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### Roughness detection in fricative-like noise and tone stimuli

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Audio (spectral) and modulation (envelope) frequencies both carry information in a speech signal. While low modulation frequencies (2-20Hz) convey syllable information, higher modulation frequencies (80-400Hz) allow for assimilation of perceptual cues, e.g., the roughness of amplitude-modulated noise in voiced fricatives, considered here. Psychoacoustic 3-interval forced-choice experiments measured AM detection thresholds for modulated noise accompanied by a tone with matching fundamental frequency at 125Hz: (1) tone-to-noise ratio (TNR) and phase between tone and noise envelope were varied, with silence between intervals; (2) as (1) with continuous tone throughout each trial; (3) duration and noise spectral shape were varied. Results from (1) showed increased threshold (worse detection) for louder tones (40-50dB TNR). In (2), a similar effect was observed for the in-phase condition, but out-of-phase AM detection appeared immune to the tone. As expected, (3) showed increased thresholds for shorter tokens, although still detectable at 60ms, and no effect for spectral shape. The phase effect of (2) held for the short stimuli, with implications for fricative speech tokens (40ms-100ms). Further work will evaluate the strength of this surprisingly robust cue in speech.