The Impact of Masks on Speech Understanding in Normal-Hearing Listeners

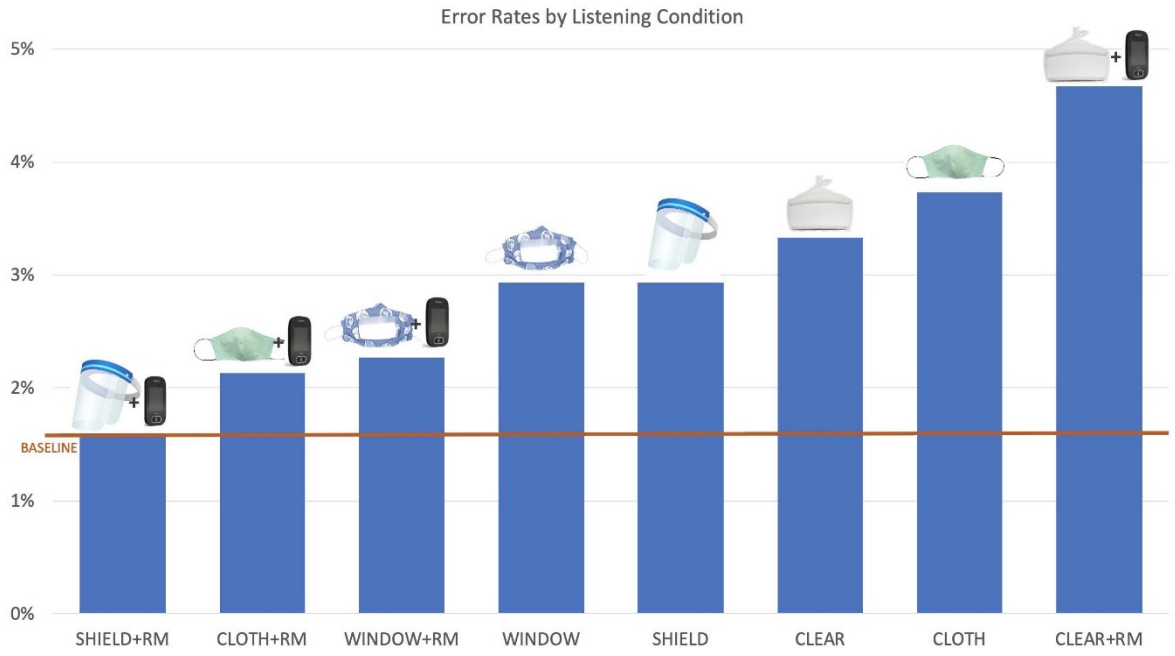
Lauren Watson and Stacey Kampe Au.D., CCC-A

Background

- All masks attenuate frequencies above 1000 Hz with the worst attenuation above 4000 Hz (Corey et al., 2020).
- This attenuation primarily affects consonant sounds “f”, “s”, and “th” (Corey et al., 2020).
- Surgical masks attenuate high frequencies by 3-4 dB, and N95 masks attenuate high frequencies by close to 12 dB (Goldin et al., 2020).
- Masks primarily attenuate frequencies from 2000-7000 Hz (Goldin et al., 2020).
- Transparent masks have poorer acoustics when compared to medical and cloth masks (Corey et al., 2020).

Background

- Measured speech perception in a classroom with 6 feet of separation
- Best scores resulted from a face shield with remote microphone
- Worst scores resulted from a ClearMask with remote microphone
- There is likely to be increased listening difficulty depending on hearing loss, new vocabulary, increased distance, or background noise



The Effects of Face Coverings and Remote Microphone Technology on Speech Perception in the Classroom (Rudge, Sonneveldt, & Moog Brooks, 2020)

Purpose

- To assess the impact of commonly used masks on normal-hearing listeners' ability to understand speech in quiet.

Method

- Created a recorded 25-word list for each condition tested
  - Lists were NU-6 lists commonly used in audiology clinics for word recognition testing
- Participants included 15 adults with normal hearing from 250-8000 Hz
- Recording was presented through speakers in a sound booth at 55 dB HL (a normal conversational level of speech)
- Participants were instructed to repeat back each word

Conditions Tested

- No Mask
- Cloth Mask
- Surgical Mask
- N95 Mask
- ClearMask
- Cloth Mask With Window
- Face Shield

Results

1. Surgical Mask: 25.00 (100%)
2. N95: 24.93 (99.7%)
3. Cloth Mask: 24.87 (99.5%)
4. Cloth Window: 24.86 (99.4%)
5. Face Shield: 24.80 (99.2%)
6. ClearMask: 24.33 (97.3%)

Future Research

- How masks affect speech understanding in individuals with hearing loss with and without the use of visual cues

References

Corey, R. M., Jones, U., & Singer, A. C. (2020). Acoustic effects of medical, cloth, and transparent face masks on speech signals. The Journal of the Acoustical Society of America, 148(4), 2371-2375. doi:10.1121/10.0002279

Goldin A, Weinstein BE, Shiman N. How do medical masks degrade speech perception? Hearing Review. 2020;27(5):8-9.

Rudge, A. M., Sonneveldt, V., & Moog Brooks, B. (2020). The Effects of Face Coverings and Remote Microphone Technology on Speech Perception in the Classroom The Moog Center for Deaf Education. Retrieved from www.ResearchGate.net

Contact Information

Lauren Watson

lewatson1@shockers.wichita.edu

Wichita State University