



SoundNavigation: Accurate program selection for ultimate convenience

Summary

Savia with SoundNavigation offers four base programs to cover individual listening needs in the most significant listening situations. Study results confirm that the speed and frequency of the automatic program selection are appropriate. Thus, SoundNavigation reacts correctly to various situations. It chooses the suitable base program just as wanted by the user and contributes to a high level of user convenience.

The acoustic environment is multifaceted and individual, but research shows that every-day situations can be grouped into four main, relevant clusters which cover virtually every listening situation: speech in quiet situations, speech in noise, noise, and music. In each of these four basic clusters of listening situations, the hearing aid has to meet specific hearing expectations. In quiet, for example, the user expects overall sound awareness and effortless hearing. Listening to speech in noisy environments requires effective noise suppression with focus on speech intelligibility. While listening to music, on the other hand, the user expects rich, full, and undistorted sound. To effectively meet these different expectations, Savia is comprised of four base programs. Each base program is made up of the signal processing features and settings which are appropriate for the respective category.

However, there is no need for the client to manually switch between programs. Savia constantly analyses the acoustic situation, classifies it into one of these four categories and activates the appropriate base program. In the feature extraction stage, a range of acoustic parameters are constantly computed from the input signal. They characterize the signal and allow for precise



classification. The extracted features describe intensity, as well as spectral and temporal properties of the signal. It is known from Auditory Scene Analysis [1] that these features are also utilized by humans to segregate distinct "acoustic objects" in the environment. For categorizing the input signal into one of the four classes, an observation time of up to 10 seconds is considered. The transition into the appropriate base program takes 1-5 seconds, depending on the user preferences. Figure 1 illustrates how SoundNavigation automatically selects the appropriate base program in different environments.

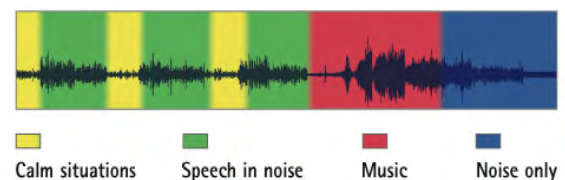


Figure 1: Illustration of SoundNavigation. As soon as the acoustic environment changes, SoundNavigation detects it and chooses the appropriate hearing program.

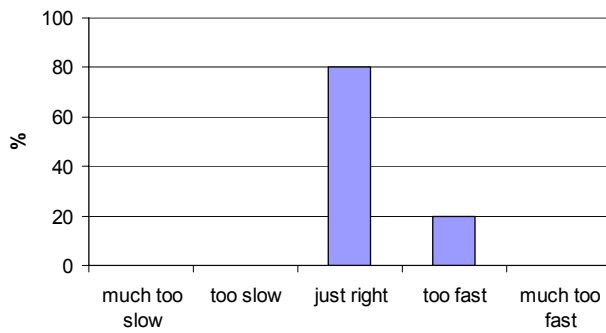


Figure 2: "How do you rate the speed of automatic switching when the environment changed?"

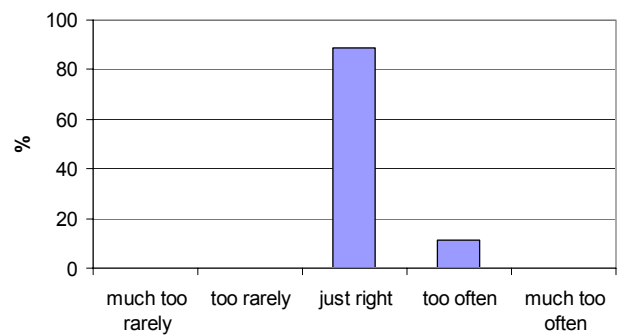


Figure 3: "How do you rate the frequency of automatic switching when the environment changed?"

Study setup

To evaluate the performance of SoundNavigation in everyday-life conditions, a field study with hearing impaired clients was conducted. In total, twelve experienced adult hearing instrument users participated in the trial. Their mean hearing loss (Pure Tone Average) was 57 dB, and their mean age 60 years (STD: 16.5 years). They were fit with Savia 211 BTE hearing instruments. All four Savia base programs were activated. Manual access was also possible, i.e., the base program selection was not only determined by SoundNavigation but could be overridden. The test participants were instructed in the differences between the four base programs in a range of environments. Then, they used the Savia instruments at home for a period of 2 weeks. During that time, they kept a diary where they described the acoustical environment and performance of SoundNavigation in the respective situation. At the end of the trial, the subjects had to judge the overall performance of SoundNavigation.

Results

On average, the subjects wore their Savias for more than 10 hours per day. Most of them used Savias on 7 days a week. Thus, a representative range of typical acoustical situations was covered during the trial. In general, the participants described the speed of automatic program transition as being "just right" (see Figure 2). This means that SoundNavigation reacts fast enough in new situations and chooses the appropriate base program just as wanted by the user.

At the same time, the frequency of base program switching was also rated as being "just right" (see Figure 3). Thus, the automatic program selection does not react too "nervously" on subtle changes of the acoustic environment (or too sluggish) but appropriately chooses the right base program.

As the acoustical environment is not exactly the same for both ears (for example, when there is a distinct noise source on one side), SoundNavigation may choose different base programs in the left and right hearing instrument. However, this has only occasionally been noticed by the subjects (median rating: "rarely"). If it has been noticed, it was not regarded as annoying in most cases. This reflects previous research on asynchronous listening conditions [2].

In conclusion, SoundNavigation provides a reliable and accurate selection of the appropriate base program and thus significantly contributes to a high level of user convenience with Savia.

*The study was conducted by Dr. Birgitta Gabriel, Hörzentrum Oldenburg, Germany.

References

- [1] Bregman AS (1990). Auditory Scene Analysis (MIT Press, Cambridge)
- [2] Payne E, Lutman ME (2002). Speech recognition performance and speech quality ratings in asymmetric listening conditions with adaptive directional microphone hearing instruments, *International Hearing and Research Conference, Lake Tahoe, California, USA, 2002*