REAL-LIFE BENEFITS OF WIDEX EVOKE: AN EARLY LOOK AT END-USER SURVEY RESULTS

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INTRODUCTION
Since the launch of Widex EVOKE, there have been countless users who have reported their preference for their new EVOKE devices. Launched on the promise of intelligent today, smarter tomorrow, Widex EVOKE combines the best of both worlds: market-leading sound and automation and the latest in real-life intelligent personalisation. Our evidence at launch showed that changes to the Widex open-fit rationales were strongly preferred by users (Schmidt, 2018), and that SoundSense Learn, an app-based feature delivering hearing aid adjustments via a machine-learning algorithm, improved sound quality for listeners (Townend et al., 2018). To verify these claims and to back up our evidence, Widex is conducting a large user survey. The survey methods and preliminary results are discussed in this WidexPress. Overall, these preliminary results are very positive, and while it is not at this stage a deep analysis of the data, it is still useful to see the impact that Widex EVOKE is already having in the market and in users’ lives.

SURVEY METHOD
To investigate how the Widex EVOKE hearing aids are experienced by real users in their real lives, we are conducting a large user survey across ten different countries, where we ask hearing aid users about their satisfaction with their own existing hearing aids and with Widex EVOKE hearing aids. The survey involves a seven-week process, giving users time to experience the EVOKE hearing aids across a range of situations and compare them with their own hearing aids. The survey is still running, and we are eagerly anticipating having the results of the full survey later in the year. In the meantime, we can show preliminary results for 40 participants from three countries (Canada, the UK and the US), which show some very clear and exciting advantages for the EVOKE hearing aids, when compared to participants’ own hearing aids (of various brands).

Participants
Participants were hearing aid users with all types and configurations of hearing loss within the fitting range of the Widex EasyWear M-receiver (up to approximately 85 dB HL below 3 kHz, and approximately 90 dB HL above). They were recruited by hearing care professionals (HCPs) at nine clinics in Canada, two clinics in the UK, and two clinics in the US. The present preliminary analysis includes 40 participants, aged between 23 and 88 years (mean 63 years), of whom 18 were female and 22 were male.

Survey design
The survey runs over a seven-week period, with participants answering questionnaires at four different times in a so-called cross-over design – two questionnaires about their experience of their own
hearing aids and two questionnaires about their experience with Widex EVOKE. Each participant starts the process at week 0 with a visit to their HCP, where they answer the first questionnaire about their own hearing aids and are fitted with Widex EVOKE hearing aids. The participants then wear EVOKE for three weeks and answer a questionnaire about the EVOKE experience at week 3, before switching back to their own hearing aids. After wearing their own hearing aids again for two weeks, they answer a second questionnaire about their satisfaction with their own hearing aids at week 5. Then, for the final two weeks of the survey, they wear EVOKE and answer the second EVOKE questionnaire at week 7. These questionnaire times are represented in the figures below, where we see marked differences between EVOKE and own hearing aids, as well as between the week 0 and week 5 questionnaires on the participants’ own hearing aids.

Each questionnaire consists of questions modelled on questions from the MarkeTrak survey (MarkeTrak 2015). Respondents are asked about general satisfaction with the hearing aids, specific aspects of hearing aid use (e.g. sound quality, soft sounds and battery life), and specific use situations (e.g. use in restaurants and during transport). For Widex EVOKE, we also ask questions about the use and experience of the SoundSense Learn feature for personalisation. Satisfaction is rated on 7-point scales, ranging from very dissatisfied (coded here as 1) to very satisfied (coded as 7). Participants fill in the questionnaires online in the survey system SmartTrial.

SURVEY RESULTS
Our initial analysis is very positive for Widex EVOKE. We see a substantial advantage for EVOKE hearing aids across all questions, generally on the order of at least 1 point on a 7-point scale and in many situations more. We will focus in this WidexPress on users’ general satisfaction, the particularly large advantage for EVOKE in noisy situations, and the use of SoundSense Learn.

Overall satisfaction
When we look at overall satisfaction (i.e. participants’ answers to the question “Overall, how satisfied are you with the current hearing aids you have worn?”, illustrated in figure 1), there are two things that stand out.

Figure 1. Mean ratings of overall satisfaction with own and Widex EVOKE hearing aids at the different questionnaire times. In this figure and in figures 2-4, the scale from very dissatisfied to very satisfied has been transformed into numbers 1 to 7 in order to calculate means (shown as filled circles) and standard deviations (shown as error bars).

Firstly, we see that users are substantially more satisfied with Widex EVOKE than with their own hearing aids, with ratings of EVOKE on average around “satisfied”. This mean value covers as many as 34% of users giving the highest rating “very satisfied” to the EVOKE hearing aids. In contrast, participants are on average only between “neutral” and “somewhat satisfied” with their own hearing aids, with only 5% being “very satisfied” in week 5, when they have had a chance to compare their own hearing aids with Widex EVOKE. If we look at individual participants, we see that 63% give the EVOKE hearing aids higher ratings than their own hearing aids.

The second noticeable thing in figure 1 is that participants’ ratings of their own hearing aids go down markedly after they have tried Widex EVOKE. This in itself indicates a substantial relative advantage for the EVOKE hearing aids. The mean rating of own hearing aids falls by as much as 0.8 points from week 0 to week 5.

In addition to overall satisfaction, we also considered another general satisfaction parameter, namely satisfaction with the hearing aids across all listening situations, i.e. emphasizing the functionality and sound quality of the hearing aids in real life. Here, we see an even more pronounced advantage for Widex EVOKE, which is illustrated in figure 2. The ratings of EVOKE are 1.5 points higher than those of participants’ own hearing aids.
Figure 2. Mean ratings of satisfaction across different listening situations with own and Widex EVOKE hearing aids at the different questionnaire times.

Overall satisfaction and satisfaction with hearing aids across all listening situations are very broad questions. These questions do not focus on a particular situation or feature, so in order to elicit high satisfaction ratings in these categories, a hearing aid would have to offer a very broad range of features that deliver satisfaction in a broad range of listening situations. A broad range of situations is exactly what is provided by Fluid Sound Technology, which is at the heart of Widex EVOKE. Fluid Sound Technology is an automatic system that identifies and reacts to multiple environments to provide optimum sound in the environment the listener is in. In addition, users who wish to personalize sound in specific situations for their own listening intentions also have access to SoundSense Learn, a novel fine-tuning interface driven by machine learning. This, as we will see later in the survey, gives improvements for those subjects that choose to use it. The observation that not all subjects choose to use it, along with the high general satisfaction ratings for Widex EVOKE, tells us that the hearing aid automation was delivering a satisfying sound.

Increased satisfaction in noisy situations
One particular area that may be driving the overall higher satisfaction with Widex EVOKE hearing aids is their superior performance in noisy situations, which are notoriously difficult for hearing aid users – and in fact also for many normal-hearing people. Looking at the MarkeTrak and EuroTrak surveys, hearing aid performance in noise is an absolutely central aspect for hearing aid users and one where they are frequently dissatisfied. For instance, the environment with the lowest satisfaction level across all groups in MarkeTrak 2015 was when trying to follow a conversation in the presence of noise. In the present data, we see that the general advantage for Widex EVOKE over participants’ own hearing aids is even more pronounced when we look at users’ satisfaction with the hearing aids in a variety of noisy situations, exactly the situations that are identified as problematic in MarkeTrak and elsewhere. Figure 3 shows users’ satisfaction ratings with the hearing aids in noisy backgrounds, and we see the same substantial advantage for EVOKE across a range of situations where noise is an important issue, including restaurants (see also figure 4), conversations in noise, during transport and in noisy streets.

Figure 3. Mean ratings of satisfaction in noisy backgrounds with own and Widex EVOKE hearing aids at the different questionnaire times.

As described earlier, Fluid Sound Technology is central to Widex EVOKE. A part of Fluid Sound Technology is environment-specific sound classes that are designed to ensure that optimum sound is delivered in varying environments, including those containing noise. Sound classes that are designed for noisy environments aim to maximise the preservation of speech and reduce listening effort by using all available hearing aid features to give the best automated response.

Looking at the pattern of individual respondents with respect to noisy situations, 70% of respondents give Widex EVOKE higher ratings when it comes to noisy situations in general, rising to 83% who are more satisfied with Widex EVOKE than their own hearing aids.
Figure 4. Mean ratings of satisfaction in restaurants with own and Widex EVOKE hearing aids at the different questionnaire times.

In restaurants. The restaurant results are an interesting example of the cocktail party effect, which constitutes such a challenge to hearing aid users but which the EVOKE hearing aids help users overcome to a much larger extent than other hearing aids.

In sum, we see Widex EVOKE hearing aids outperforming users’ own hearing aids across all questions, with especially large advantages for EVOKE in situations where noise plays a big role, such as in restaurants and traffic. This is evidence of the superb automatic hearing aid that Widex has created with EVOKE. At the same time, EVOKE also allows advanced personalization with the SoundSense Learn feature, which we will focus on in the next section.

HEARING AID PERSONALIZATION WITH SOUNDSENSE LEARN

While Widex strives to design and build the most automatic hearing aid possible, we know there will always be situations where automation does not match an individual hearing aid user’s listening intention. In order to provide for these situations, many controls have been developed over the years to enable hearing aid users to adjust their devices in the moment. However, one of the limitations of more control has been users’ lack of ability to understand and use these controls to make meaningful improvements to the hearing aid sound. SoundSense Learn aims to deliver a solution to alter the hearing aid sound to better match the user’s listening intention via an interface that is both easy and intuitive, not a complex barrier to users. This is all made possible by using a live machine-learning algorithm to analyse user inputs on sound preference and quickly identify the combination of settings that match the user’s intention. In many cases, using SoundSense Learn will not be necessary, due to the superior automatic performance of Widex EVOKE – at the same time, no two users are the same, and SoundSense Learn allows each user an exceptional tool for personalizing sound.

In order to explore how users apply the SoundSense Learn feature, we ask about it in the survey and also explore the anonymized data on SoundSense Learn usage that are created when the feature is used. Turning first to the survey, we see that a total of 23 out of the 40 participants have used SoundSense Learn, most of them in both periods of Widex EVOKE use. SoundSense Learn use relies on the EVOKE app and hence on hearing aid users also being regular smartphone users, so we would not expect all users to use it. We also noted earlier that if the automatic features are delivering the sound the user wants, then they will not need to use a feature such as this.

Figure 5. Number of participants who feel that SoundSense Learn has improved a listening situation (top) and who would recommend it to others (bottom).
Overall, our survey participants are happy with the SoundSense Learn feature, as illustrated in figure 5, where we see that most participants feel that SoundSense Learn has helped them improve a listening situation (top panel) and that most participants using this feature would recommend it to others (bottom panel). Interestingly, the results are more positive in week 7 than in week 3, i.e. participants are most positive when they have had maximal chances of getting familiar with the feature. In week 7, after five weeks of Widex EVOKE usage, 76% of SoundSense Learn users feel that they have been able to improve a listening situation using SoundSense Learn, while 82% would recommend the feature to others.

A second interesting aspect to explore is the use of SoundSense Learn by Widex EVOKE users generally, rather than restricted to the customer survey. We can investigate this general use of SoundSense Learn because anonymized data on SoundSense Learn usage are created when the feature is used; these data are used for development purposes as well as for understanding how users may benefit from SoundSense Learn. We looked at data from a sample taken in August 2018, where we saw that approximately 10% of the users whose EVOKE model allows them to use SoundSense Learn were using it to create and save programmes for specific listening situations.

The SoundSense Learn feature allows users to create programmes and name them, choosing from a range of different labels such as ‘Work’, ‘Traffic’ and ‘Restaurant’. We focus here on the subset of programmes that have been saved and named because these are likely to be those that users find most valuable for their specific needs. We saw that 1860 such SoundSense Learn programmes were created and categorized by users in the sample taken in August 2018.

While we do not have access to the acoustic environments in question or to users’ explicit motivations for creating SoundSense Learn programmes, we can explore the equalizer settings that the SoundSense Learn machine-learning algorithm has helped the users settle on. These are plotted for the ‘Restaurant’ setting, which we also explored in the customer survey above, in figure 6. The figure shows the bass, middle and treble settings of the EVOKE users’ real-life restaurant programmes. Each programme is represented by a dot, and we see that these dots are distributed over the entire three-dimensional space with no apparent clustering. While further analysis may reveal patterns, the wide spread of the programme settings indicates that the settings that the individual user converges on are in fact individual and, as intended, tailored to the specific situation and intention. Equally diverse patterns can be observed for other programme labels, including ‘Work’ and ‘Traffic’.

This diversity is not going to be covered by a predicted automatic hearing aid program; it is only covered when the individual listening intention is considered and used to find settings.

**CONCLUSION**
These preliminary results are very positive, reflecting a successful balance between hearing aid automation and personalization. While we still endeavour to make the most automatic hearing device possible, it seems that there will always be situations where the listening intention of the user is better met via powerful and effective personalization in the moment. Together, Widex EVOKE, Fluid Sound Technology and SoundSense Learn change the way end-users experience hearing aid automation and interact with hearing aids, providing them with opportunities for immediate personalized improvement based on their intentions and preferences.
REFERENCES
