, are considered. [Supported by NIH grant R01DC03909].