

# Supero 413 AZ: outstanding directional benefit

## Summary

The directional benefit of the Supero 413 AZ power instrument was assessed in listeners with severe-profound hearing losses. Speech tests in noise show an average directional benefit of 7.9 dB, which corresponds to a substantial improvement in speech understanding. Thus, Supero 413 AZ provides outstanding directional benefit to those clients who need it most.

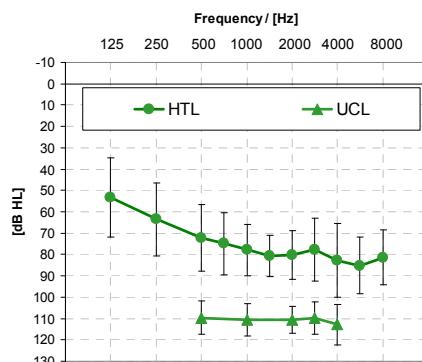
Subjectively, the participants reported that the listening effort is low even in challenging situations.

## Introduction

Directional microphones are the means of choice for improving speech intelligibility in noise, which is the largest improvement sought by those wearing hearing aids [1]. In fact, directional microphones provide the only verified method of improving speech intelligibility in noise with hearing aids (see [2] for a review). The greater the hearing loss, the greater is the need for additional support in noise. While directional microphones are available in a wide range of hearing instruments for moderate to severe losses, there is a lack of power hearing aids with directional microphones. Accordingly, there are only limited data on the directional benefit for clients with severe-profound losses. Thus, a clinical trial was conducted to assess the performance of the Supero 413 AZ power instrument in this subject group\*.

## Setup of the study

In total, 20 experienced hearing aid users (mean age: 54 years) participated in the trial. The average hearing loss is shown below (PTA [0.5 - 4 kHz]: 78 dB).



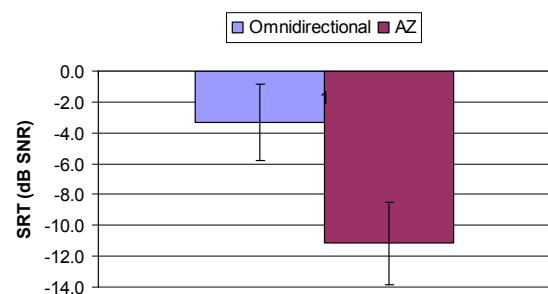
The subjects were fit with Supero 413 AZ. The hearing aids were adjusted to NAL R.P. which was verified in a 2cc coupler. The signal processing was set to Super Compression. Noise canceller and feedback canceller were switched off to avoid any interference with the test signals and to allow for isolated assessment of the directional microphones. The adaptive Oldenburg Sentence Test was used for speech testing in noise. The speech was presented from the front, and the noise signal from behind (180°). The speech level was fixed at 65 dB SPL. It was verified that all subjects had at least 80% speech understanding in quiet with the test material at 65 dB. This was to ensure that poor performance in the test is actually caused by interfering noise, and not by insufficient audibility. The noise signal was unmodulated and had the same spectrum as the long-term

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spectrum of the speech material. The level of the noise was adapted to result in 50% speech intelligibility. The test was conducted with omnidirectional microphones and with directional microphones in randomized order. Apart from directionality, there were no other differences in the hearing aid settings in the two conditions.

## Results

The picture below shows the average SNR which was necessary for 50% intelligibility in both test conditions. A lower (negative) value indicates better performance.



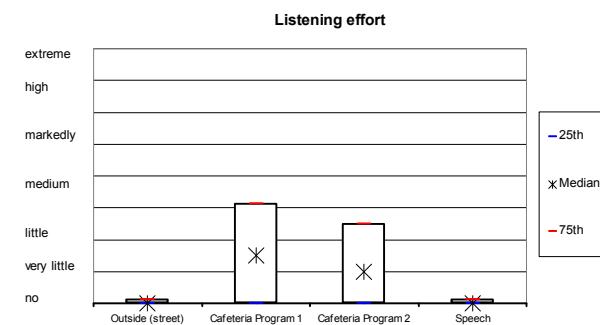
The average directional benefit (i.e., the difference between both conditions) is 7.9 dB. This corresponds to a substantial improvement in speech understanding, as the slope of the used test is about 17% speech intelligibility improvement per dB [3]. For all subjects except one, the individual directional benefit was between 6 and 10 dB. There was no relationship between individual hearing loss and directional benefit.

Previous studies on directional microphones in subjects with moderate to severe losses [4] report average directional benefits between about 4–8 dB. Thus, the results from the present study confirm these findings for subjects with severe-profound losses. In conclusion, the Supero 413 AZ power hearing instrument provides outstanding directional benefit to those who need it most.

## Subjective impression

In addition to formal speech tests, the subjects were asked to rate their subjective initial

impression on the Supero hearing instruments. They were fit using default settings, i.e. according to the Phonak Digital Power+ fitting formula. Immediately after the fitting (with overall gain adjustments based on initial comments only) the subjects were taken on a walk through the research facility building and asked to rate the performance in different listening environments. The overall sound quality for speech in quiet and music was described rather positively. In the cafeteria, a very challenging environment, the sound quality was described as medium. The next figure shows the self-reported listening effort, which was generally described as being very low, even in demanding situations.



In total, 90% of all subjects indicated that they would be willing to test the hearing aids in daily life. This is noteworthy, as people with severe to profound losses are demanding clients who are absolutely dependent on maximum performance of their hearing aids, and who simply cannot afford to compromise.

\*The study was conducted by B. Gabriel, PhD, Hörzentrum Oldenburg, Germany

For further information, please contact info@phonak.ch

## References

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- [2] Killon M (2004). The Hearing Review 11(3)
- [3] Wagener K, Brand T, Kollmeier B (1999). Z f Audiologie 38(3):86-95
- [4] Pumford JM, Seewald RC, Scollie SD, Jenstad LM (2000). JAAA11(1): 23-35