Starkey Genesis AI: A New Standard In Sound Quality

Larissa Taylor, Ph.D., Kendra Bergstrom and Michelle Hicks, Ph.D.

Sound quality is an important leading metric when deciding to purchase a hearing aid.[1] A study completed by Starkey Research evaluated sound quality ratings for the all-new Starkey Genesis AI hearing aids and hearing aids from a competitive hearing aid manufacturer, using an online Multiple Stimuli with Hidden Reference and Anchor (MUSHRA) task. The results show that sound quality ratings across a variety of listening conditions were significantly higher for Genesis AI hearing aids compared to the competitor's device.

Introduction

Most modern hearing aids can provide enough amplification to compensate for the wearer's hearing loss. However, patients' satisfaction and acceptance of hearing aids often relies, in part, on sound quality. Patients expect premium hearing aids to "sound good" and in fact, sound quality is a critical component when deciding to purchase a hearing aid.[1]

With Genesis AI, the combination of the Neuro Sound Processor and Neuro Sound Technology brings together a new standard in sound quality, outperforming a competitive manufacturer.

Methods

Thirty normal-hearing participants (10 males and 20 females) with no prior experience in sound quality rating assessments were recruited for this study (age range 25-56 years, mean=40.7 years). Genesis AI receiver-in-canal (RIC) hearing aids and flagship RIC hearing aids from a competitive hearing aid manufacturer were fitted to an N3 hearing loss[2] *(Figure 1)* using the default manufacturer fitting formula and the recommended earbuds for an N3 audiogram hearing aids were set to default.

Music processing was enabled by default in the competitor's device while no music or Edge Mode+ processing was activated in the Genesis AI hearing aid.

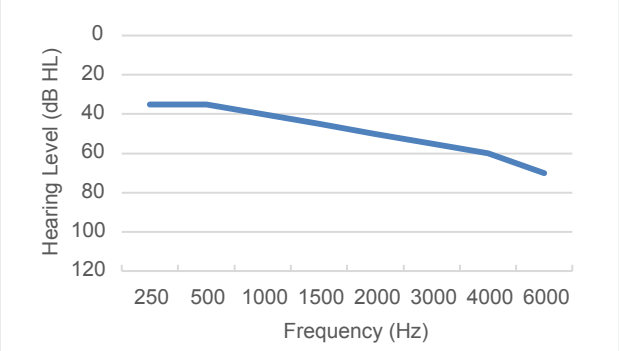

Figure 1: Audiogram of an N3 hearing loss

The devices were placed on a KEMAR (Knowles Electronics Manikin for Acoustic Research) manikin set in the center of an 8 speaker-array, placed 1m equidistant from the manikin *(Figure 2)*. Recordings were made from the manikin in a sound-treated room for the following listening situations:

- Speech in Quiet (Male and Female speech at 50, 60, and 70 dB SPL)
- Speech in Noise (Male and Female speech at 0 and +5 dB SNR)
- Music ("Marco Polo" and "Just Like a Man" at 70 dB SPL)

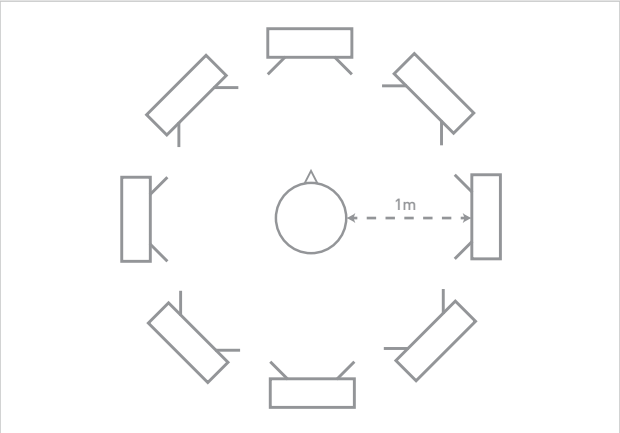

Figure 2: Overview of the laboratory setup

All non-music samples were from the Ambisonics Recordings of Typical Environments (ARTE) database[3]. For all recordings, 60 seconds of the audio stimuli was presented and recorded and a sample from 30-42 seconds was used in the later assessment to allow time for hearing aid processing adaptation. For the Speech-in-Noise recordings, 15 seconds of noise preceded the speech to allow for hearing aid processing adaptation to the noise. All audio samples were filtered to equalize the response of the KEMAR manikin's ear canals and the headphones used for assessment.

Participants were then asked to evaluate the recordings using the Multiple Stimuli with Hidden Reference and Anchor (MUSHRA) methodology[4] via an online webpage and using calibrated headphones. Participants were blinded to the audio samples and were not informed that the comparisons included a competitor. They were given the opportunity to set the computer volume to a comfortable level, and then performed the paired comparisons in a randomized order. Ratings could be between 0-100, with 0 meaning poorer and 100 meaning better.

Results

Total ratings analyzed included 312 total comparisons. There were 156 Speech-in-Quiet comparisons, 104 Speech-in-Noise comparisons and 52 Music comparisons. Statistical testing on the difference in ratings indicated that Genesis AI was rated significantly higher than the competitor hearing aid manufacturer overall ($p<0.001$). The box plots in Figure 3 displays the distribution of the dataset for each condition. The lines represent the range of scores from minimum to maximum, and the boxes represent the first and third quartiles of the data, with the lines through the boxes representing the median result.

The difference in ratings were significant for all three stimuli types (all $p<0.001$). The difference in rating was significantly greater for the Speech-in-Noise condition than it was for the Speech-in-Quiet condition ($p<0.001$).

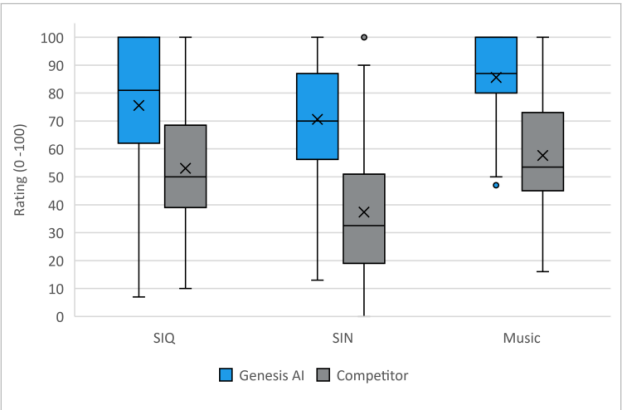

Figure 3: Sound quality ratings across Speech-in-Quiet (SIQ), Speech-in-Noise (SIN), and Music conditions for Genesis AI and competitor hearing aids. Ratings were measured from 0-100, where 100 was rated as "Excellent". The "X" symbols represent the mean performance, while the dots show outliers in the data.

The only factor that had a significant main effect on the difference in ratings between the two devices was presentation level for the Speech-in-Quiet condition. Talker gender for Speech-in-Quiet and Music samples had close to significant main effects ($p<0.06$).

The difference in rating between the two devices was greatest for the loudest presentation level of the Speech-in-Quiet condition. The other manufacturer was rated similarly across all three presentation levels while sound quality ratings for Genesis AI improved with increasing presentation levels *(Figure 4)*. The gender of the target speech did not have a significant effect.

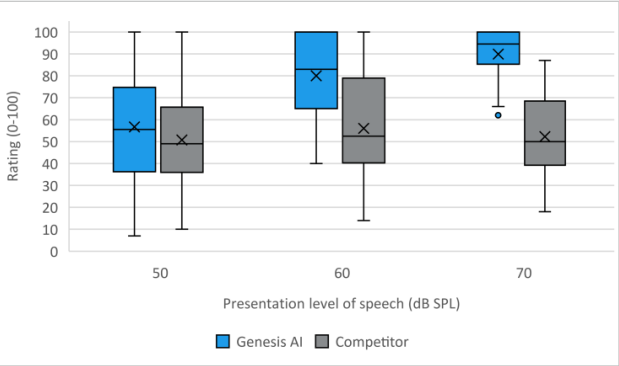

Figure 4: Sound quality ratings for Speech-in-Quiet by presentation level of speech for Genesis AI and competitor hearing aids. Ratings were measured from 0-100, where 100 was rated as "Excellent". The "X" symbols represent the mean performance, while the dot shows an outlier in the data.

Conclusion

With an all-new processor and all-new sound, Genesis AI was preferred over a competitor's flagship product in multiple listening scenarios using a blind study method. This study adds to that foundation of data supporting Genesis AI as a hearing aid patients prefer.

References

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Author Biography

Larissa Taylor, Ph.D., is an Audio Systems Engineer at Starkey. Her primary focus is ensuring the overall sound quality of hearing aids. Larissa started at Starkey in 2022 upon completing her doctorate on listening effort and sound quality with hearing aids at McMaster University, Hamilton, Ontario Canada.

Kendra Bergstrom is a Market Analyst with the Product Marketing team at Starkey. Kendra has worked with multiple facets of the industry for over 20 years from dispensing hearing aids, manufacturing support, to product management. Her primary focus is providing insights on the market and the competitive landscape.

Michelle Hicks, Ph.D., is Vice President of Education and Audiology at Starkey. She currently leads a team of audiologists and hearing professionals responsible for clinical and audiology research, as well as product and feature validation of new hearing aid products and accessories. She joined Starkey in 2010 and has over 22 years of experience in clinical practice, research, education, and industry.