

SpeechFocus improves speech intelligibility in special listening situations

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Preliminary electro-acoustic testing revealed that the SpeechFocus algorithm has the potential to improve significantly speech understanding in special listening situations. To examine the effectiveness of the SpeechFocus algorithm for improving speech understanding in background noise, clinical studies were conducted at two different sites: Site 1 was the University of Iowa, Iowa City, IA, and Site 2 was the University of Northern Colorado, Greeley, CO. The same protocol was used at both sites.

The participants were individuals with downward sloping sensorineural hearing loss, all experienced hearing aid users (n=15 at Site 1, n=21 at Site 2). The participants were fitted bilaterally with the Siemens Pure 701 BTE instruments using closed domes, programmed to the NAL-NL1 prescriptive fitting. The prescribed fitting was stored in three different programs, which only differed in terms of the microphone mode setting: Program 1: fixed omnidirectional, Program 2: conventional frontal automatic/adaptive directional, and Program 3: SpeechFocus (fully automatic/adaptive directional including backward directivity).

Testing was conducted with speech delivered from the back (180° azimuth) and noise from the front of the listener (0° azimuth). The speech material used was the Hearing in Noise Test (HINT). The standard HINT noise was presented at a constant level of 72 dB(A) and the level of the sentences was adaptive; a reception threshold score (RTS) for sentences in noise was obtained for each participant for each microphone setting.

The results from the two sites were very similar. In both cases, repeated-measure ANOVA revealed that the main effect of microphone mode was significant ($p < .0001$), and follow-up tests (with Bonferroni correction) showed that the performance between all microphone modes was significantly different ($p < 0.0001$): omni was better than adaptive frontal directional, SpeechFocus was better than adaptive directional and omni.

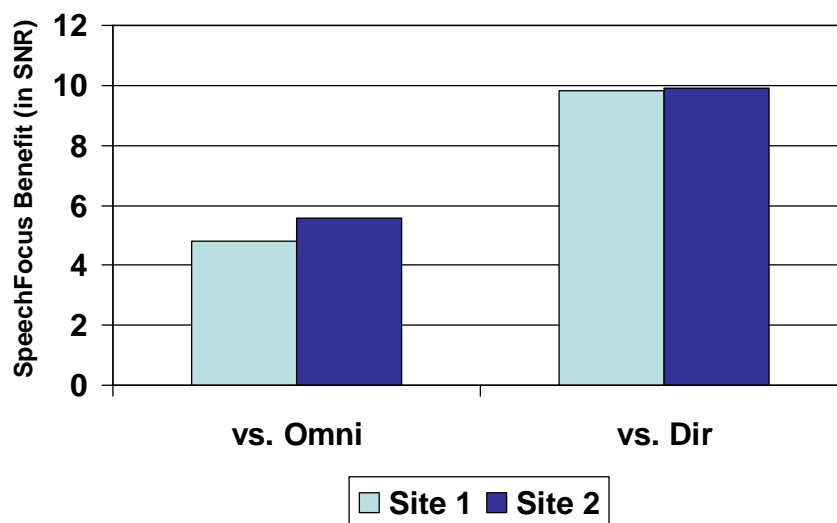


Figure 1: The mean benefit of SpeechFocus for the two different research sites.

Figure 1 shows the results from the two experimental sites plotted as a function of mean SpeechFocus benefit. Observe that the benefit for SpeechFocus for the two sites was nearly identical when compared to the two other microphone mode options. As shown in this Figure, the SpeechFocus benefit is about 10 dB when compared to adaptive directional, and about 5 dB when compared to omnidirectional.

If we examine individual data, and simply compare SpeechFocus to the omni microphone mode, at Site 1 there was a benefit for SpeechFocus of at least 2 dB for 100% of the participants, and 67% of the participants had a SpeechFocus benefit of at least 4 dB. At Site 2, 95% of the participants had a SpeechFocus benefit of at least 2 dB (when compared to omni) and 81% had a benefit of at least 4 dB; 3 of the 21 participants had a SpeechFocus benefit of over 9 dB.

Summary

Clinical trials at two independent research sites with the new SpeechFocus technology revealed a significant benefit for SpeechFocus for understanding speech in background noise. This microphone mode provided an average improvement of ~5 dB compared to omnidirectional and ~10 dB compared to frontal adaptive directional. As has been pointed out in many surveys of hearing aids users, overall satisfaction with hearing aids often is related to the number of listening situations in which patients report that the instruments provide benefit. With SpeechFocus, we believe we have just added one more listening situation where patients will now say that a significant improvement in speech understanding is present.

References

Branda E, Hernandez A. New directional solutions for special listening situations. Paper presented at the 2010 annual meeting of the American Academy of Audiology, April, 2010, San Diego.