WSA Wonderful Sound for All

White Paper

Sound preference as a measurable dimension in hearing aid fitting: Evidence from comparisons of time-domain and frequency-domain processing

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ABSTRACT

It is a common clinical experience that for some hearing aid wearers, one type of sound processing does not feel quite right, while another feels much better. But working systematically with such sound preferences is not part of standard clinical practice. This paper reports two studies that investigate listener preferences for two distinct sound designs: A time-domain approach (Widex) and a frequency-domain approach (Signia). Across a large-scale online study (n=248) and a real-world guided-walk study (n=28), up to 40% of participants demonstrated a strong and consistent preference for one processing design.

These data indicate that sound preference represents a meaningful and clinically relevant aspect of hearing aid experience. Preferences were not predicted by lifestyle or demographic factors but constitute a nuanced and personal phenomenon that ideally requires listeners to experience sounds in different environments.

Main results

- Up to 40% of listeners indicate a strong preference for a specific sound processing approach, with equal proportions indicating a strong preference for time-domain and frequency-domain processing.
- Within the broader groups of listeners with specific sound preferences, the reasons for those preferences are nuanced and personal.
- Demographic and lifestyle factors are not predictive of sound preference.

Clinical consequences

- Difficulties with acclimatization to new hearing aids may be reduced if individual sound preference is considered during device selection and fitting.
- Sound preference may help explain variability in user satisfaction among patients with similar audiometric profiles.
- Structured listening comparisons across different sound designs may help audiologists assess sound preference as part of the fitting process, supporting a more personalized and patient-centered approach.

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Introduction

In clinical audiology, success is about making sure that life is heard – that conversations can be joined, words understood, music enjoyed, and environments recognized. In standard clinical practice, this translates into patients adapting smoothly and effortlessly to hearing aids. While the criterion for success is clear, so is the clinical truth that no single hearing aid brand can achieve all this for all people. Instead, good hearing is achieved in different ways for different people.

Clinicians know this: It does not require long clinical practice to gain the experience that for some people one hearing aid can be simply wrong, while another is just right. One type of sound processing is perceived as jarring and unpleasant, while another allows the wearer to relax into the sound. This variability is widely acknowledged in clinical practice: In a May 2025 survey of 150 hearing care professionals (HCPs) in Germany and the US, 85% of respondents agreed that no single hearing aid platform can be right for everyone.

One possible explanation for this clinical observation lies in the fundamentally different signal processing approaches of modern hearing aids. A core element of this is the choice of filter bank, which sets the playing field for the rest of the signal processing. Importantly, the choice of filter bank also entails a choice on the unavoidable trade-off between frequency resolution and time resolution: Filters that are broader in frequency necessarily have lower processing delay, while narrower filters always result in longer processing delay.

Time-domain filter banks use varying filters widths to keep average signal processing time low with broader frequency bands in the higher frequencies, while frequency-domain filter banks use the same filter width for the entire frequency spectrum, applying many high-resolution filters in parallel. Frequency-domain signal processing is widely used in contemporary hearing aids because of its processing power. In contrast, time-domain processing has the advantage of preserving naturalness by mimicking the logarithmic nature of the filters in the human cochlea and keeping signal processing delay low.

The foundational nature of these differences makes it relevant to examine whether listeners respond systematically to such differences. This paper begins to address this fundamental question by addressing listener preferences for different sound designs, comparing Widex time-domain processing with Signia frequency-domain processing.

One obvious place to start is the complementary profiles of the two sound designs. Signia frequency-domain processing is known for its innovative solutions for multi-talker conversations in noise (Folkeard et al., 2024; Jensen et al., 2023) and own-voice processing (Powers et al., 2018a; Powers et al. 2018b) allowing wearers to participate effortlessly in conversations. Widex time-domain processing focuses on natural clarity by mimicking the ear's mechanisms (Balling et al., 2022) and by balancing focus on speech with awareness of surroundings (Balling et al., 2025). Based on this, it is tempting to conclude that Signia's frequency-domain filtering should be prescribed to active users who value conversation in noise, while users who appreciate natural sound should be fitted with Widex's time-domain filtering. However, sound preference in real life is a complex and personal issue, which may override such categorizations.

There is a wealth of research on performance and preference with individual hearing aid features depending on specific wearer characteristics, but this research generally does not speak directly to the foundational effect of filter bank differences. The results include the finding that compression speed settings should depend on working memory capacity (for a review of this literature, see Windle et al. 2023); that preference for (Lelic et al., 2022a) and sensitivity to (Stiefenhofer, 2022) shorter signal processing delays depend on hearing loss and on spectral ripple discrimination ability (Súsonnudóttir et al., 2024), and that preference for the number of channels and the type of amplification when listening to music is influenced by listeners' frequency resolution abilities (Croghan et al., 2014). This research also includes multiple efforts to understand the variability in individual preferences for noise reduction (Houben et al., 2023; Kubiak et al., 2022; Neher & Wagener, 2016; Völker et al., 2018).

In addition to such research on individual features, a prominent line of research is concerned with categorizing hearing aid wearers into distinct groups through audiological profiling (Cherri et al., 2024; Saak et al., 2022; Sanchez-Lopez et al., 2020; Sanchez-Lopez et al., 2021). A key challenge of audiological profiling is that successful profiling requires (1) a manageable test battery that allows the prediction of (2) a limited set of distinct profiles as well as (3) specific well-defined treatments for each group that show a higher-than-average success rate. So far, although individual studies have shown relevant results, it is fair to say that no coherent framework of audiological profiling beyond the pure-tone audiogram has won general approval.

While the research on audiological profiles focuses mostly on appropriate fitting and fine-tuning of a given set of hearing aids, another line of research focuses more on listeners' taste in sound processing, and as such arguably comes closer to the choice between two distinct hearing aid sound processing designs. This includes the research of Schoeffler and Herre (2013), who found that some listeners are more aware of the contents of what they are listening to, while for others the audio quality is critical. In this research, the focus is on songs, but something similar likely holds for speech: for some listeners, their focus on the content of speech may be enough to justify more aggressive processing, while for others the consequent unnaturalness may make the speech signal more difficult to understand (Neher & Wagener, 2016).

Some of these aspects may help the HCP choose the right hearing aid for a specific individual, but it remains a challenge to fully understand sound preference, which is an intricate and deeply personal experience that is not likely to be primarily driven by individual features. Instead, a full understanding of sound preference requires consideration of many different aspects and their interactions, including aspects of hearing aid processing, wearer characteristics, and listening environments. The studies reported in this paper constitute the beginning of a line of research addressing these multiple aspects and their interactions.

A key goal of this line of research is to go beyond a clinical focus on audibility or performance on specific tests, typically related to speech intelligibility. While most well-fitted, high-end hearing aids deliver audibility and intelligibility in most situations, this does not mean that every user is happy or that all their needs are met. Instead, audibility and intelligibility must be the starting point, on top of which at least two further aspects need to be considered. First, specific features may be particularly relevant for specific situations or specific wearers, such as the Signia focus on multi-talker conversation or the Widex ZeroDelay processing for mild-to-moderate hearing loss. Second, and equally important, the patient's sound preference should ideally be considered prior to the choice of hearing aid, so that the acclimatization can revolve around hearing again, not around a sound quality that is not preferred.

The two studies reported investigate listeners' experiences with two distinct hearing aid signal processing approaches and their preferences and priorities. The first of the two was a large-scale online study where participants in the target group for hearing aids listened over headphones to recordings made with two different types of processing. This allows for a rapid assessment of the preferences of a large number of listeners. However, listening over headphones of course does not fully represent the experience of wearing hearing aids in real life, so a second study used a guided-walk methodology, where experienced hearing aid wearers compared the two hearing aids in a range of representative real-life situations. The guided walk has the advantage of combining a high degree of ecological validity by taking place in representative real-world situations, while also retaining much higher similarity between the scenes rated compared to a home trial of hearing devices.

Together, the two studies address the following hypotheses:

1. **Listeners have distinct and systematic preferences when choosing between different sound processing designs.** While there is likely a middle ground of people who could function well with either sound design, we hypothesize that there is also a substantial group of listeners who have a strong preference for one sound design over the other and who would therefore likely have a much better hearing aid experience if fitted with that sound design.

2. **Listeners prefer different sounds for different reasons.** This hypothesis is investigated by asking listeners about the reasons for their preference, using both quantitative (closed questions) and qualitive (open questions) methods.

3. **Demographics, hearing needs, and auditory lifestyle can predict preference.** This is assessed using several standardized questionnaires as well as custom questions.

Study 1 method: Listening to recordings

Participants

Participants were recruited via the Prolific platform (https://www.prolific.com/). Before entering the main study, they were required to complete the ShoeBox Online hearing screening test (https://www.shoebox.md/products/shoebox-online/). Those whose results suggested normal hearing were excluded from participation. To maintain data quality in an online study where we cannot control how focused participants are when performing their tasks, we embedded four attention checks throughout the listening tasks and questionnaires. Participants who failed these checks were also excluded from the study.

In total, 248 participants completed the study successfully. The average age was 63 years (range: 50-79 years, standard deviation (SD): 7 years), with a nearly equal gender distribution of 125 women and 123 men. According to the results of a five-minute questionnaire-based hearing test that was included in the test battery (Kochkin & Bentler, 2010; Koike et al., 1994), 3% of participants exhibited very mild hearing loss, 20% had mild-to-moderate hearing loss, 31% had moderate hearing loss, 25% had moderate-to-severe hearing loss, and 21% had severe-to-profound hearing loss. When asked about hearing aid usage, 58% of participants reported never having used hearing aids.

In contrast, 18% indicated that they use hearing aids regularly. The remaining participants had either explored the option but decided against purchasing, had returned hearing aids after a trial period, or had owned them but used them only occasionally or not at all.

Hearing aids, fittings and recordings

The studies tested listener preference for different sound processing designs. Time-domain processing was represented by Widex Allure RIC and frequency-domain processing by the Signia Integrated Xperience (IX) Pure C&G. For the recordings, the relevant devices were fitted to a KEMAR manikin using M-receivers and instant Sleeve Vented eartips, and programmed to an N3 hearing loss (Bisgaard et al., 2010). The fitting was done using the relevant proprietary fitting rationales, following a default fitting flow with settings for experienced users.

The recordings were created in two different laboratory environments at WS Audiology: The Spatial Audio Lab in Lynge, Denmark, and the Wonderful Sound Lab in Erlangen, Germany. The Spatial Audio Lab consists of a 45-channel spherical loudspeaker array which uses fourth-order Ambisonic encoding and decoding to recreate a variety of real-world scenarios in a highly realistic way.

The Wonderful Sound Lab uses a built-in array of 45 loud-speakers and 24 directional microphones to provide a variety of virtual acoustic scenes with live reverb augmentation. Different sound libraries are implemented for the two labs, so the specific lab for a given recording depended on the chosen scene.

Table 1 provides an overview of the recorded sound scenes. After recording, the audio files were post-processed to optimize them for headset playback by compensating for the double ear canal resonance caused by the sound being recorded at the eardrum and listened to via headphones, and by adjusting the gain for an appropriate listening level when presented in the online experiment. The recordings matched in overall sound level, ensuring that differences in loudness would not drive differences in preference.

Scenes recorded for Study 1

1. Instrumental pop music
2. Restaurant ambience away from occupied tables
3. Restaurant ambience recorded at an eight-people table
4. Restaurant with target speech
5. Sound of nature: Rain
6. Sounds in a large fitness room with music
7. Speech in quiet
8. Classroom with target speech from teacher
9. Classroom with students chatting
10. Beer hall ambience

Table 1. Overview of the 10 recorded sound scenarios evaluated by participants in Study 1.

Procedure

The study procedure is illustrated in Figure 1. After successfully completing the ShoeBox Online hearing screening test, participants proceeded to complete several questionnaires (see below). Once the questionnaires were submitted, the main listening test began.

During the main listening test, participants evaluated 10 different scenarios, switching back and forth between the sounds as often as they liked. For each scenario, they were asked to indicate their preferred sound design and rate the strength of their preference on a scale from 1 (very weak preference) to 5 (very strong preference). The sound designs were anonymized as Sound System A and Sound System B. To balance potential bias, approximately half of the participants were presented with the time-domain processing as System A and the other half with the frequency-domain processing as System A. The scenarios evaluated are detailed in Table 1.

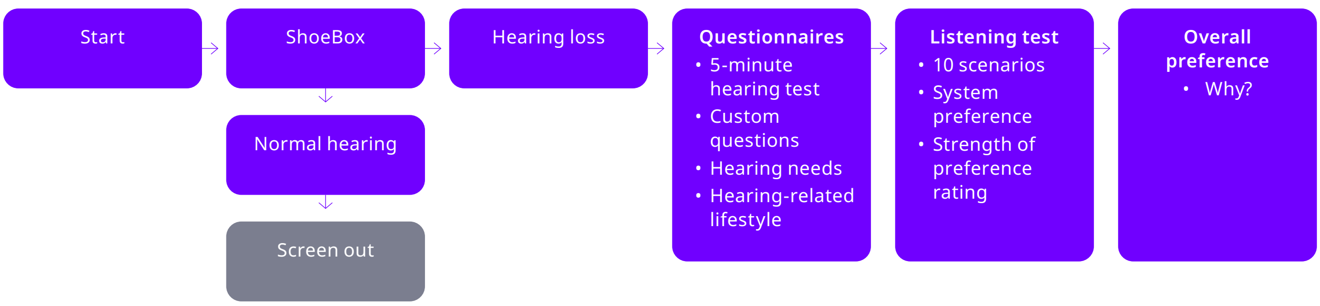

Figure 1: The flow of Study 1.

Study 2 method: Guided walk

Participants
Twenty-eight participants (7 women, 21 men) completed the guided walk. Their average age was 69 years (range: 44-80 years, SD: 9 years), and they were all physically capable of doing the walking which was an inherent part of the guided walk test protocol. All participants were experienced hearing aid users with a self-reported regular use of at least one year. None of them were current users of the sound designs tested in the study, and their own hearing aids covered six different hearing aid brands. They had a sensorineural mild to moderately severe hearing loss within the fitting ranges of both of the test hearing aids used in the study. The average pure tone average hearing loss (across 0.5, 1, 2 and 4 kHz) was 48 dB HL (range: 22-67 dB HL, SD: 13 dB HL).

The guided walk was conducted in Lynge and Copenhagen, Denmark with 23 native speakers of Danish, and in Erlangen, Germany with five native speakers of German.

Sound processing and fitting
As in Study 1, frequency-domain sound processing was represented by the Signia Pure C&G IX and time-domain sound processing by the Widex Allure RIC. All participants were fitted bilaterally with these, using the same ear tip configuration for both pairs of hearing aids, chosen in accordance with the hearing loss of the participant. The hearing aids were fitted using the proprietary fitting rationales in the Compass Cloud and Connexx fitting software, respectively, following the recommended best practice fitting procedure for both hearing aids. When recommended by Compass Cloud, the Widex hearing aids were fitted with the PureSound (ultra-low delay) program, and this program was then used in the guided walk. Fine-tuning was not performed, but if a participant found the overall loudness inappropriate, or if noticeable loudness differences between the two hearing aids occurred, adjustments of the master gain were allowed.

Identifying labels and logos on the devices were covered with colored stickers in order to blind participants to the brand identity, and participants did not see the fitting software on the screen during the fitting.

Procedure
The study flow is illustrated in Figure 2. In the Danish site, steps 1-4 and the two first scenes of the guided walk (step 5) were done on one day, while the last four scenes of step 5 and the remaining steps (6-7) were done on another day. In the German site, the full program was completed in one day.

The guided walk included six scenes in different sound environments, as listed in Table 2. In all scenes except from scene 1, the test leader acted as a conversation partner, offering a way for the participant to evaluate both speech perception and own voice, besides the naturally occurring environmental sounds in the scene. In each scene, the participant wore one pair of hearing aids for some minutes before switching to the other pair, allowing enough time for conversing with the test leader and for listening to the environmental sounds. After having listened with both hearing aids, the participants were asked to state their preference between the two hearing aids in that specific scene.

Study 2: Scenes during guided walk
1. Listening to music via loudspeakers in a quiet listening room. The specific piece of music was the choice of the participant.
2. A relatively quiet but reverberant reception area with people passing by and sporadical talking.
3. The arrival hall of a busy train station with people passing by and talking and with occasional loudspeaker announcements.
4. A café with people talking and background music.
5. A city square close to a busy street with heavy traffic.
6. A city park with people walking by, birds singing, and traffic noise in the distance.

Table 2: Overview of the six sound scenes evaluated during the guided walk in Study 2.

The test order of the two hearing aids was counterbalanced across participants and scenes. Thus, for a given participant, the time-domain sound was tested first in three of the six scenes, and for a given scene, the time-domain sound was tested first for half of the participants (and vice versa for the frequency-domain sound).

Conducting the guided walk in real-world scenarios involves natural variation in each scene both between and within sessions, since the configuration of sound sources and sound levels could vary within and between days and between the two different study sites (Denmark and Germany). However, the scenes chosen are sufficiently internally consistent to allow ratings to be analyzed and presented together, and the guided-walk approach has the major advantage of representing a range of actual rather than simulated real-world scenarios, while retaining some degree of experimental control.

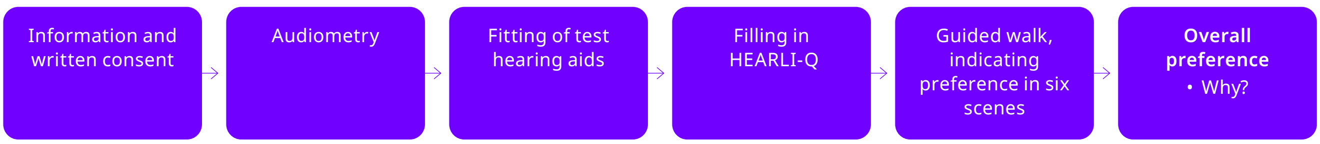

Figure 2: The flow of Study 2.

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Study 1 and Study 2: Questionnaires

The participants in both studies answered a range of questions. Before the listening tests, the questions included:

- The Hearing-Related Lifestyle Questionnaire (HEARLI-Q, Lelic et al. 2022b), which includes 23 listening scenarios, for which all participants rated three dimensions: frequency of occurrence, importance of hearing well, and difficulty of hearing. These ratings were used to derive three predictors of preference: richness of hearing-related lifestyle, hearing demand, and hearing difficulty.
- Custom questions on hearing aid experience and, if relevant, current hearing aid brand.
- In Study 1, the "social/occupational" and "technology" sections of the hearing needs assessment questionnaire (https://www.hearinghealthclinic.com/wp/wp-content/uploads/2016/05/HNAAPRIL2015v2.pdf): participants judged whether a series of potential reasons for needing hearing aids were either very important, desirable, or not important to them.
- In Study 1, where no audiometry information was available (the Shoebox being only available as a screening tool), a five-minute questionnaire-based hearing test (Kochkin & Bentler, 2010; Koike et al., 1994). This questionnaire includes a selection of potentially difficult hearing situations and asks participants to report the frequency with which each situation causes difficulty. The questionnaire score has been shown to correlate with pure-tone audiometry (Koike et al., 1994).

During the listening tests, participants indicated their sound preference for that scene.

After the listening tests, participants were asked about:

- Their overall preference in a binary forced choice between the two sound designs.
- The strength of the overall preference.
- The reasons for the overall preference, both open-ended and using the following categories: sound quality, sound quality of music, naturalness, pleasantness, recognizability, speech understanding, speech clarity, own voice (guided walk only), and localization (guided walk only).

Results

Hypothesis 1:
Listeners have distinct and systematic preferences when choosing between different sound processing designs.
The first question we address is how participants' overall preferences, at the end of each study, were distributed. This is shown in Figure 3 and turns out to be very similar across the two studies, with a 53/47 split in the recordings study and a 50/50 split in the guided walk.

The overall preference in both studies was a forced choice between the two distinct sound designs, based on the logic that in a clinical setting one hearing aid will always have to be chosen (by the hearing aid wearer or their HCP). This makes it interesting also to consider the strength of participant preference. This was assessed on a five-point scale in the recordings study and on a three-point scale in the guided walk. The results indicate, as expected, that not all preferences are equally strong. The group of listeners with a strong preference makes up around 30% of the sample in the recordings study (defining ratings of 4 and 5 as 'strong' preferences) and closer to 40% in the guided walk study, as illustrated in Figure 4. Like overall preference, these are approximately equally distributed between the two sound designs. If this translates to a clinical context, which is not unlikely given that we see it across both studies, we would expect around 20% of patients to have a strong preference for each sound design, with up to 60% being equally well helped with either sound design.

Finally, it is interesting to look at how systematic the preferences are, in other words how the preference in individual scenarios align with overall preference. The simplest way to consider this is by counting the number of scenarios in which participants' preference aligns with their overall preference. In the recordings study, with its 10 scenarios, participants chose their overall preferred sound in on average 6.4 scenarios, i.e., approximately two thirds of the scenarios. In the guided walk, with its six scenes, participants chose their overall preferred sound in on average 4.2 scenes, i.e., also approximately two thirds of the scenes.

In sum, participants' by-scenario preferences generally align with their overall preference. However, the level of alignment varies, with some scenarios showing more individual deviations from the overall preference than others. This means that some sounds or scenes are more likely to be predictive of overall preference than others; if these can be recreated or reproduced in the clinic, this may help clinicians choose the right hearing aid from the outset. Any predictive power from specific scenarios may be further refined by considering also the frequency and importance of the given scenarios in the individual patient's life, but this remains a topic for further research.

Hypothesis 2:
Listeners prefer different sounds for different reasons.
Turning to the second hypothesis, we investigate the reasons for listeners' preferences using both open and closed questions. The open question asked participants in both studies to describe the reasons for their preference, allowing for a qualitative analysis of their responses. The most general conclusion from this qualitative analysis is that participants' reasons for preferring different sound designs are nuanced, situational, and often difficult to summarize using broad descriptors like sound quality, speech intelligibility, or naturalness. A case in point is the dimension *Clarity*—one of the most frequently mentioned terms for both sound designs. Participants frequently cited clarity as a key reason for preferring either time-domain or frequency-domain processing, but a closer look at their open-ended responses reveals subtly different ways of describing what clarity sounds and feels like.

For participants with an overall preference for the Widex time-domain processing, clarity was used about sound separation and accuracy. Quotes such as "*The sound characteristics were clearer, sharper, and easier to hear*" and "*more focused and crisp sound in most cases*" from participants in Study 1 illustrate this way of talking about clarity. For participants with a Signia frequency-domain preference, the language used to describe clarity is subtly different, using words focusing more on a sense of comfort and immersion. This is reflected in quotes from Study 1 like "*A little clearer without having to strain*" and "*Can hear voices clearer and not too sharp*."

Importantly, these differences in preference reasons are not about which system is objectively clearer, but about how listeners experience clarity, and the words they use to make sense of their experience. Similar patterns apply also for other descriptors like naturalness and sound quality and for participants' answers to a closed question about the reasons for their sound preference. This question asked participants to choose three reasons for their preference from a closed set of seven sound attributes in Study 1 (Speech intelligibility, Speech clarity, Sound quality, Sound quality of music, Pleasantness, Naturalness and Recognizability of sounds) and nine attributes in Study 2 (the same as in Study 1 and two additional attributes, Own voice and Localization, that are only relevant in a real-life setup, not when sounds are presented over headphones). All of the attributes were picked as one of the three preference reasons per patient, indicating substantial breadth in people's reasons for preference.

Comparing the two sound designs, the results show that the two preference groups only differ marginally in the attributes they indicate as reasons for their preference. This indicates that these broad categories are interpreted in different ways by listeners with different overall preferences. For example, both time-domain and frequency-domain selectors may choose "*Sound quality*" as a preference reason, but with reference to different experiences and different sensory preferences. Or they may choose "*Speech clarity*" for instance based on an experience of improved naturalness of speech (what we would expect for Widex) or an experience that the speech is more enhanced and isolated from the background (which we would expect for Signia).

Study 1: Overall preference **Study 2: Overall preference**

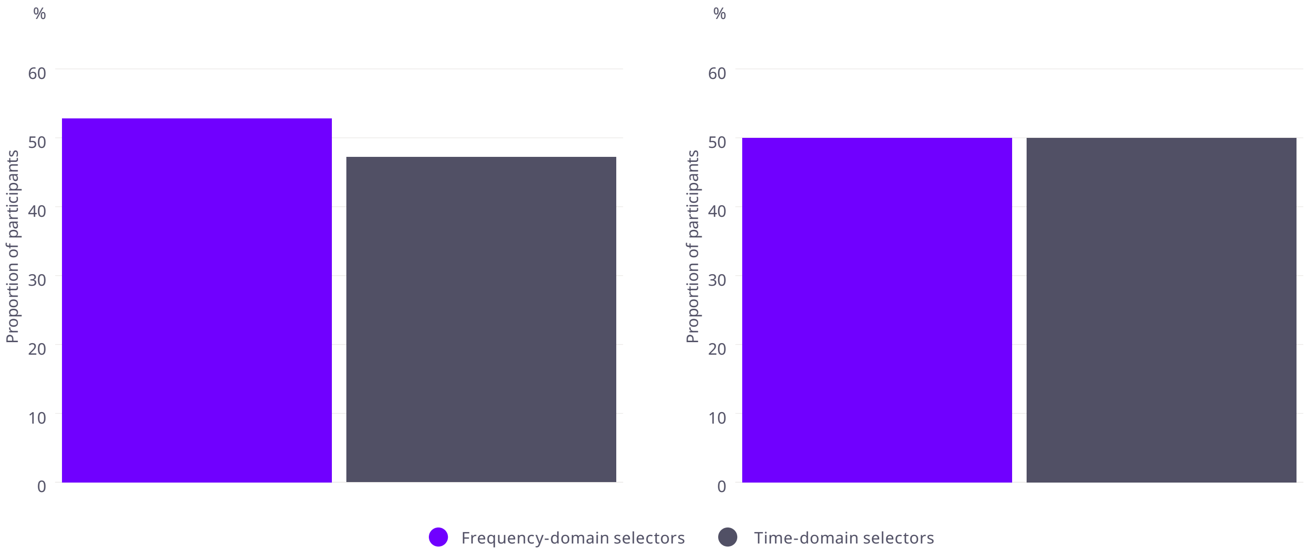

Figure 3: The distribution of preferences in Study 1 (recordings), left, and Study 2 (guided walk), right.

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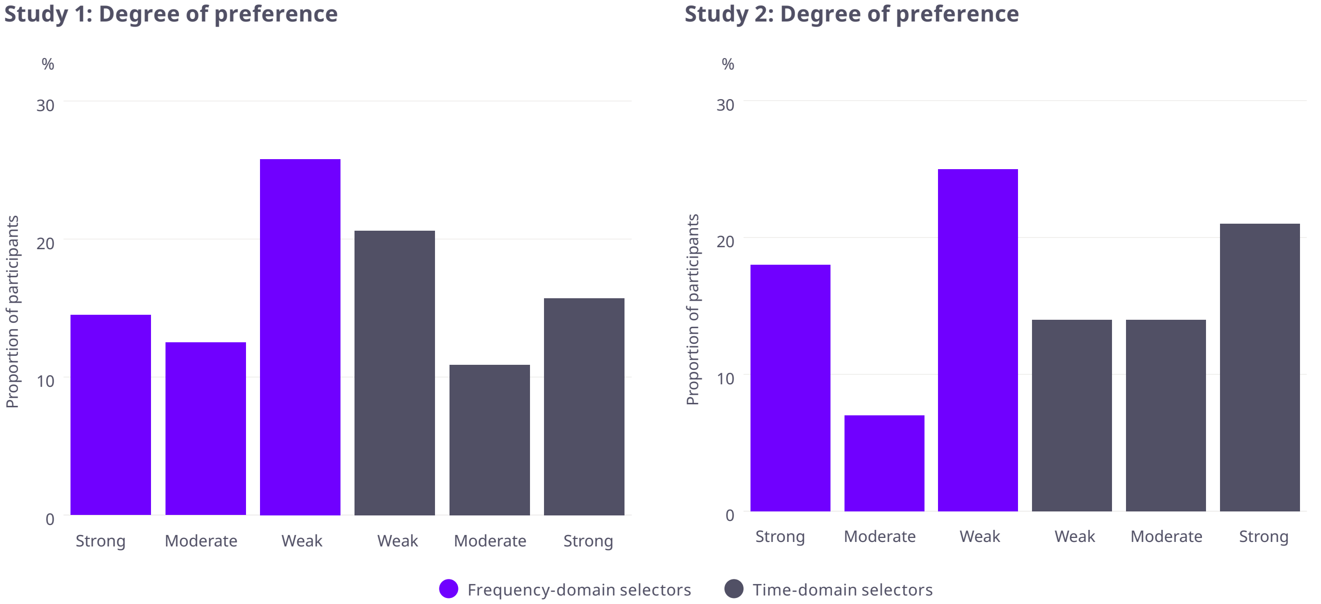

Figure 4: The degree of preference for each brand indicated by the participants in the recordings study, left, and the guided walk, right. The 5-point scale from Study 1 is converted to the same 3-point scale as the Study 2, with ratings of 4 and 5 grouped as "Strong", 3 as "Moderate", and 1 and 2 as "Weak".

In sum, answers to both open and closed questions confirm the hypothesis that listeners prefer different sounds for different reasons, but the analysis also indicates that generalized attributes of sound cannot systematically capture differences in preference for the two sound designs. This means that sound preference cannot necessarily be determined by asking listeners about broad attributes like "*Sound quality*" or "*Speech clarity*", but often requires more nuanced vocabulary, such as different ways of talking about clarity. Another avenue for investigating sound preference, as we saw in connection with Hypothesis 1 above, is considering listeners' reaction to specific sounds or scenarios that may be predictive of general preference.

Together, the results indicate that sound preference arises from an interaction between perception, listening context, and individual listener factors, and that this interaction should be considered in clinical practice.

Hypothesis 3:
Demographics, hearing needs, and auditory lifestyle may predict preference

For the third hypothesis, we consider a range of variables related to the participants in the two studies, including both basic demographic variables (gender, age, hearing loss) and responses to the questionnaires investigating hearing needs and auditory lifestyle.

None of the demographic variables were predictive of preference. This is arguably unsurprising for gender and age. It is more interesting, though also not surprising, to observe very similar distributions of hearing loss categories for selectors of both sound processing designs in Figure 5. This indicates that preference for either type of processing can be observed across the audiogram. Figure 5 illustrates the distribution for Study 1 only, because the much larger sample size in this size gives a more appropriate illustration of the distribution. But also in Study 2, degree of hearing loss was not predictive of preference.

Similar to the demographic variables, neither study showed a difference between time-domain and frequency-domain selectors in the richness of their hearing lifestyle, their hearing demand, or hearing difficulty as measured by the HEARLI-Q questionnaire. Nor did we observe differences based on the Hearing Needs Assessment included in Study 1.

Thus, although it may be appealing to assume that sound preference could be predicted from demographic or lifestyle characteristics of hearing aid candidates—variables that can be readily assessed through intake questionnaires—the present findings indicate that such factors are not independently predictive of sound preference. Instead, preference appears to depend more strongly on experiences in particular listening situations. Consistent with this interpretation, certain listening scenarios were more predictive of overall preference than others.

The most promising avenue for predicting overall preference is therefore considering by-scenario preferences, possibly in combination with the individual listener's rating of occurrence and importance for those selected scenarios.

Although preference observed in a single listening scene should not be used in isolation, greater weight may be given to preferences expressed in scenes that are particularly frequent and important for an individual listener when estimating which signal processing approach is most likely to provide an optimal match.

Study 1: Hearing losses of participants

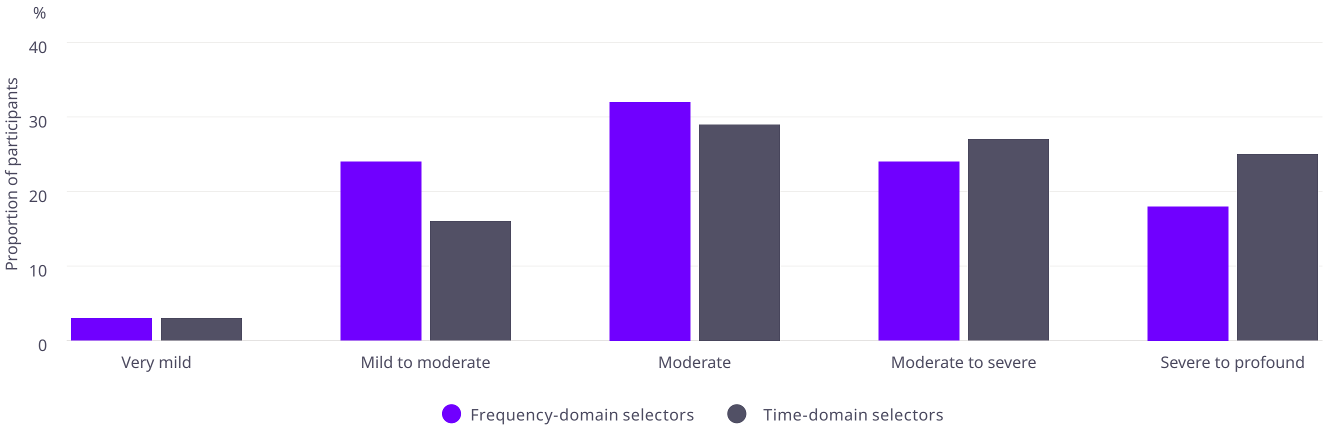

Figure 5: Distribution of participants in Study 1 on hearing loss categories (based on the questionnaire-based hearing test of Koike et al. 1994). The percentages are calculated per preference group.

Conclusion

The two studies reported in this paper are remarkably consistent across modalities (recordings played back over headphones in Study 1 vs. real-life situations in Study 2) and user groups (mixed group of predominantly non-users in Study 1 vs. experienced hearing aid users in Study 2). Together, the results indicate that up to approximately 40% of listeners exhibit a strong preference for a specific sound design, equally distributed between the two different sound designs tested. The remaining 60% demonstrate weaker preferences and may arguably be served equally well with a well-fitted hearing aid using either type of processing.

The results also showed that these preferences are not likely to be predicted by the listener characteristics included in the analysis. At least age, gender, and lifestyle did not offer significant predictive power. The alignment between scene-specific preferences and overall preference, however, does offer the promise that the complex phenomenon of sound preference in the real word can likely be assessed by listeners experiencing the different sound designs in different scenes, whether online or in a brief real-world trial.

These findings support the interpretation that sound preference represents a clinically relevant perceptual dimension of hearing aid experience. The results constitute the beginning of a line of research with the clinical goal of predicting which sound processing design will best suit any individual patient walking in the door of the clinic. Sound preference is foundational and should be considered alongside well-known drivers of choice, such as look and feel or connectivity. The aim of this research is to shift the focus beyond audibility, performance, and individual hearing aid features—all of which are important, but none of which can capture the full complexity of individual sound preference or account for the common clinical experience of one sound processing design being right for some patients and wrong for others. Accounting for sound preference may also ease acclimatization, especially for users with strong preferences.

Future clinical approaches may benefit from incorporating structured evaluation of sound preference through targeted listening comparisons between different sound designs, alongside established audiological assessments. Such an approach may support more personalized device selection and improve the overall hearing aid journey.

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