

# Field Study News



## Roger and hearing instruments

### Excellent speech understanding in high noise levels

A recent study by Professor Linda Thibodeau at the Callier Center for Communication Disorders, part of the University of Texas in Dallas, revealed that the usage of Roger systems in combination with hearing instruments resulted in significant improvements in speech understanding in noise at 65 to 80 dB(A) noise levels over traditional and Dynamic FM technologies. The average improvement in speech recognition afforded by Roger over Dynamic FM at the 80 dB(A) level was 35%. At 75 dB(A) there was an improvement of 54% over traditional FM. Roger was also the preferred technology of most listeners in the study in real-world listening situations.

#### Objective

The purpose of the study was to compare the benefits of Phonak's new Roger wireless technology with traditional and Dynamic FM technologies through objective and subjective measures of speech recognition in both clinical and real-world settings.

#### Design

Sentence recognition in quiet and in noise was evaluated in three conditions of wireless technology. Speech recognition was evaluated using randomly-selected lists of HINT sentences. Multiclassroom noise, recorded from a first-, second-, third-, and fourth-grade school classroom during independent work time, was digitally overlapped and served as the competing noise signal (Schafer and Thibodeau 2006). This competing signal was presented at 50, 55, 60, 65, 70, 75 and 80 dB(A) when measured at the position of the subject's head. A second measurement of the noise level at the position of the transmitter microphone ensured that the noise level at that position was the same.

The quiet condition and the seven noise levels with the three different types of wireless systems, accounted for a total of 24 conditions. Starting noise conditions and technology type were counterbalanced.

Subjective ratings of the wireless technology types were obtained in a noisy real-world setting. Participants and examiners were blinded to the technology type throughout the experiment. For details of test set-up for objective measurements see Figure 1.

The stimuli for subjective ratings were paragraphs based on the instructional materials for exhibits at the Dallas World Aquarium. The ambient noise levels at the four locations that were visited ranged from 71 to 83 dB(A) at the position of the listeners and from 70 to 82 dB(A) at the position of the talker. After listening to three or four sentences without visual cues, the participants were instructed to change their wireless technology. After listening to all three technologies, they rated their listening difficulty for each and selected the technology they preferred.

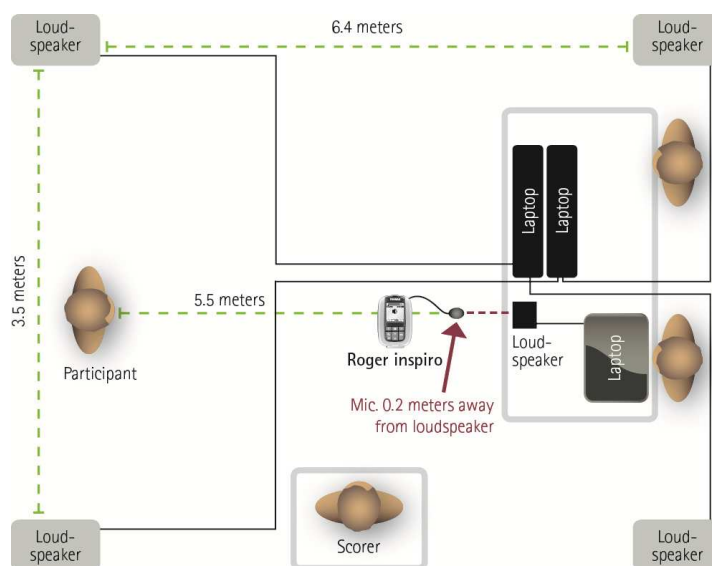


Fig. 1 The objective measures were conducted in a large room with four speakers placed at the corners to present classroom noise and one at the front to deliver the speech. Distance between Roger inspiro microphone and loudspeaker was 0.20 m (8").

## Sample

Eleven participants took part in the study, aged 16 to 78, with primarily moderate-to-severe bilateral hearing losses. Ten wore Phonak hearing instruments, one wore Oticon hearing instruments. Four were in high school and two were in college. All were experienced in the use of hearing instruments and FM systems.

## Results

The participants' speech in noise performance when using Roger technology was significantly better than that obtained using traditional and Dynamic FM technology, with the greatest benefits at the highest noise level (see Fig. 2).

Eight of the participants (73%) selected Roger as their preferred technology across all of the study's four locations. Of the remaining participants, one selected Dynamic FM and one selected a mix of both Roger and Dynamic FM across these listening stations. One of the participants, who also participated in a previous study (Thibodeau, 2010), commented that Roger was a dramatic improvement over the best in the previous study. The majority of listeners also preferred Roger when listening to speech in a real-world noisy environment.

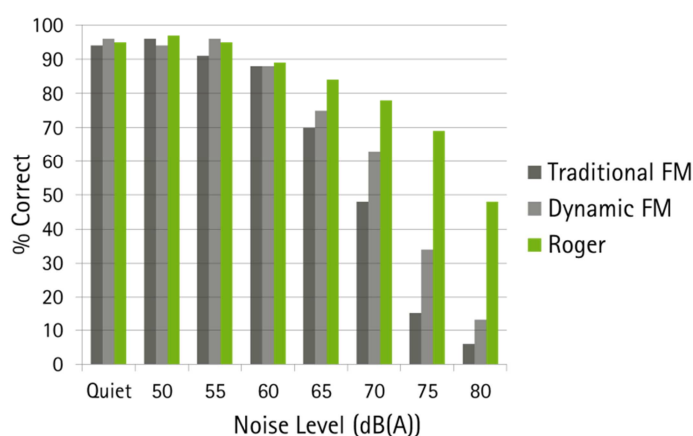


Fig. 2 HINT percent correct scores for total words correct as a function of noise level for traditional FM, Dynamic FM and Roger. At the 80 dB(A) noise level 9 participants scored <10% for traditional FM, 6 scored <10% for Dynamic FM, and only 1 scored <10% for Roger.

## Conclusion

The use of Roger will allow persons to engage in communication in environments that would have otherwise not been possible using traditional wireless microphone (FM) technology.

## References

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- Erin Schafer, Linda Thibodeau. Speech recognition in noise in children with cochlear implants while listening in bilateral, bimodal, and FM-system arrangements. 2006. *American Journal of Audiology*, 15(2): 114–126.

For more information please contact Hans Mulder at [hans.mulder@phonak.com](mailto:hans.mulder@phonak.com)