OTICON | **Opn S**

Oticon Opn S™ – significant benefits for all

96% of users prefer new Oticon Opn S over Oticon Opn™

Oticon is launching Opn S with the innovative and multi-patented OpenSound Optimizer™. By introducing a unique way of handling feedback by preventing it from even occurring, OpenSound Optimizer preserves the optimal gain, in an open fitting, without the risk of feedback*.

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The benefits of OpenSound Optimizer were tested during a two week field trial where the participants carried on with their daily lives and thus subjected the hearing aids to the dynamic environments they were normally in.

At the end of the trial period, the results showed that 96% rated Oticon Opn S to be 'much better' or 'somewhat better' than Oticon Opn (Figure 1). This unprecedented high preference for a new hearing aid has never been seen before by Oticon and it is attributed to OpenSound Optimizer.

When giving their top three reasons for preferring Oticon Opn S, speech intelligibility and sound quality were by far rated as the most important (Figure 2).

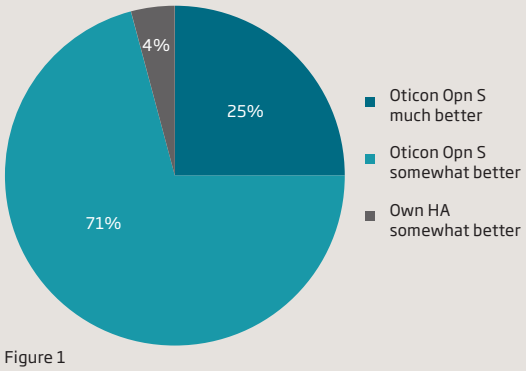

Figure 1

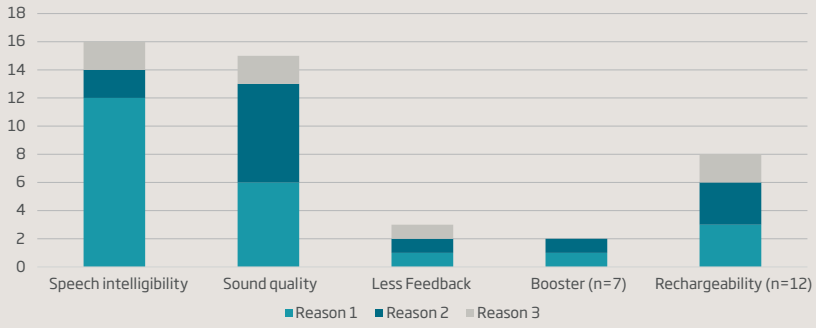

Figure 2

Participants:
24 participants with a mix of hearing losses (17 men and 7 women)
12 BTE Plus Power users, 2 miniRITE T 60 speaker users (testing miniRITE R), 10 miniRITE/miniRITE T 85 speaker users (testing miniRITE R) and mean age of 73.5 years (range 49 - 86 years)

All participants were experienced and satisfied Oticon Opn 1 users who were not experiencing audible feedback problems.

OpenSound Optimizer – improving OpenSound Navigator™ and Speech Guard™ LX for higher signal integrity
Better speech intelligibility and improved sound quality as reported for Oticon Opn S is due to a unique interaction that starts with OpenSound Optimizer. OpenSound Optimizer allows prescribed rationale amplification to be delivered as intended, with Speech Guard LX providing rich speech detail and OpenSound Navigator providing a cleaner and clearer speech signal in noisy surroundings. Altogether, this means that OpenSound Optimizer is the reason Oticon can provide higher signal integrity as the result of multiple crucial systems in the hearing aid supporting each other.

The preferences of the test participants in the validation study proves that OpenSound Optimizer profoundly impacts other key hearing aid features in a positive way.

*For prescribed fittings, according to best practice

Traditional hearing aids reduce gain up to 50% of the day

A static environment is when there is no activity around the hearing aids – either around the head or inside the head and neck. The hearing aids are performing (amplifying) as expected with optimal gain (assuming a good initial fitting was provided).

A dynamic environment is when there is activity in the environment around the client's head or changes in the ear canal shape due to jaw or neck movement (chewing, talking, hugging, using the phone, wearing a hat, resting against a couch, or sitting close to a wall or window). Activity around the hearing aids alters the feedback path and forces the hearing aid to take precautions to prevent audible feedback.

Too slow to react when feedback builds, traditional and reactive technologies manipulate the sound signal and reduce gain in order to manage the feedback loop and return to stable gain. The result is discomfort when audible feedback arises or a compromise on speech understanding due to reduced gain, until the hearing aid returns to stability.

A traditional feedback management system is challenged as much as 20-50% of the time over the course of a day, causing it to constantly be in a state of reducing gain by 3-10 dB (Figure 3).

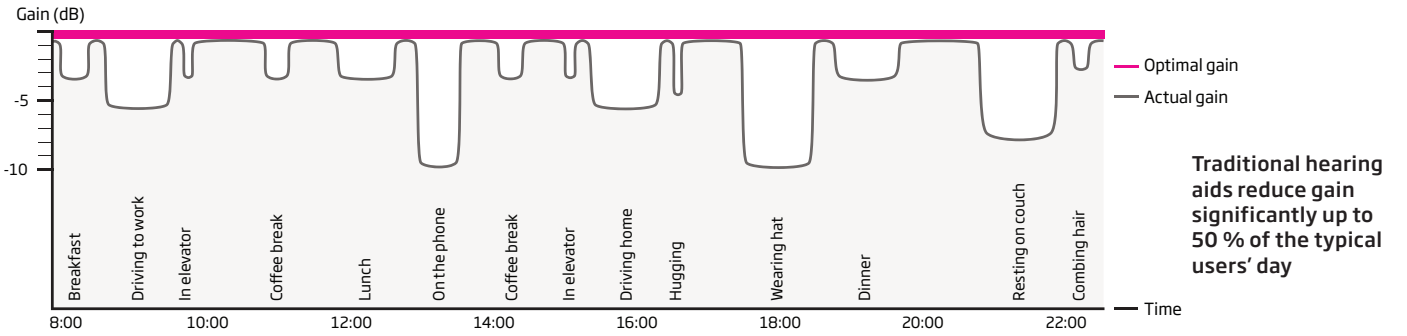

Figure 3

OpenSound Optimizer delivers optimal and consistent gain, with no risk of feedback

By analyzing the amplified sound at an astonishing 56,000 times/sec, OpenSound Optimizer proactively identifies feedback risk and engages a patented breaker signal in risk areas before feedback builds.

This enables OpenSound Optimizer to provide a 6 dB higher feedback limit, with the option to manually provide an additional 4 dB. This additional gain can be used to fit to target and/or provide more headroom, eliminating the many daily gain reductions and providing the user with prescribed amplification (Figure 4).

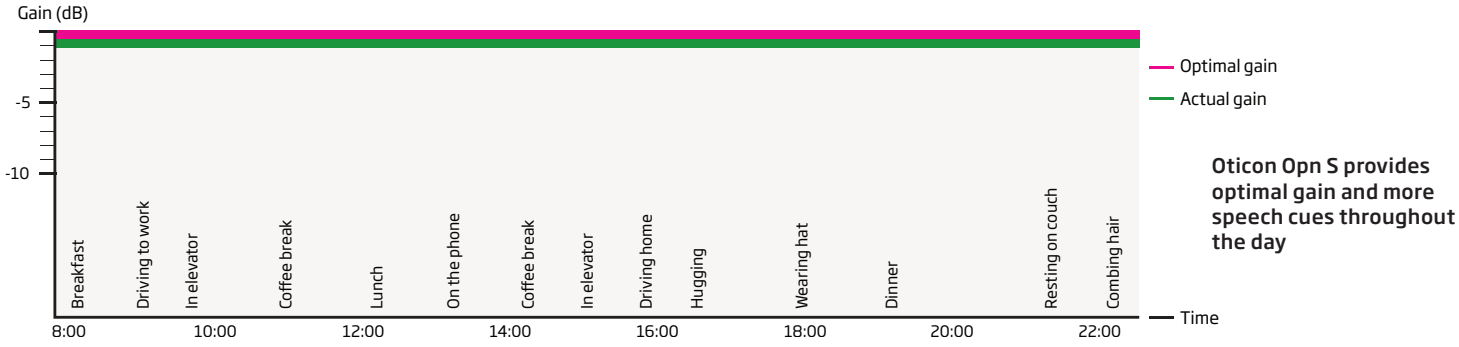

Figure 4

OpenSound Optimizer also provides a more stable system at higher gain levels, leading to fewer incidences of sound quality degradation caused by the hearing aids operating at levels close to audible feedback*. Hearing aid behaviors in dynamic situations (gain reduction, large frequency shifts) and when getting close to instability (sound quality degradation) are problematic because they are heard as poor sound quality to the hearing aid wearer, but are not easily discovered by the hearing care professional. OpenSound Optimizer minimizes these "invisible" behaviors, resulting in better sound quality and a better listening experience for the client (Callaway 2019, Oticon Whitepaper).

* Dillon, H. (2012). Hearing aids. Boomerang Press.

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Gain reduction by feedback system: Static situation

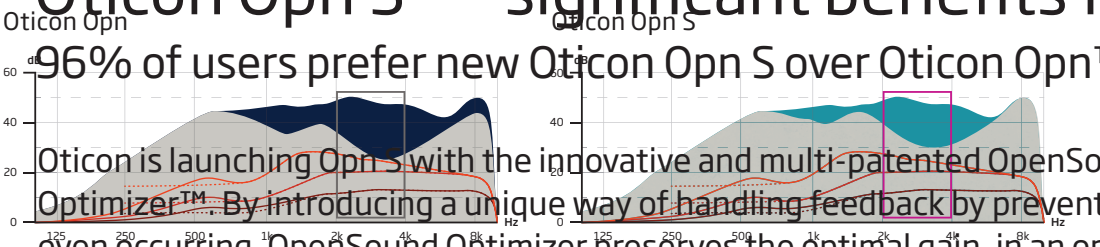

Figure 5
In a static situation, gain for Oticon Opn is just below the feedback limit. For Opn S, the 0 dB extra headroom is visible.

Gain reduction by feedback system: Dynamic situation – biting an apple

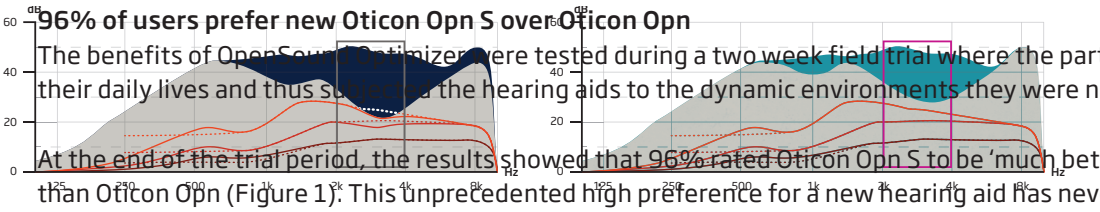

Figure 6
In this dynamic situation, feedback risk increases when the user bites an apple. For Oticon Opn, there is a gain reduction of 3-5 dB for soft sounds but for Opn S, gain is well preserved. In Opn S, there is still headroom, allowing the hearing aid to avoid any sound quality degradation as a result of being too close to the feedback limit.

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At the end of the trial period, the results showed that 96% rated Oticon Opn S to be 'much better' or 'somewhat better' than Oticon Opn (Figure 1). This unprecedented high preference for a new hearing aid has never been seen before by Oticon and it is attributed to OpenSound Optimizer.

OpenSound Optimizer – stable prescribed gain with no risk of feedback

When giving their top three reasons for preferring Oticon Opn S, speech intelligibility and sound quality were by far rated as the most important (Figure 2).

Oticon conducted a lab test with a KEMAR manikin comparing Oticon Opn S and two premium competitor hearing aids to evaluate performance in a static and dynamic environment with background noise (Figure 7). For Oticon Opn S the test showed no audible feedback while gain was maintained and noise was reduced to optimize audibility and speech intelligibility.

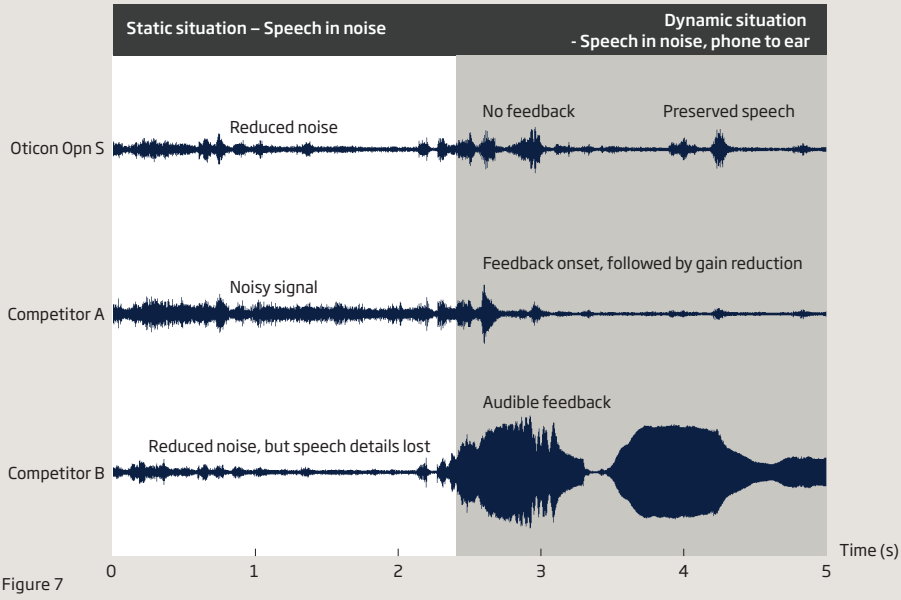

Figure 7

Left side - static
Oticon Opn S amplifies speech as expected, benefiting from OpenSound Navigator reducing noise substantially. Competitor A handles noise poorly. Competitor B handles noise well, but speech details are lost.

Right side - dynamic
There are two undesirable effects: audible feedback and drastic gain reduction:

1) Audible feedback
Competitor B has two audible feedback sounds and stability is not achieved until after the test period ends. For Oticon Opn S, no audible feedback is observed.

2) Drastic gain reduction
Competitor A has very brief feedback, followed by a drastic gain reduction to prevent audible feedback in the dynamic situation. Gain reduction is 10-12 dB, effectively reducing audibility of speech for a long period. For Oticon Opn S gain is preserved.

Competitors A and B represent common examples of undesirable effects as a result of traditional feedback management strategies across manufacturers. In addition to this, Figure 7 visualizes the more rapid and effective noise reduction provided by the OpenSound Navigator, as compared to competition.

Test conditions:
Speech presented from the front (0 degrees) and speech-shaped noise presented from two back speakers (+/- 135 degrees)

Levels: 70 dB or 0 dB SNR
Sentence: "What can I have for dinner tonight, I do have some pasta in the fridge…"

Hearing aid fitting: Standard S2 audiogram (Bisgaard, N., Vlaming, M. S., & Dahlquist, M. (2010). Standard audiograms for the IEC 60118-15 measurement procedure. Trends in amplification, 14(2), 113-120.) modified to be slightly steeper, open domes, feedback path analyzer run

Oticon Opn S takes BrainHearing™ benefits to a new level

With Oticon Opn, Oticon set a new industry standard with 30% better speech understanding in noise, 20% reduced listening effort, and 20% improved memory recall (compared to Alta2 Pro).

Powered by the Velox S™ platform, Oticon Opn S takes these benefits even further.

- OpenSound Navigator gives continuous 360° access to all relevant sounds, including speech, even in challenging listening environments. Oticon Opn S comes with an upgraded version of this feature. A new Very High setting, that can be activated in Oticon Genie 2 software, offers users even more help in everyday listening situations.
- OpenSound Optimizer gives access to up to 30% more speech cues throughout the day. This is a result of consistent, stable amplification, unaffected by gain reductions due to the risk of feedback (Callaway 2019, Oticon Whitepaper).

As a result, with Oticon Opn S speech understanding is improved with an additional **15%** (Figure 8), objective listening effort is reduced **10%** further (Figure 9a and 9b), and memory recall is improved with an additional **10%** (not shown). The reduced load on the brain supports communication since less effort for listening, processing and retaining in memory leaves more capacity to respond and engage (Juul Jensen 2019, Oticon Whitepaper). In fact, with Oticon Opn S, Oticon closes another gap to normal hearing by delivering speech understanding on par with normal hearing in noisy environments (Juul Jensen 2018, Oticon Whitepaper).

Improved speech understanding

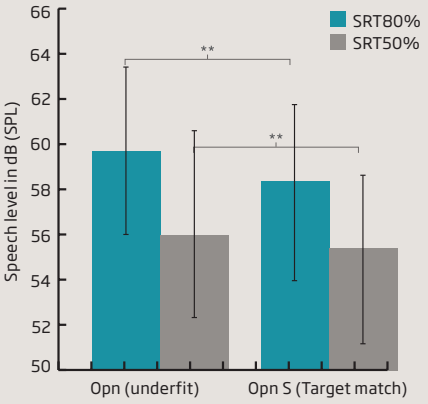

Figure 8

Reduced listening effort

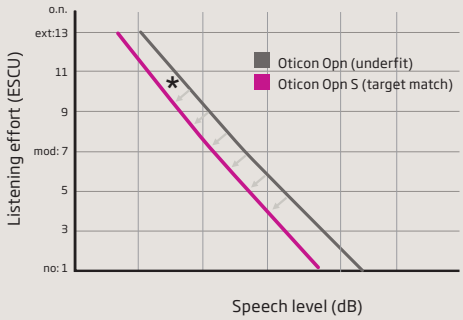

Figure 9a

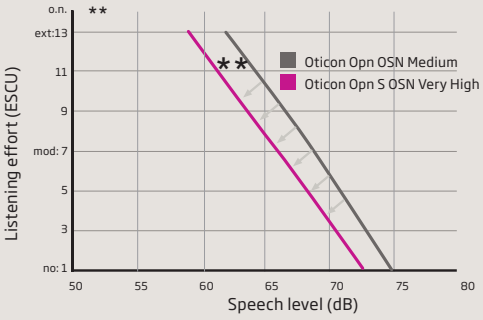

Figure 9b

Oticon Opn S – significant benefits for all:

- 96% of users prefer new Oticon Opn S over Oticon Opn. Speech intelligibility and sound quality were the main reasons
- Traditional hearing aids are continuously challenged by the dynamic environments of everyday life, reducing gain by 3-10 dB and/or by having poorer sound quality - up to 50% of the time over the course of a day
- OpenSound Optimizer provides 6dB more gain, with the option to manually provide an additional 4 dB. This greater head-room enables the preservation of gain and sound quality to a much higher degree in both static and dynamic environments
- OpenSound Optimizer improves the functionality of key features such as OpenSound Navigator and Speech Guard LX for a higher overall signal integrity
- OpenSound Optimizer gives the hearing care professional a whole new level of fitting freedom. Those users who have previously been underfit, now have access to gain they didn't have before, in an open fitting, with no risk of feedback
- Compared to Oticon Opn, Opn S improves speech understanding with an additional 15%, objective listening effort is reduced 10% further, and memory recall is improved with an additional 10%
- Oticon Opn S delivers speech understanding on par with normal hearing in noisy environments

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