

Field Study News

auto ZoomControl

Objective and subjective benefits with auto ZoomControl

Abstract

ZoomControl allows hearing instrument users to select their preferred direction of focus. With the premium hearing instruments of the Phonak Spice Generation, users now not only have the option of manually selecting and changing focus direction but can also use auto ZoomControl to automatically select and adjust to the direction of the dominant speaker.

The first of the two studies mentioned below describes the subjective improvement of speech understanding and listening comfort when compared with the automatic program (SoundFlow), while the other is an objective comparison of speech understanding using auto ZoomControl and the speech focusing program of a competitor's product. The results show that in 83% of cases, listening situations where it is not possible to face the speaker are subjectively regarded as being better with auto ZoomControl. The 5-second switching time was rated as comfortable, and the instruments switched symmetrically. Measuring speech understanding in background noise with auto ZoomControl showed a performance that was better than that of the competitor's product by 1 dB SNR.

Introduction

The multi-microphone technology in Phonak's latest hearing instruments makes it possible to automatically differentiate between wanted and unwanted signals. In this process, the desired speech direction is assumed to be from the front. Additionally, for the first time, ZoomControl gives users the ability to manually select a preferred hearing direction other than to the front (Nyffeler, 2009). The premium hearing instruments of the Phonak Spice Generation not only give users the option of manually selecting the direction, but also allow them to use auto ZoomControl to automatically select the direction of the dominant speaker. The focus direction adjusts itself automatically if the direction of the dominant speaker changes.

The purpose of this study was to test the subjective advantage of auto ZoomControl over the SoundFlow program in everyday situations. They also investigated whether the 5-second switching time for auto ZoomControl in various directions was considered acceptable and comfortable, and whether the instruments switch synchronously and without audible artifacts.

The second study is an objective comparison of speech understanding from the side, compared to a competitor's product with a special program for speech focusing. This speech focusing program switches between three microphone characteristics based on the speech direction: omnidirectional, directional toward the front and directional toward the back. If the speech source is on the right or left, an omnidirectional microphone is automatically selected.

Test subjects and methods

In the first study investigating the subjective evaluation of auto ZoomControl, 16 test subjects (4 women, 12 men) with moderate to profound hearing loss took part. The subjects were between 50 and 83 years old, with an average age of 71.6. Testing took place in the laboratory and in real-life everyday situations. Subjective impressions in everyday situations were recorded by means of a questionnaire. A "sound parcours" (a series of examples of real-life listening environments) with four loudspeakers (at 0°, 90°, 180° and 270°) provided background noise in the form of the sound of traveling in a car. The noise was presented from all four loudspeakers. A male or female speaker was also presented from 90°, 180° or 270°. This laboratory test compared auto ZoomControl with the SoundFlow program. The direction of the speaker's voice was varied between the side and rear loudspeakers with a delay of five seconds.

In the second study comparing a competitor's product in the laboratory, nine test subjects (1 woman, 8 men) with moderate to profound hearing loss took part. The subjects were between 39 and 81 years old, with

an average age of 67.1. This study used the speech signal of the Oldenburg Sentence Test, presented from 0° and 90° (OLSA, Wagener et al., 1999). The background noise was in the form of uncorrelated cafeteria noise, presented from five loudspeakers (at 60°, 120°, 180°, 240° and 300°) at a level of 65 dB (A). The subject sat in the centre of the circle of loudspeakers, at a distance of 1.4 meters from each speaker.

Results

The investigations for the subjective evaluation of auto ZoomControl compared to the SoundFlow program in the laboratory showed that about 30% of the subjects rated the comprehension and volume of the male and female voices as better, while the remaining subjects detected no difference. Sound quality was not affected. In this laboratory situation, 83% of the subjects preferred auto ZoomControl over the SoundFlow program (Fig. 1).

Preferred hearing instrument setting in the laboratory test

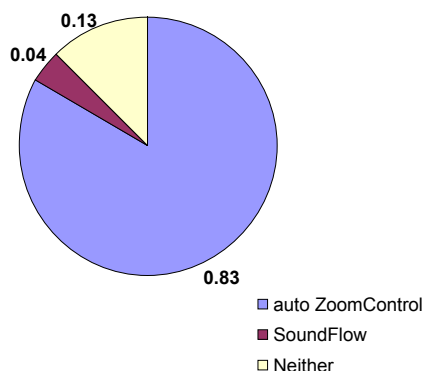


Fig. 1: Subjective evaluation of hearing from the side with auto ZoomControl compared to the SoundFlow program.

Further analysis showed that no asymmetric switching of the hearing instruments was detected when the direction was changed, nor were there any noticeable audible artifacts. All the subjects rated the 5-second switching time as comfortable. There were no complaints of any latency in switching behavior when the speaker direction changed or of any "jumpiness" in the switching behavior.

The subjective results from the questionnaires showed that auto ZoomControl was mainly used when traveling by car or when cycling. This usage is already familiar from manual ZoomControl, and has proven successful. auto ZoomControl was also used in other situations such as in the garden, in an open-air restaurant, in a training situation and in the theater when chatting with people sitting nearby.

The advantage of auto ZoomControl over manual ZoomControl is that the hearing instruments react automatically to a change in the direction of the dominant speaker. In 83% of cases, subjects were able to improve their hearing in everyday

situations by switching from SoundFlow to auto ZoomControl. 100% of subjects were satisfied with the functioning of auto ZoomControl. The comparison between speech intelligibility in background noise (OLSA) using speech presentation from the side (90°), with Phonak Ambra in the auto ZoomControl program and the competitor's product with the speech focusing program, showed that auto ZoomControl produced an SNR improvement of 1 dB (Fig. 2).

OLSA speech in noise test (n=9) from 90° with continuous uncorrelated cafeteria noise at 65 dB(A)

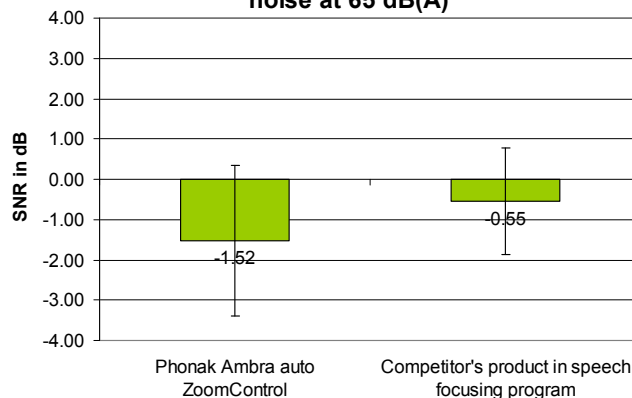


Fig. 2: OLSA measured at 90° with Phonak Ambra auto ZoomControl and a competitor's product

Conclusion

The results of the subjective evaluation show that the subjects noticed an improvement over SoundFlow in particular situations where the desired listening direction is not focused to the front. The switching time was judged to be reasonable.

In addition, the objective comparison with the competitor product in the OLSA test showed a marked advantage for Phonak Ambra with auto ZoomControl when the focus direction is not to the front.

References

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