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# The Influence of Reduced Speech Signal Audibility on Masked-Speech Recognition for Young Adults with Normal Hearing



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## Introduction

- ❖ It can be difficult to recognize and comprehend speech in environments with multiple talkers. Introducing prosodic contour differences (i.e., intonation differences) between the target and masker speech can help listeners better identify the target in multi-talker environments (Kidd and Colburn, 2017).
- ❖ Data has indicated that the ability to utilize target/masker differences is significantly reduced for older adults with sensorineural hearing loss (SNHL) in multi-talker conditions (Best et al., 2017; Lee and Humes, 2012) even when individualized NAL-RP amplification was applied to the stimuli (Wasiuk et al., 2020).

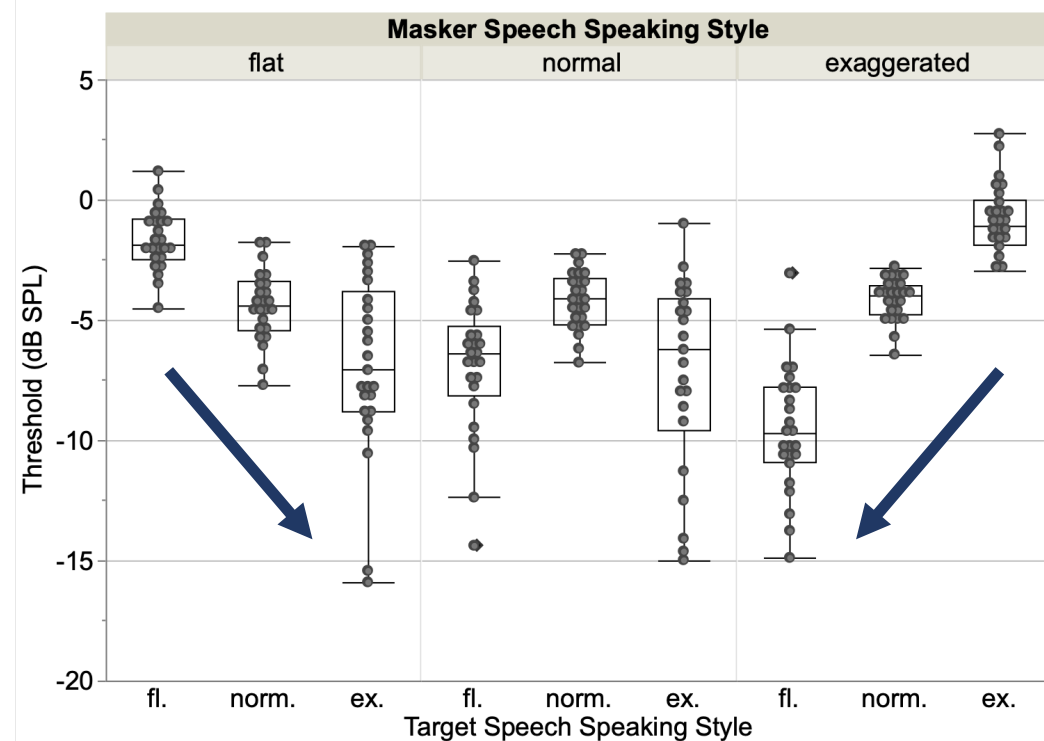


Figure 1. SRTs (dB SNR) for a young adult listener group with normal hearing presented with natural speech stimuli for three target speaking styles: flat (fl.), normal (norm.), and exaggerated (ex.) in two-talker maskers with three different speaking styles: flat (left column), normal (middle column), and exaggerated (right column). Lower SRTs (smaller or more negative SNRs) indicate better target recognition performance.

- ❖ For a masked-speech recognition task, a prosodic mismatch between the target and masker speech (i.e., *flat* masker and *exaggerated* target) improved the listener's SRT, or speech reception threshold, for young normal hearing (NH) adults (Calandruccio et al., 2019) but not for older adults with SNHL (Wasiuk et al., 2020).
- ❖ Improvement in speech recognition as a result of difference cues (e.g., Rhebergen et al., 2005) is referred to as a 'release from informational masking.'

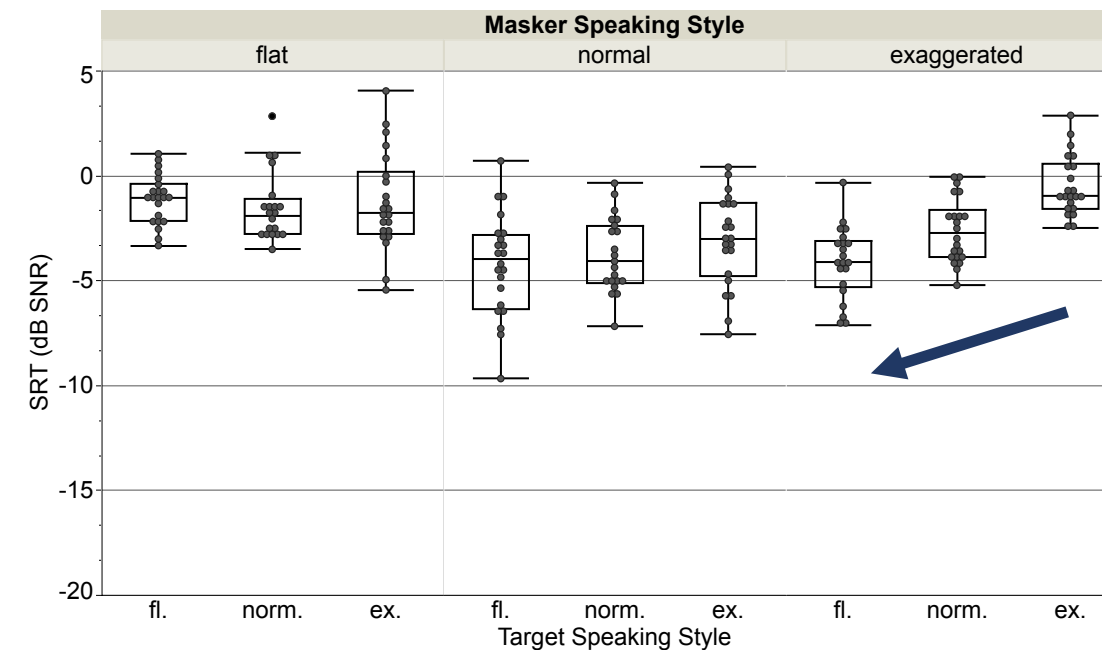


Figure 2. SRTs (dB SNR) for older adults with mild to moderate sensorineural hearing loss presented with spectrally shaped/hearing aid amplified stimuli for three target speaking styles: flat (fl.), normal (norm.), and exaggerated (ex.) in two-talker maskers with three different speaking styles: flat (left column), normal (middle column), and exaggerated (right column). Lower SRTs (smaller or more negative SNRs) indicate better target recognition.

- ❖ **Hypothesis:** A loss of speech signal audibility, approximating that experienced by the older listeners with SNHL in Wasiuk et al., 2020, can significantly reduce the recognition of target speech for young NH listeners, despite access to target/masker prosodic contour differences in masked-speech recognition.

## Methods

- ❖ Read and sign informed consent document
- ❖ Demographic questionnaire to confirm native language
- ❖ Hearing screening < 20 dB HL 250-8000 Hz bilaterally
- ❖ Task: Target speech recognition in a two-talker masker

## Stimulus Material

- ❖ Target speech was presented with two competing talkers in the background (i.e., two-talker maskers).
- ❖ Prosodic contour cues of target and masker speech were systematically manipulated to be *flat*, *normal*, or *exaggerated* (see Calandruccio et al., 2019).

- ❖ Speech processed to simulate the audibility profile of older adults with SNHL was presented to young NH listeners (i.e., speech was presented via a simulated hearing loss program).
- ❖ Speech matched the average frequency-dependent audibility of the older adults with SNHL from Wasiuk et al., 2020.

## Current Results

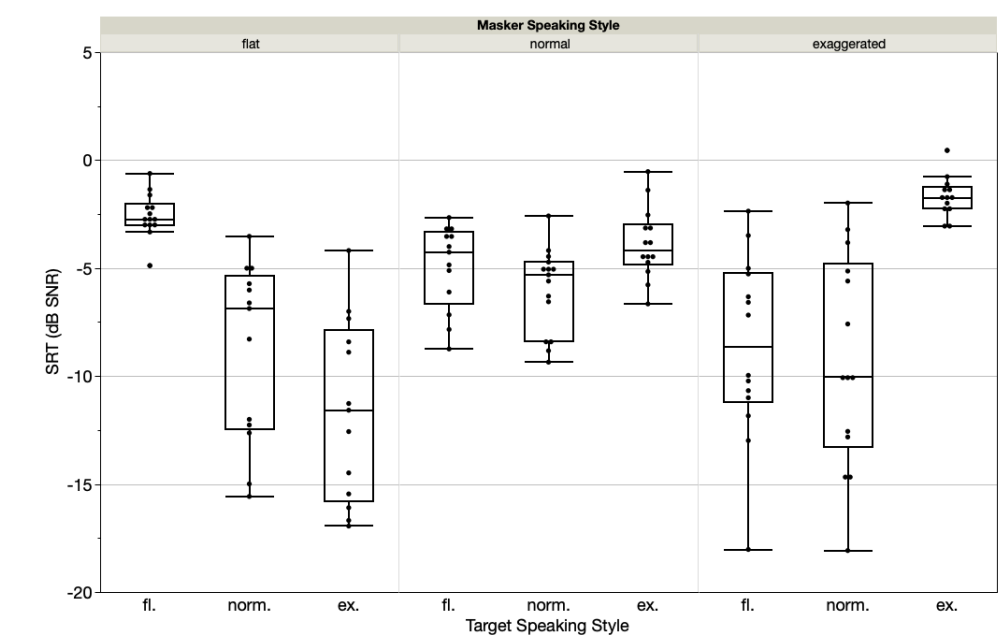


Figure 3. SRTs (dB SNR) for young adult listener with NH in the current reduced audibility experiment.

- ❖ Young NH listeners are still able to benefit from prosodic contour differences between the target/masker, even while listening via the reduced audibility of SNHL.
- ❖ Sample size (n) = 15

## Implications

- ❖ This research has important implications for older adults in real-world multi-talker environments and may contribute to the improvement of hearing aid amplification technology to help those with SNHL communicate more effectively.

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