Phonak
Field Study News

Best first-fit experience from Phonak: Phonak Marvel™

New hearing aid users must find the initial fit acceptable to become long-term hearing aid users. Phonak has developed a new first-fit pre-calculation on the Marvel platform to meet these needs. The current study assessed the potential of this pre-calculation to improve initial first-fit acceptance for new hearing aid users, and to determine whether this feature maintains hearing aid performance as compared to a competitor hearing aid and the previous Phonak platform, Belong™. The average ratings for all 18 participants showed significantly higher ratings of spontaneous first fit acceptance as compared to a competitor, and better ratings than Belong. This study also revealed a significant preference for Marvel at first fit when asked which hearing aid out of the three was preferred.

Lori Rakita and Elizabeth Stewart / October 2018

Introduction

It is widely accepted by clinical audiologists that new hearing aid users typically require a period of adjustment to be satisfied with amplification. Whether or not hearing aid benefit actually increases across the acclimatization period is unclear,[1,2] but there is evidence that hearing aid satisfaction is positively correlated with duration of use.[3] For new hearing aid users to become satisfied long-term users, they must first find the initial fit acceptable. Thus, to promote successful first fittings and the greatest potential for long term use, an ideal hearing aid delivers a pleasent and natural sound quality while ensuring the necessary audibility to optimize hearing performance.

Recently, Phonak has developed a new first-fit pre-calculation on the Marvel platform to specifically meet the needs of first-time hearing aid users. This pre-calculation is designed to improve spontaneous acceptance of the hearing aids at first fit without sacrificing the long-term listening performance that Phonak has delivered across previous hearing aid generations. This is achieved by applying small reductions to the prescribed gain at frequencies > 3 kHz only for first-time hearing aid users. Results of electroacoustic measures reveal that these reductions do not amount to substantial differences in the measured gain relative to the Belong pre-calculation. This new pre-calculation was verified

in a study completed at the University of Oldenburg, which showed that ratings of shrillness were lower and overall volume was more comfortable compared to the pre-calculation used in the previous Phonak platform (Belong). Despite these improvements in listening comfort with Marvel, the study showed that performance was maintained (Woodward, 2018).

In addition to changes in the pre-calculation, improvements to the Sound Delivery System (SDS), updates to AutoSense OS™, and optimization of compression in certain environments, yield exceptional sound quality from first fit.

The goal of the current study was to assess the impact of the new Marvel hearing aid on first fit acceptance for new hearing aid users, and compare the performance of the new pre-calculation and SDS to that of the Belong platform, as well as a competitor device.

Methodology

Participants

Study participants consisted of 18 adults between the ages of 32 and 82 years (average age = 65). The participants did not own personal hearing aids and had little to no prior experience with amplification. Average hearing thresholds for participants' right and left ears are shown in Figure 1.

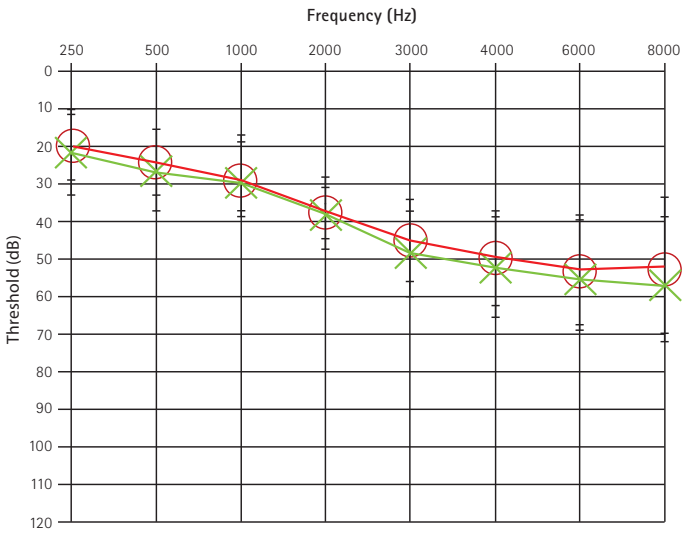

Figure 1: Average right and left hearing thresholds (+ 1 Standard Deviation (SD)) for the study participants.

Hearing aids and programming

Phonak Audéo™ M90-312 and Phonak Audéo B90-312 hearing aids, as well as a comparable, premium RIC hearing aid from a competitor were used in the present study to evaluate differences in first fit acceptance. Hearing aids were programmed to each participant's hearing loss using the proprietary fitting formula and prescribed gain settings for a "first time" hearing aid user for each manufacturer. Software-prescribed default settings and acoustic coupling were used for each hearing aid (Marvel, Belong, competitor). Testing was completed in the default start-up program (automatic program) for each manufacturer.

Procedure

Testing was completed at the Phonak Audiology Research Center (PARC). Each participant took part in one study session lasting approximately 2 hours. The study appointment had two phases: an immediate, spontaneous acceptance phase, and a longer second phase assessing perception of sound quality following exposure to various types of input in multiple listening environments. The spontaneous acceptance phase of the test session was completed in the programming room at PARC – a space resembling an audiologist's office. A realistic space was desired to better understand the immediate reactions of hearing aid users at first fit in a clinical environment. Participants were seated at a table across from the experimenter. The spontaneous acceptance phase of testing was completed with each set of hearing aids prior to moving on to the sound quality portion of the study.

The second phase of testing began with a guided walk. The walk included several pre-determined stops to ensure consistency in the type of listening environments across participants, and exposure to a variety of listening environments. These stops occurred in the front foyer (large open space with many reflective surfaces), just outside the front door (busy street, parking lots, people passing by), a central location within the customer care/inside sales departments (constant background of multiple live talkers), and in front of a noisy coffee machine (talking people, machine sounds, dishware noise). Conversation with the experimenter was ongoing throughout these different listening environments. Following this walk, the participants returned to the programming room to provide perceptions of the hearing aids he or she was wearing during the walk. Next, participants provided ratings of sound quality of their own voice and the experimenter's voice (based on readings of phonetically-balanced passages), as well as samples of classical and jazz music. This procedure was then repeated with the second and third pair of hearing aids.

For both the first and second phase of testing the participant wore the Marvel hearing aids, the Belong hearing aids, and the competitor's hearing aids, and these three conditions were counterbalanced across participants. However, the devices were tested in the same order within the two study phases for each individual participant. Additionally, a double-blind

procedure was used for this experiment, that is, neither the participant nor the experimenter collecting the participant's ratings and comments knew the hearing aid type being tested. Acoustically-transparent coverings were placed over the hearing aids and a second experimenter was responsible for placing the hearing aids on the participant to ensure blinding to the experimental condition.

Outcome measures

Spontaneous acceptance

The first phase of the study session was designed to capture participants' initial impressions of the sound quality of each set of hearing aids within 2-3 minutes of the first fit. Immediately following the fitting of each set of hearing aids, participants were asked to provide spontaneous comments regarding the sound of the experimenter's voice, as well as their own voice. Quantitative ratings of initial acceptance were captured with two questions:

1. How would you rate the likelihood of wanting to wear this hearing aid at home?
2. How would you rate the initial sound quality of this hearing aid?

Ratings were collected using a 'Likert' scale (1-7) with indicating low likelihood or a poor sound quality, and 7 indicating high likelihood or excellent sound quality. This procedure was then repeated for the other two sets of hearing aids. Participants were provided with a structured notes sheet and were encouraged to record their perceptions of initial sound quality with each hearing aid platform. After listening to and providing ratings for each set of hearing aids, the participants were asked to rank them in order from their most preferred to their least preferred.

Ratings of multi-environment sound quality

This second phase of the study was designed to capture a more realistic sense of listening in varied environments, and give the participant more time to formulate their opinion as to their preferences and perceptions of sound quality. Following the guided walk around the building, passage readings, and music listening, the participant was asked to rate their overall hearing aid sound quality enjoyment, likelihood of wearing the hearing aids full-time, and likelihood of recommending the hearing aids to a friend or family member. Ratings were again provided using a Likert scale, with a rating of 1 indicating very low enjoyment/likelihood and 7 indicating very high enjoyment/likelihood.

Results

Spontaneous acceptance

The results of spontaneous acceptance ratings are shown in Figure 2 and Figure 3. A repeated measures analysis of variance (ANOVA) showed a significant main effect of hearing aid for both dimensions of first fit acceptance. Post-hoc analyses revealed significantly higher average ratings of initial sound quality and likelihood of home wear for the Marvel devices compared to the competitor. No significant differences were present between ratings for Marvel and Belong.

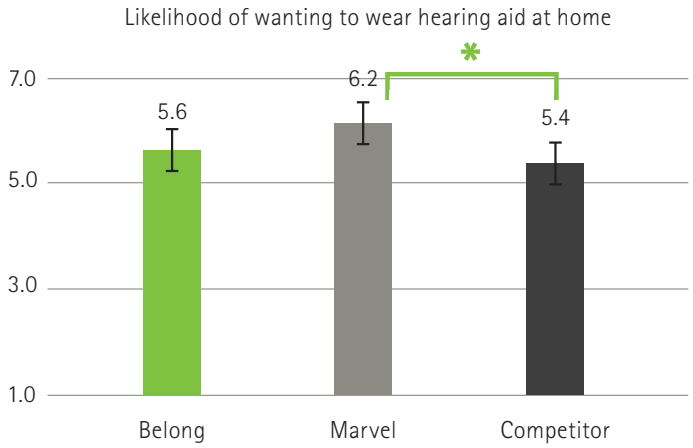

Figure 2: Average ratings of likelihood of wanting to wear hearing aids at home, based on first fit sound quality (n=18). Error bars represent standard error of the mean. Asterisks indicate a statistically significant difference based on a repeated measures ANOVA (alpha level = .05).

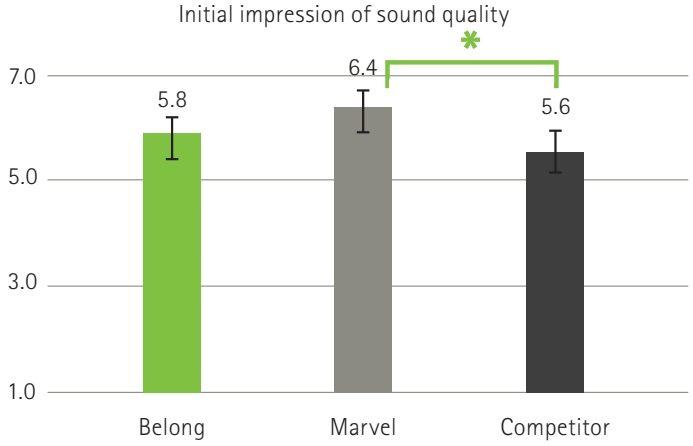

Figure 3: Average ratings for initial impression of sound quality (n=18). Error bars represent standard error of the mean. Asterisks indicate a statistically significant difference based on a repeated measures ANOVA (alpha level = .05).

Figure 4 shows the number of times each hearing aid was rated as most preferred ("best") based on the sound quality at first fit.

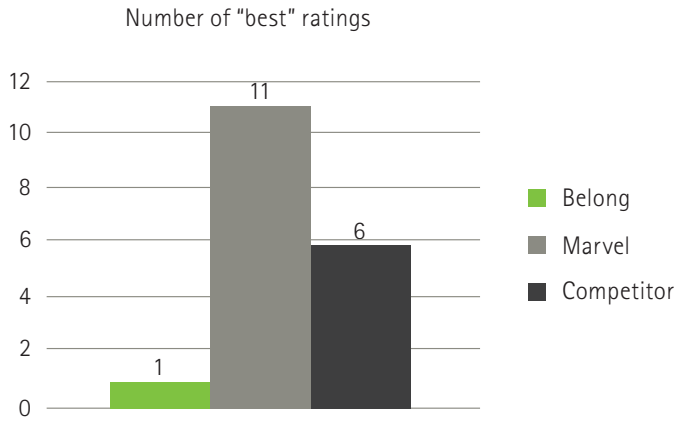

Figure 4: The number of times each manufacturer was rated as "best" for sound quality at first fit. Experimenter and participant were blinded to the condition.

Ratings of multi-environment sound quality

Sound quality rating results following the guided walk, passage readings, and music listening are shown in Figure 5. A one-way repeated measures ANOVA revealed a main effect of hearing aid on overall enjoyment of sound quality. A post-hoc analysis revealed significantly higher ratings for Marvel compared to the competitor on this dimension. No other significant findings were present.

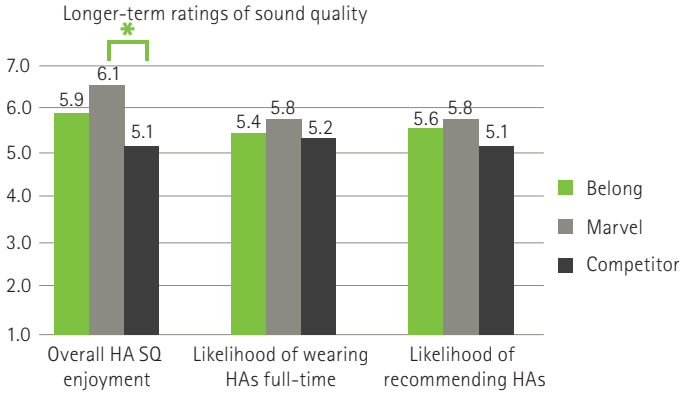

Figure 5: Average ratings for dimensions of sound quality following multi-environment listening. Asterisks indicate a statistically significant difference based on a repeated measures ANOVA (alpha level = .05). SQ = sound quality, HA = hearing aids

Conclusion

First-time hearing aid users with mild to moderate hearing loss were asked to rate their spontaneous acceptance of the new Phonak Marvel hearing aids, the previous Phonak Belong hearing aids, and a competitor's hearing aids.

Average ratings for all 18 participants showed higher ratings of sound quality at first fit, as well as higher ratings of sound quality following exposure to multiple listening environments with the Marvel device as compared to Belong and the competitor device. Thus, Phonak Marvel provides a superior initial first fit experience for first time users over previous Phonak platforms and a competitor's current hearing aid. The results of the present study suggest that the new pre-calculation, in combination with end to end optimization of sound quality, delivers a first experience with hearing aids that maximizes the potential for long-term hearing aid use and satisfaction.

References

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4. Jansen, S. and Woodward, J. (2018). Love at first sound: the new Phonak pre-calculation. Phonak Insight, retrieved from www.phonakpro.com/evidence, accessed October 16, 2018.

Authors and investigators

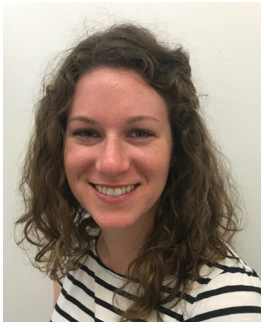
Lori Rakita, Senior Manager of Clinical Research at Phonak Audiology Research Center (PARC)

Lori received her Doctorate of Audiology from Washington University in St. Louis, and worked in the area of cochlear implants before coming to Phonak in July of 2014. Lori is the Senior Manager of Clinical Research at the Phonak Audiology Research Center (PARC), where she designs research studies in both lab and real world environments to understand key performance aspects of hearing aid innovations.

Elizabeth Stewart, Research Audiologist

Elizabeth joined the Phonak Audiology Research Center (PARC) in Warrenville, Illinois in 2017. Her educational background includes a Doctorate of Audiology from the University of Kansas Medical Center (2013) and a PhD in Speech and Hearing Science from Arizona State University (2017). She currently manages in-house pediatric studies in addition to other projects at PARC.

Jacqueline Drexler, Research Audiologist



Jacqueline joined the Phonak Audiology Research Center (PARC) as a research audiologist in 2018. She received her Doctorate of Audiology from the University of Buffalo in New York. Jacqueline joined Sonova in 2017 for a one-year formal development program. During that time, she worked at Unitron US, Connect Hearing Canada, Advanced Bionics, Phonak US, and Phonak HQ. She is currently involved in daily-wear research and remote microphone systems.