

Field Study News

Naída UP

Better speech clarity - unparalleled in its class

Summary

Naída's unique combination of SoundRecover, PowerProcessing, and BassBoost provide an extraordinary level of audibility and clarity. SoundRecover offers better auditory perception of high-frequency signals, whereby consonants such as "s/f/sh" can be successfully heard, identified, and differentiated. Tests of the new Naída family of hearing devices yielded high spontaneous acceptance and a particularly positive evaluation of sound quality despite additional high range information applied in the audible range. A significant benefit of Naída V UP with SoundRecover with regard to speech intelligibility compared to three competitor products was able to be shown in the Freiburg monosyllable test in a quiet environment and the Oldenburg sentence test (OLSA) in a noisy environment.

Introduction

Naída is the new water-resistant Phonak product line for individuals with severe to profound hearing loss. As a result of the improved hearing of high-frequency signals provided by SoundRecover, consonants such as "s/f/sh" can be successfully heard, identified, and differentiated. This innovative, nonlinear algorithm for frequency compression without time dependence compresses selected high-frequency signals into a lower frequency range in which auditory perception and signal differentiation are better. Frequencies below the frequency compression knee point are amplified by the hearing system without frequency shifting using the proven signal processing strategy. The nonlinear algorithm of SoundRecover was developed and verified in Australia on the basis of extensive clinical tests (Simpson, Hersbach & McDermott, 2005; Simpson, Hersbach & McDermott, 2006). Additional comprehensive field studies performed over the past four years with adults and children in Australia, Canada, and Germany confirmed the numerous advantages of SoundRecover.

Subjects and Hearing Instruments

11 test persons (5 female and 6 male participants) between the ages of 41 and 79 years (average age of 56.3) participated in the study. All test persons have profound hearing loss and were provided with binaural hearing instruments. Further, they were all experienced HI wearers. A precalculation with the same acclimatization level and a feedback test was performed for all four hearing aids and two manual programs (one with the omni-

microphone mode and one with directivity) were set. Since one of the competitor products does not have a directional microphone, the omnidirectional microphone mode was used. The competitor products are referred to as A, B, and C in the following.

Method

The spontaneous acceptance and the subjective evaluation of the Naída V UP devices in the environment of each test person were determined by various questionnaires. The comparison of speech intelligibility in a quiet and in a noisy environment between Naída V UP and competitor products was performed using the Freiburg monosyllable test (according to DIN 45621) in a quiet environment and the OLSA in a noisy environment.

Speech intelligibility in a quiet environment – Freiburg monosyllable test

The 20 monosyllable words per test row of the Freiburg monosyllable test were played on a speaker (0° azimuth, at head height) at a distance of 1 m from the test participant and measured at an output level of 50, 65, and 80 dB.

Speech intelligibility in a noisy environment – Oldenburg sentence test (OLSA)

Speech intelligibility in a noisy environment was assessed by the OLSA. Thereby, the signal-to-noise ratio for 50% speech intelligibility is adaptively determined by measuring the speech reception threshold (Speech Reception Threshold – SRT). Speech signals were played on a speaker (0° azimuth, at head height) at a distance of 1 m from the test participant and noise was constantly presented at 65 dB (A) on 5 speakers (head height) according to a standardized adaptive method (Wagener, Brand and Kollmeier, 1999).

Results

A very good spontaneous acceptance of Naída V UP devices with SoundRecover was shown by the fact that 90% felt that the volume was just right, 80% felt that the sound was very pleasant, 20% found the sound to be good and evaluation of one's own voice revealed that 80% found the sound of one's

own voice to be optimal. Furthermore, subjective speech intelligibility in the first conversation with the audiologist was very good. The results of the Freiburg monosyllable test (Fig. 1-3) show a clear increase in the benefit of speech intelligibility with Naida V UP compared to the competitor products. Improvement was observed primarily at a quiet speech level (17.5%-25% improvement at 50 dB; Fig. 1) and a normal speech level (17.5%-40% at 65 dB; Fig. 2)

Freiburg monosyllable test 50dB (median)

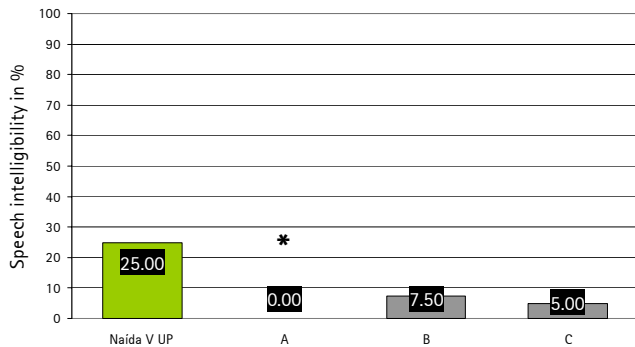


Figure 1: Average results (median) in Freiburg monosyllable test for Naida V UP and the three competitor products at 50 dB. *p < 0.05

Freiburg monosyllable test 65dB (median)

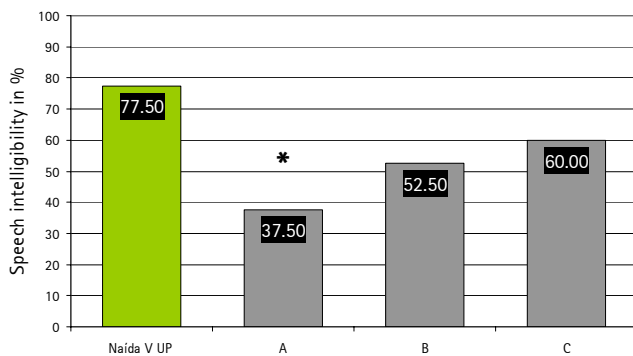


Figure 2: Average results (median) in Freiburg monosyllable test for Naida V UP and the three competitor products at 65 dB. *p < 0.05

Freiburg monosyllable test 80dB (median)

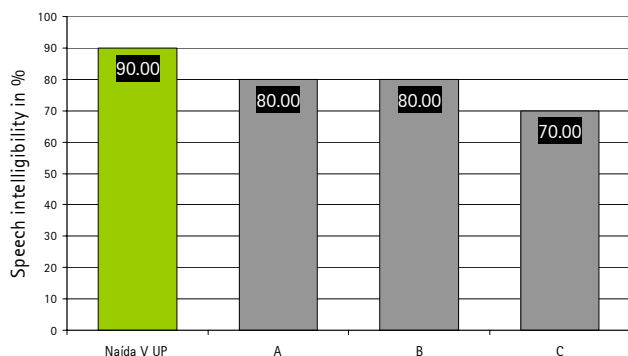


Figure 3: Average results (median) in Freiburg monosyllable test for Naida V UP and the three competitor products at 85 dB. *p < 0.05

Compared to the competitor products with a directional microphone, Naida V UP achieved a significant improvement of 6.22 dB SNR compared to HI A (p<0.005) and 4.17 dB SNR in speech intelligibility in noise compared to HI C (p<0.05; Fig.4).

OLSA median

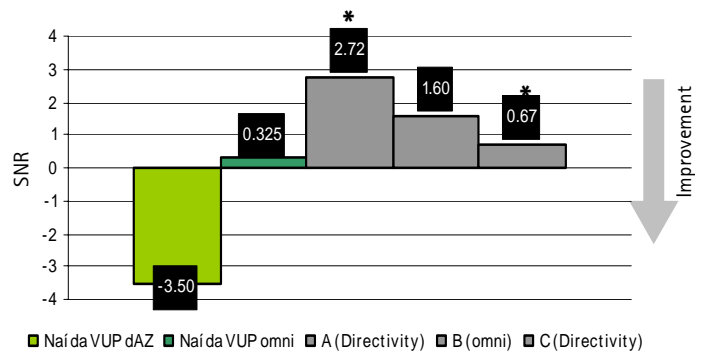


Figure 4: Average results (median) in the Oldenburg sentence test for Naida V UP and the three competitor products in a noisy environment (constant 65 dB). *p < 0.05.

Improved audibility of high-frequency frequencies

Improved audibility of high-frequency sinusoid tones is expected above 2 kHz since frequency compression is applied starting at 1.5 kHz. Depending on the particular frequency compression setting and the individual tone audiogram, measurements have shown that aided thresholds between 3-6 kHz achieve an average high range gain of up to 25 dB while no difference was able to be measured between SoundRecover "on" or "off". On average, a high range gain of 15 dB was achieved at 4 kHz with SoundRecover "on" compared to SoundRecover "off". With SoundRecover "on", the high range gain at 6 kHz even achieved a value of 25 dB. These values are additionally supported by the aided threshold of individual test persons with severe to profound hearing loss. For one test subject, SoundRecover "on" resulted in a high range gain of 75 dB (HL) at 6 kHz which resulted in a free field hearing threshold of 50 dB at 6 kHz.

References

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K. Wagener, T. Brand & B. Kollmeier, Entwicklung und Evaluation eines Satztestes für die deutsche Sprache Teil III: Evaluation des Oldenburger Satztestes. Zeitschrift für Audiologie 38, 1999. p: 86-95

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