

# Field Study News

## StereoZoom

### Improved speech understanding even with open fittings

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#### Abstract

In the premium products from the Spice generation, StereoZoom offers hearing instrument users a manual program which enables an additional improvement in speech understanding, particularly in difficult listening situations where there is diffuse, uncorrelated background noise and the hearing direction strongly focused toward the front. StereoZoom uses binaural processing technologies to create a bidirectional network of four microphones. This network can produce a directional effect that has a strong focus towards the front.

This study involving 19 participants showed a significant improvement in speech understanding against background noise when StereoZoom is compared with UltraZoom and with a situation without a hearing instrument. The measurements were carried out for open (n=8) and closed (n=1) fittings.

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#### Introduction

In general, the advantages of directional microphones are based on the fact that the desired speech source is located in front of the user or in the user's line of sight, because the directional characteristics of a standard beamformer are designed to suppress background noise from the side or from behind. However, speech signals coming from the front are accentuated to increase the signal-to-noise ratio (SNR). In particularly difficult listening situations with uncorrelated background noise, such as at a cocktail party, it is difficult for hearing instrument users to focus on a speaker directly in front of them. Creating a bidirectional network of four microphones produces a strongly focused directional effect. This enhanced directional characteristic, which enables the null position of the directional microphone to be shifted considerably further forward, produces a very narrow focus of +/- 45°, thus generating the potential for an improved SNR (Nyffeler, Field Study News 2010). By switching to the manual StereoZoom program, StereoZoom offers the hearing instrument user the chance to direct the hearing focus effectively towards a person directly in front of him. The

hearing instrument user is thus able to conduct a one-to-one conversation against background noise.

The aim of this study was to demonstrate the improvement in speech understanding with StereoZoom in comparison with UltraZoom in the manual "speech in background noise" program and with no hearing instrument, using the Oldenburg Sentence Test (OLSA) and diffuse, uncorrelated cafeteria background noise at 65 dB (A).

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#### Test subjects and methods

Eight adults with a mild hearing loss and eleven with a profound hearing loss took part in this study. The eight participants with a mild hearing loss were fitted with Phonak Ambra microM and open domes, while the eleven with a profound hearing loss were fitted with Phonak Ambra SP and individual earpieces. The speech signal of the OLSA test was presented from 0°. The background noise consisted of uncorrelated cafeteria noise from a circle of five loudspeakers (at 60°, 120°, 180°, 240° and 300°) at a volume of 65 dB (A). The test subject was seated in the middle of a loudspeaker circle which was placed at head height and a distance of 1.4 m. With the help of the OLSA test, the adaptive measuring method was used to measure the speech understanding threshold (SRT, SNR at 50% speech understanding). In this test, the UltraZoom and StereoZoom features were compared with each other and also with the speech understanding without a hearing instrument. Two manual program settings were used for the hearing instruments: a copy of the program for speech in background noise with UltraZoom and a StereoZoom program. These programs could be selected using the Phonak PilotOne remote control (Nyffeler, Field Study News 2010).

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#### Results

Due to the small number of participants and variation between the individual cases of hearing loss, the data available does not follow a normal

distribution. A non-parametric test, the Wilcoxon matched pairs test, was therefore used to investigate the significant differences.

The results of the OLSA test with Phonak Ambra microM show a significant improvement with the use of StereoZoom compared to UltraZoom ( $p=0.012$ ) and without hearing instrument ( $p=0.012$ ; Fig. 1). The results for UltraZoom compared to without hearing instrument were also considerably better ( $p=0.012$ ).

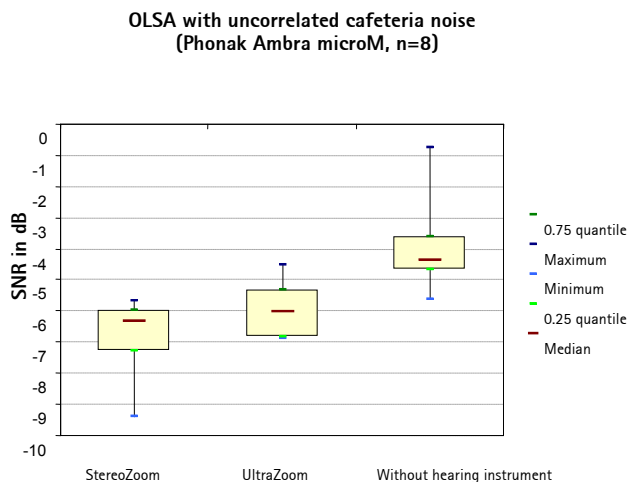


Fig. 1: OLSA results given in dB SNR for Phonak Ambra microM with StereoZoom, UltraZoom and without the use of a hearing instrument ( $n=8$ )

The individual results of the participants with open fittings (Fig. 2) show that, in all cases, a further improvement was measured using the manual StereoZoom program compared to UltraZoom. Five of these participants experienced considerable benefits in terms of speech understanding against background noise, while the other three participants in this study experienced a slight improvement.

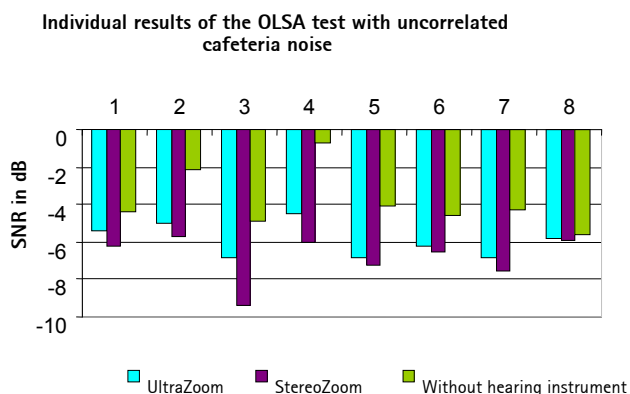


Fig. 2: Individual OLSA test results of the eight participants with a mild hearing loss who received open fittings

The OLSA test results for participants fitted with Phonak Ambra SP also show, along with the Wilcoxon matched pairs test, a significant improvement in difficult listening situations with background noise (Fig. 3). The results

(median) with StereoZoom are better than those with UltraZoom ( $p=0.012$ ) by 2.38 dB SNR and without a hearing instrument ( $p=0.01$ ) by 7.24 dB. The results for UltraZoom compared to the use of no hearing instrument were also significantly better.

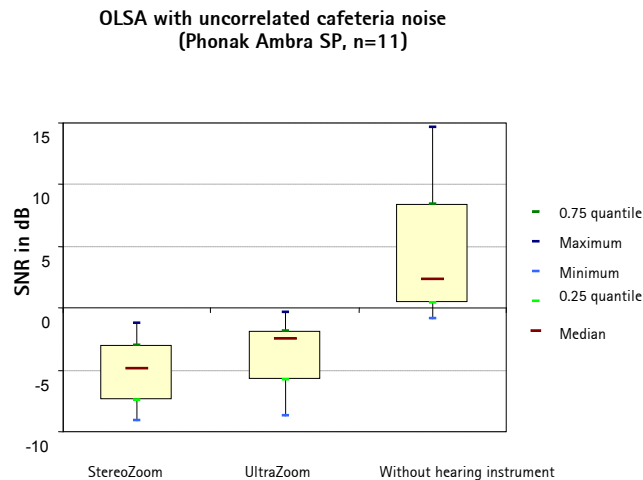


Fig. 3: OLSA test results given in dB SNR for Phonak Ambra SP with StereoZoom, UltraZoom and without a hearing instrument ( $n=11$ )

## Conclusion

The outcome of this study supports the findings of a previous study, which showed an improvement in speech understanding in diffuse listening situations (Nyffeler, 2010). The results of this study also prove that even open fittings can offer additional benefits for mild cases of hearing loss in difficult listening situations using StereoZoom.

The results for the participants with profound hearing loss show that, by switching to the manual StereoZoom program, they can significantly improve speech understanding in difficult listening situations, thus enabling them to conduct one-to-one conversations in these situations.

## References

Nyffeler M, 2010. StereoZoom – Improvements with directional microphones. Field Study News September

Nyffeler M, 2010. Phonak PilotOne – Easy handling and maximum effectiveness. Field Study News September

Nyffeler M, 2010. StereoZoom – Benefits of binaural directional microphones. Field Study News October

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