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The role of temporal fine structure in speech source segregation

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Normal-hearing (NH) listeners show better speech recognition when a stationary noise masker is replaced by an opposite-gender competing talker at the same signal-to-noise ratio (SNR). Hearing-impaired (HI) listeners often do not show this interfering-talker benefit (ITB). This may be due to a reduced ability to use temporal fine structure (TFS). Consistent with this idea, NH listeners also show little ITB when TFS is removed. We hypothesized that TFS underlies the ITB by providing source-segregation cues. To test this hypothesis, non-auditory segregation cues were introduced in the form of a video of the talker's face. Speech intelligibility was estimated in NH listeners as a function of SNR for sentences spoken by a female talker and masked by speech-spectrum shaped stationary noise or a single male talker. Target and masker were summed before processing by a 15-channel noise vocoder to remove TFS, and presented with or without accompanying video. Without video, listeners received little ITB, consistent with previous results. Auditory-visual conditions yielded as much as 9 dB of ITB, supporting the hypothesis that a diminished ability to perceptually segregate sources contributes to the lack of ITB in the absence of TFS. Similar results were obtained for unprocessed speech in HI listeners.