

# Field study trials demonstrate Eleva's taking off to new heights.



## Summary

Eleva's functional gain, spontaneous acceptance, speech intelligibility benefits and automatic program selection were assessed in a series of field trials. Performance of Eleva in different situations was measured and compared to those of a competitive product selected for its overall technical and market positioning, comparable to Eleva. Results showed clear benefits from Eleva's outstanding features, resulting in high spontaneous acceptance and overall satisfaction.

## Introduction

The purpose of this series of field studies was to evaluate the performance and spontaneous acceptance of **Eleva** hearing instruments (HI) family. Major focus was put on the evaluation of insertion gain, subjective spontaneous acceptance and objective speech in noise intelligibility measures. We also evaluated the satisfaction level with the unique Eleva TriPilot automatic functions.

## Participants and hearing instruments

Overall, 23 participants aged 35 to 88 (mean = 65), with mild to severe sloping hearing loss (20 to 90 dB in the 250-6000Hz range) entered the study. Participants' experience with HI ranged from first time (0-6 months) to very experienced (> 6 years). Tests instruments included different models from the Eleva family (14 behind-the-ear models: 5\*211, 4\*311, 5\*411 and 9 in-the-ear models: 3\*22 and 6\*11). As benchmark instruments we used newly launched and commercially available instruments from a competitive brand. This HI was selected for its similar technical features and comparable market positioning to Eleva (referred to in this paper as "Compared HI"). Fitting strategies of both products were kept constant and real ear measures were systematically used for fitting verification.

## Methods

Testing included real-ear insertion gain (REIG) measures. To assess subjective initial acceptance as well as sound quality ratings, a questionnaire was used. Finally, objective speech perception assessments were conducted using the OLSA (Oldenburger Satztest)<sup>1</sup>.

To ensure follow-up information was gathered, testing was conducted over four successive weekly visits.



## Results

### REIG measures: more gain in more frequencies

REIG was recorded at three input levels (40, 60 and 80 dB SPL) using a warble tone on an Aurical RE measurement system.

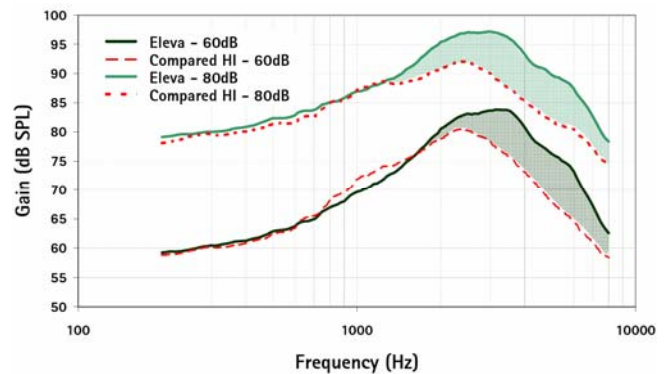


Fig. 1: Average REI-Output at 60dB and 80dB input (N=23)

As shown in Fig. 1, Eleva demonstrated significantly more gain, +5 to +8dB in the high frequency (HF) domain (~1.5 to 8 kHz). Eleva's broad frequency response offers targeted and useful amplification across the entire frequency range and particularly in the high frequencies, important for acoustic information such as speech cues.

## Subjective acceptance and satisfaction

Fig. 2 below shows sound quality ratings and their progression over the four appointments.

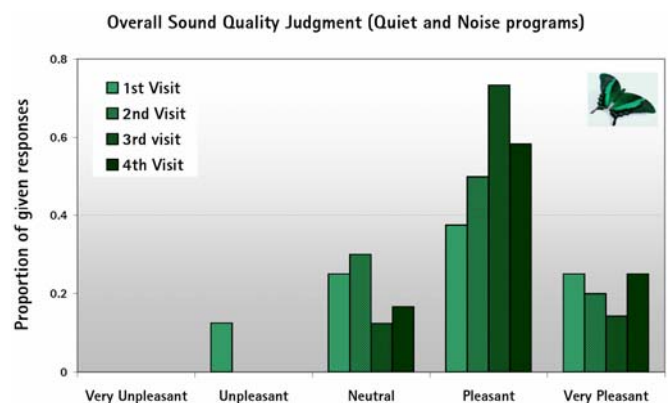


Fig. 2: Subjective sound quality rating over 4 visits.

Overall, Eleva's sound quality was rated very positively and this right from the start (63% positive, 25% neutral). Moreover it improved over the 4 weeks to reach very positive satisfaction rates (83% positive, 17% neutral, no negative rating). The sound of participants' own voice was rated as very natural (78%), as shown on Fig. 3 below.

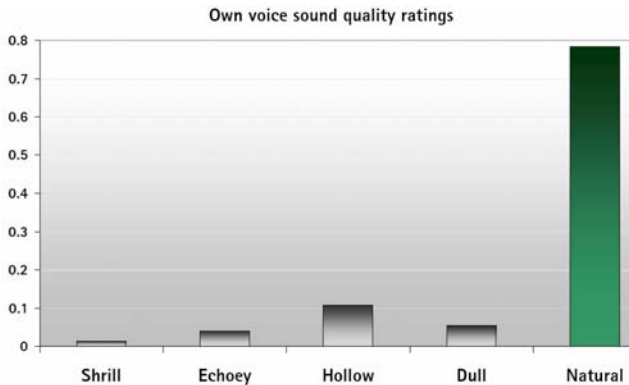


Fig. 3: Subjective own voice sound quality rating.

### *Eleva's digital AudioZoom for outstanding speech intelligibility in noise*

Understanding speech in noise is one of the main every day life challenge that HI users face. Eleva offers automatic and adaptive dual microphone beam forming technology, the digital AudioZoom (dAZ). Speech intelligibility was evaluated using an adaptive threshold test: the OLSA.<sup>1</sup> Scores are expressed in dB as the Signal-to-Noise Ratio (SNR) measured for 50% speech recognition threshold. As shown in Fig. 4, Eleva shows significant SNR advantages over comparable HIs. Globally, speech is significantly better understood in noisy situations when participants were fitted with Eleva (direct comp. Eleva vs. Comp HI; paired t-test, N=23, p=0.03).

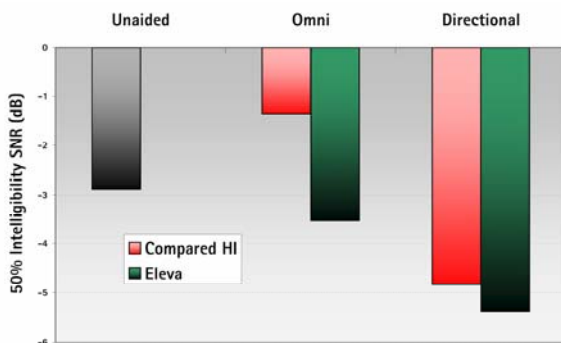


Fig. 4: Olsa SpiN test results, Eleva results in green.

Eleva shows better performances in both omni and directional modes, due to the significantly better high frequency resolution allowing better audibility of important high frequency speech cues.

### *TriPilot: intuitive program selection for automatic satisfaction*

Eleva offers 3 programs, quiet, speech in noise, and comfort in noise, which are automatically selected by TriPilot. This unique automatic analyses the acoustical environment and automatically activates the appropriate program. Participants were asked to evaluate the performance of the automatic on two dimensions: audibility and accuracy of program changes. The feedback on both criteria was very positive. Whilst participants sometimes heard the programs change (1/3 never, 1/3 always, 1/3 sometimes), only 2 out of 23 reported this as disturbing. They also rated TriPilot as accurate in activating the appropriate program as seen in Fig. 5.

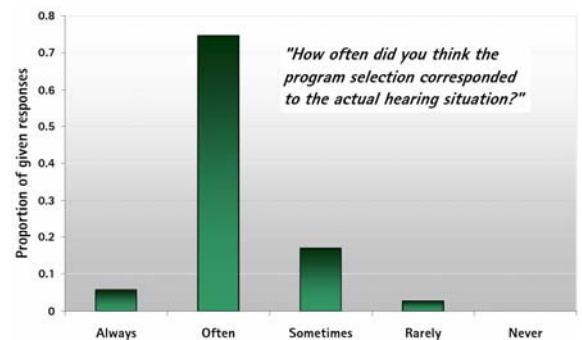


Fig. 5: Accuracy rating of automatic program selection.

### Conclusion

Eleva, thanks to its broad frequency range, fine resolution 16-channel processing and digital AudioZoom shows outstanding speech in noise intelligibility benefits and excellent overall subjective sound quality ratings. As Fig 6 shows, participants rated their overall impression of Eleva as very positive.

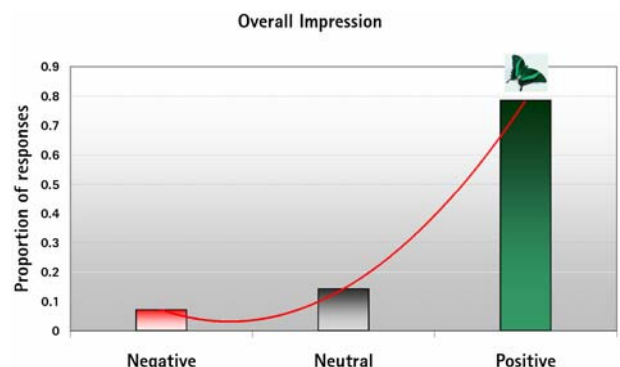


Fig. 6: Overall Impression on Eleva.

### References

<sup>1</sup> Wagener K, Brand T & Kollmeier B (1999) Z für Audiologie 38(3): 86-95.

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