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Oticon Intent:
Audiological Innovations

Virginia Ramachandran, AuD, PhD
Head of Audiology, Oticon, Inc.

oticon
life-changing technology

Virginia Ramachandran, AuD, PhD
Head of Audiology, Oticon, Inc.
vira@Oticon.com

Speaker Disclosure

Relevant financial relationships:

- Employee of Oticon, Inc. and receives a salary
- Author & Associate Editor, Plural Publishing, Inc.

Non-financial relationships:

- Past-president American Academy of Audiology

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Learning Outcomes

1. After this course, participants will be able to describe the components of Oticon Intent's MoreSound Technology features
2. After this course, participants will be able to explain the patient benefits of applying the Audible Contrast Threshold to programming of MoreSound 3.0 in Oticon Intent.
3. After this course, participants will be able to explain the patient benefits via Oticon Intent.

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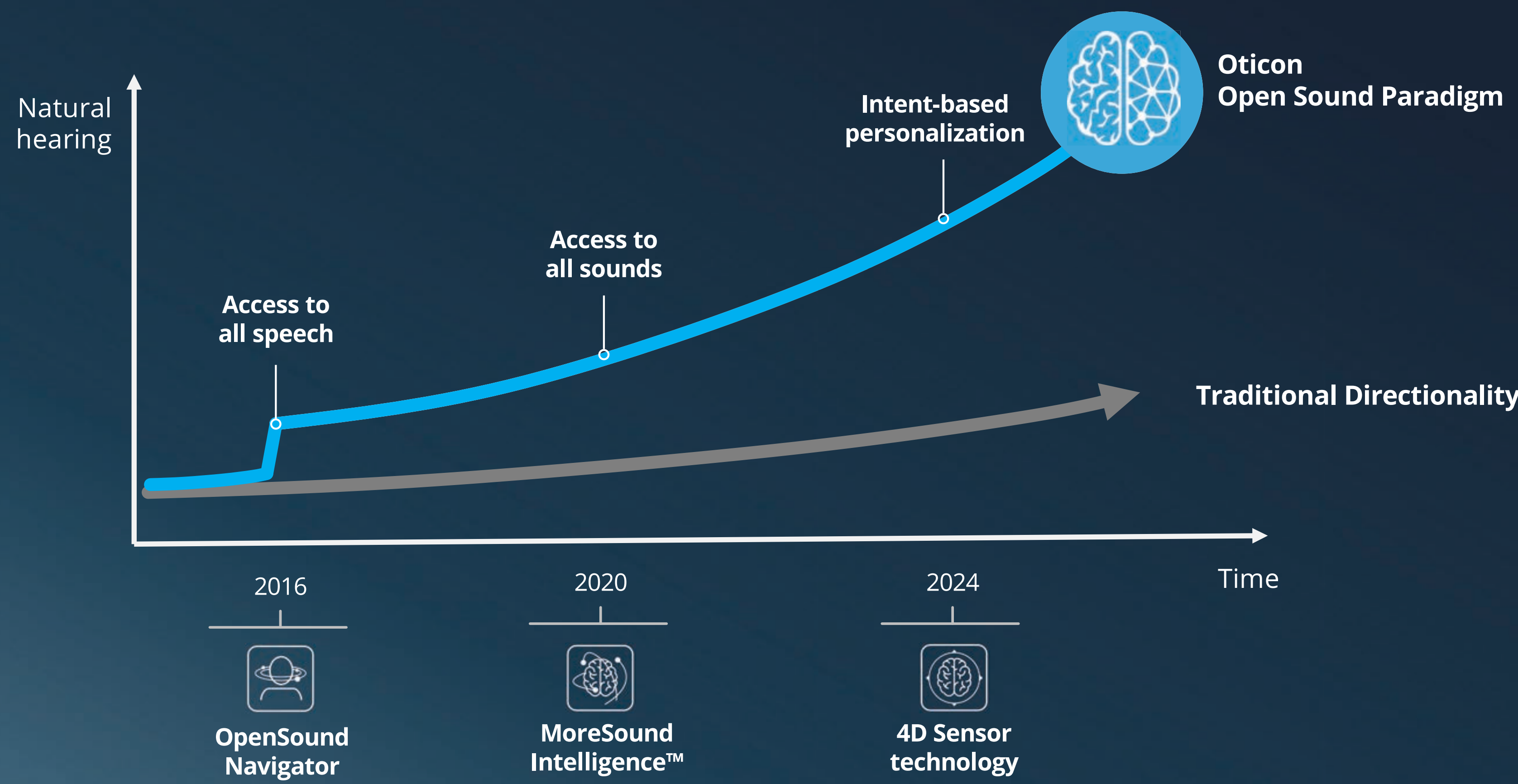
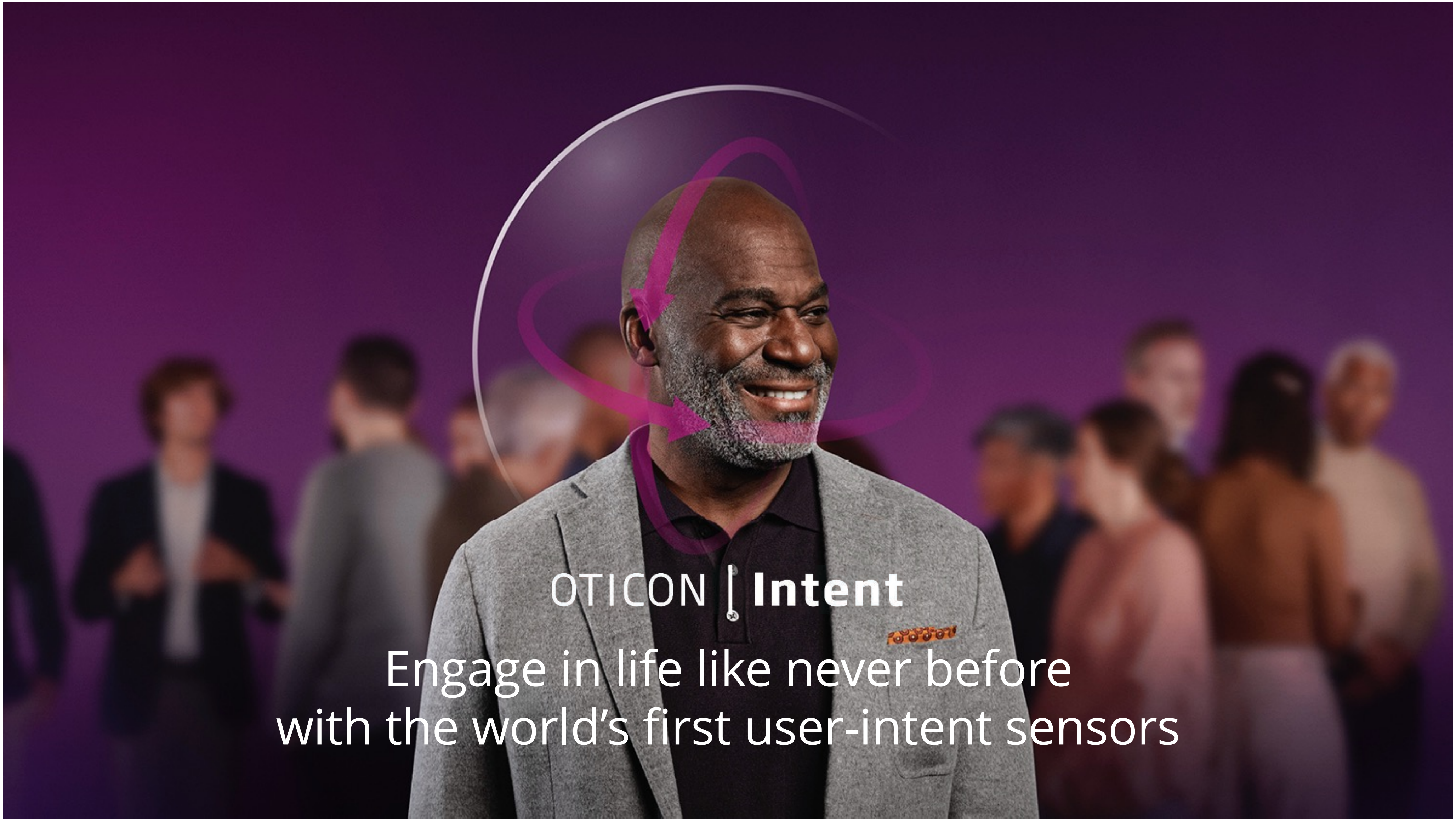
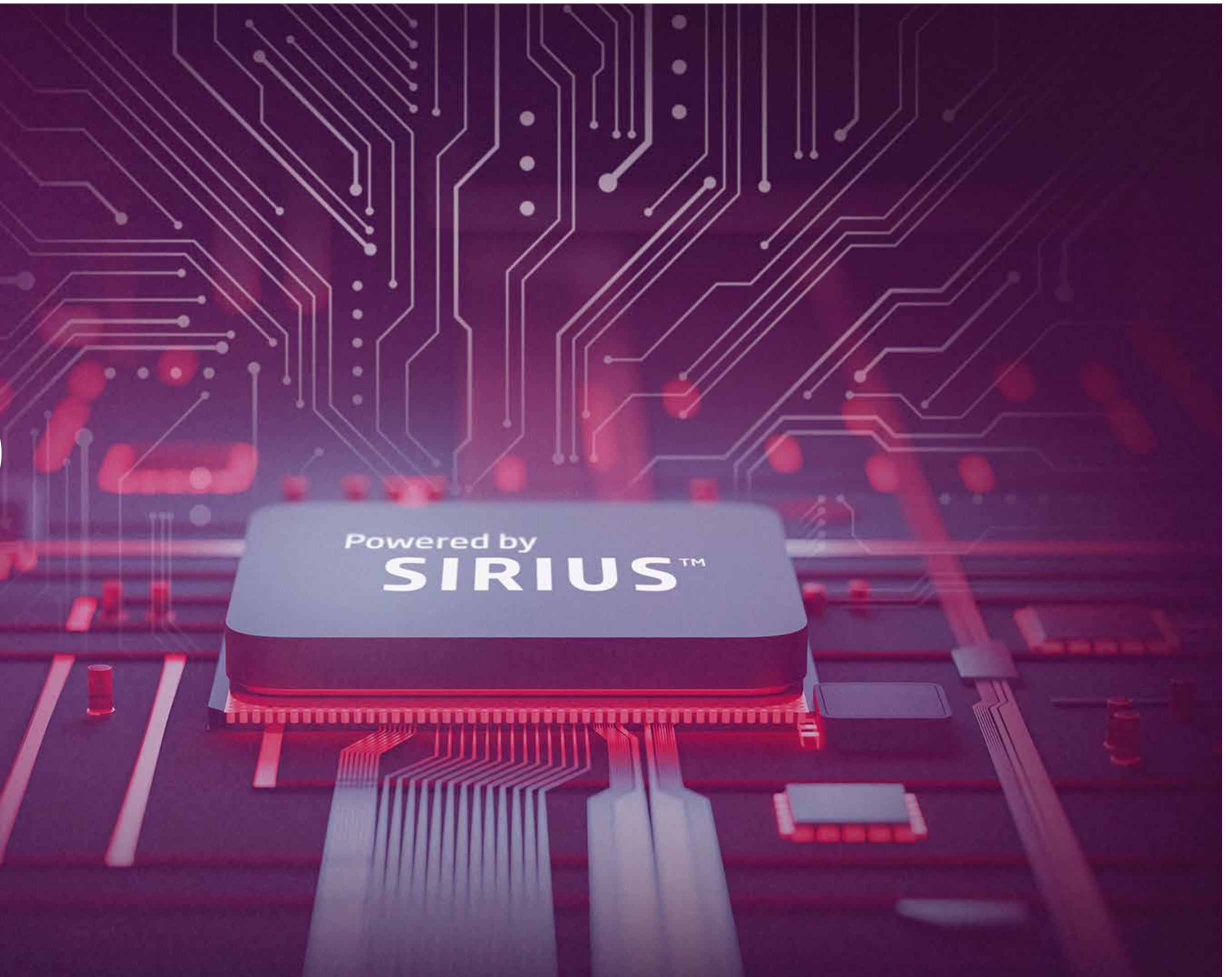
BrainHearing™ Innovations



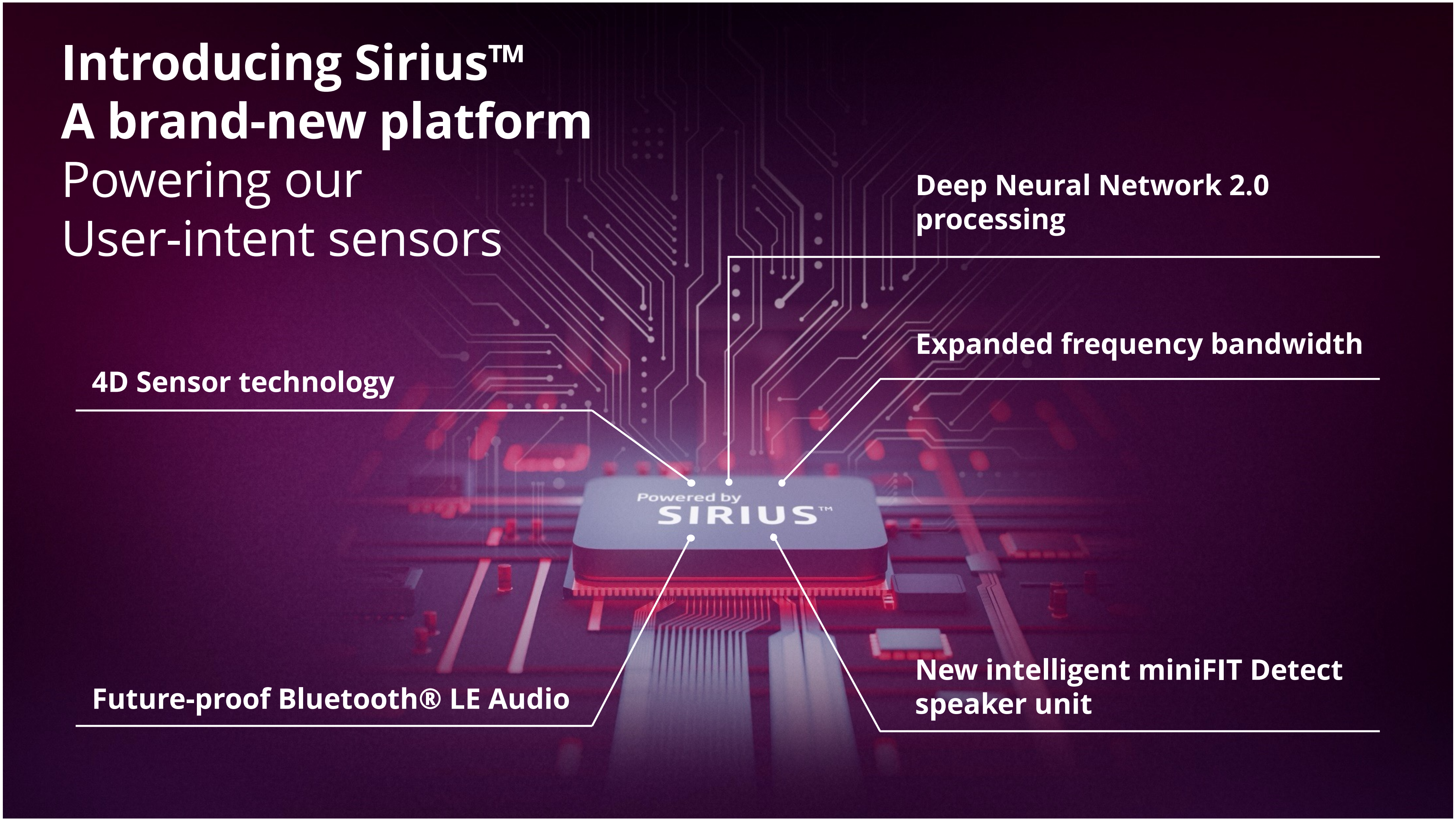

OTICON | Intent
Engage in life like never before
with the world's first user-intent sensors

MoreSound Intelligence™ 3.0



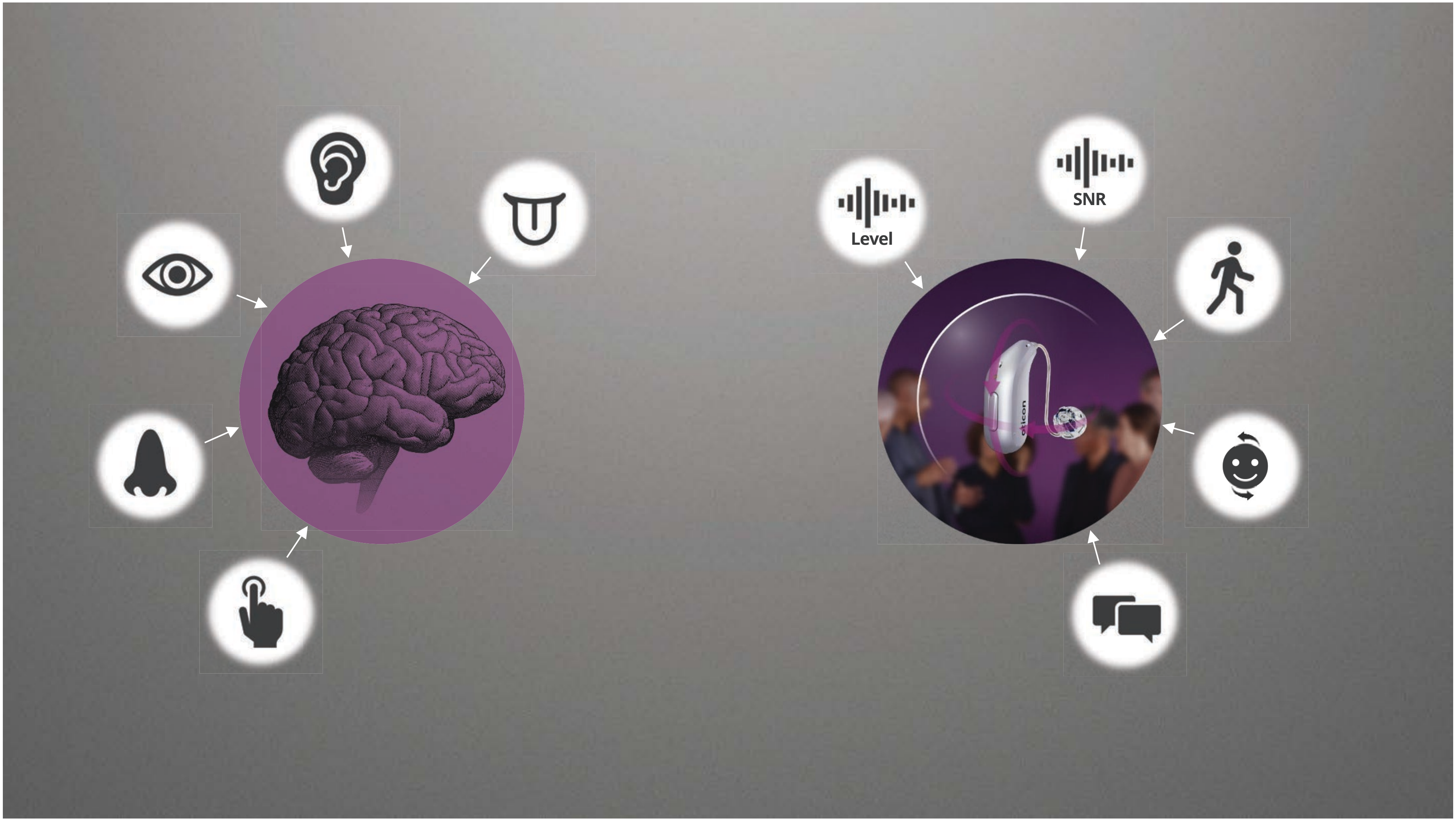
Sirius™ platform

oticon
life-changing technology


Introducing Sirius™
A brand-new platform
Powering our
User-intent sensors
Deep Neural Network 2.0 processing
Expanded frequency bandwidth
4D Sensor technology
Powered by
SIRIUS™
Future-proof Bluetooth® LE Audio
New intelligent miniFIT Detect speaker unit


Users have different needs
In the same sound environment
Valentina
James
Dave


Steps for successful communication
Listening
2
Comprehension
3
Hearing
1
4
Communication
Adapted from Kiessling et al., 2003



SNR
Level
oticon

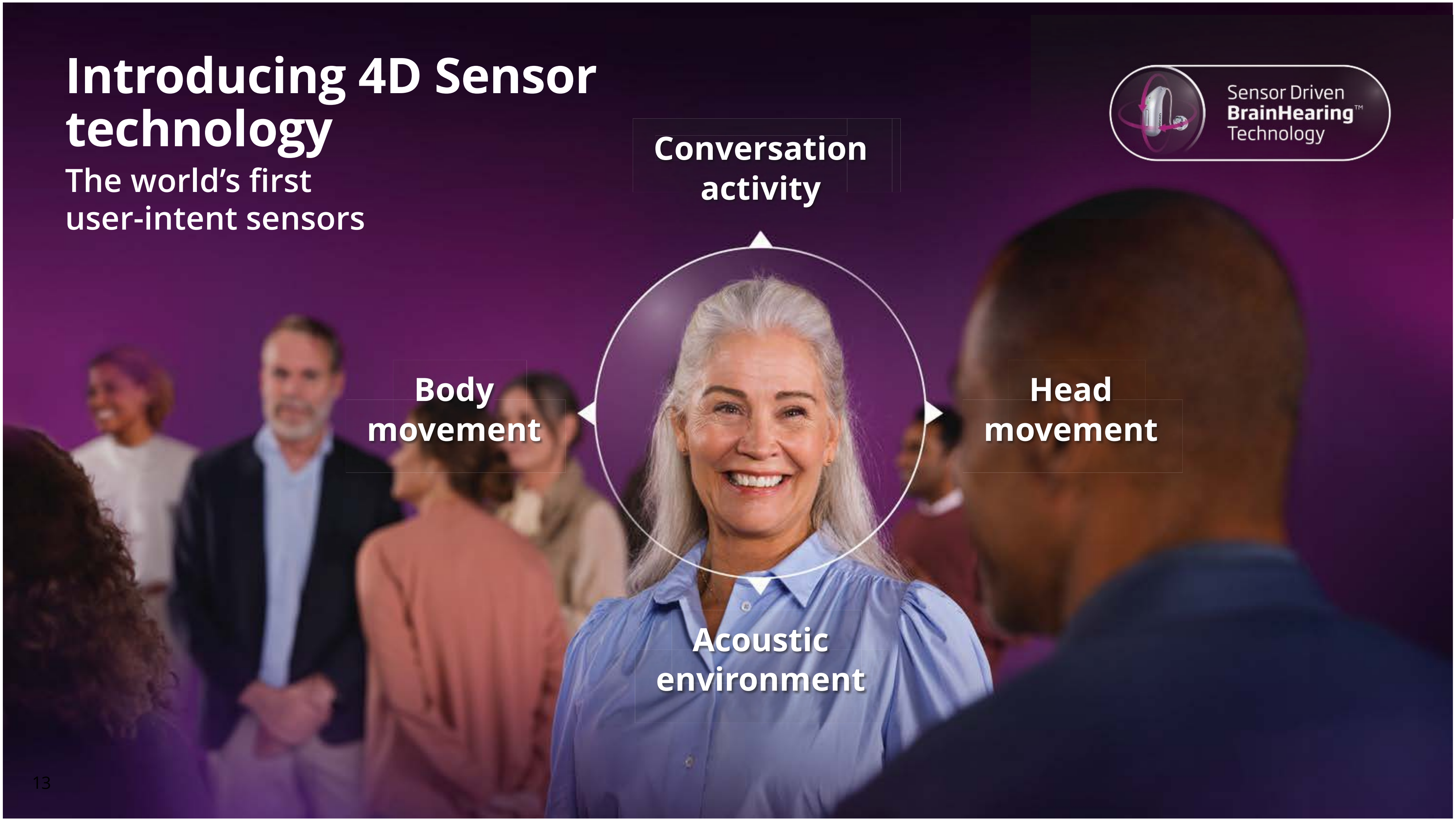
Capturing listening intentions

Head and body movements are key features for understanding communication intent

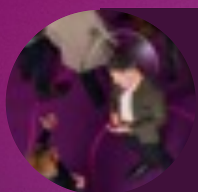
We tend to orient our head and body towards the person talking to us

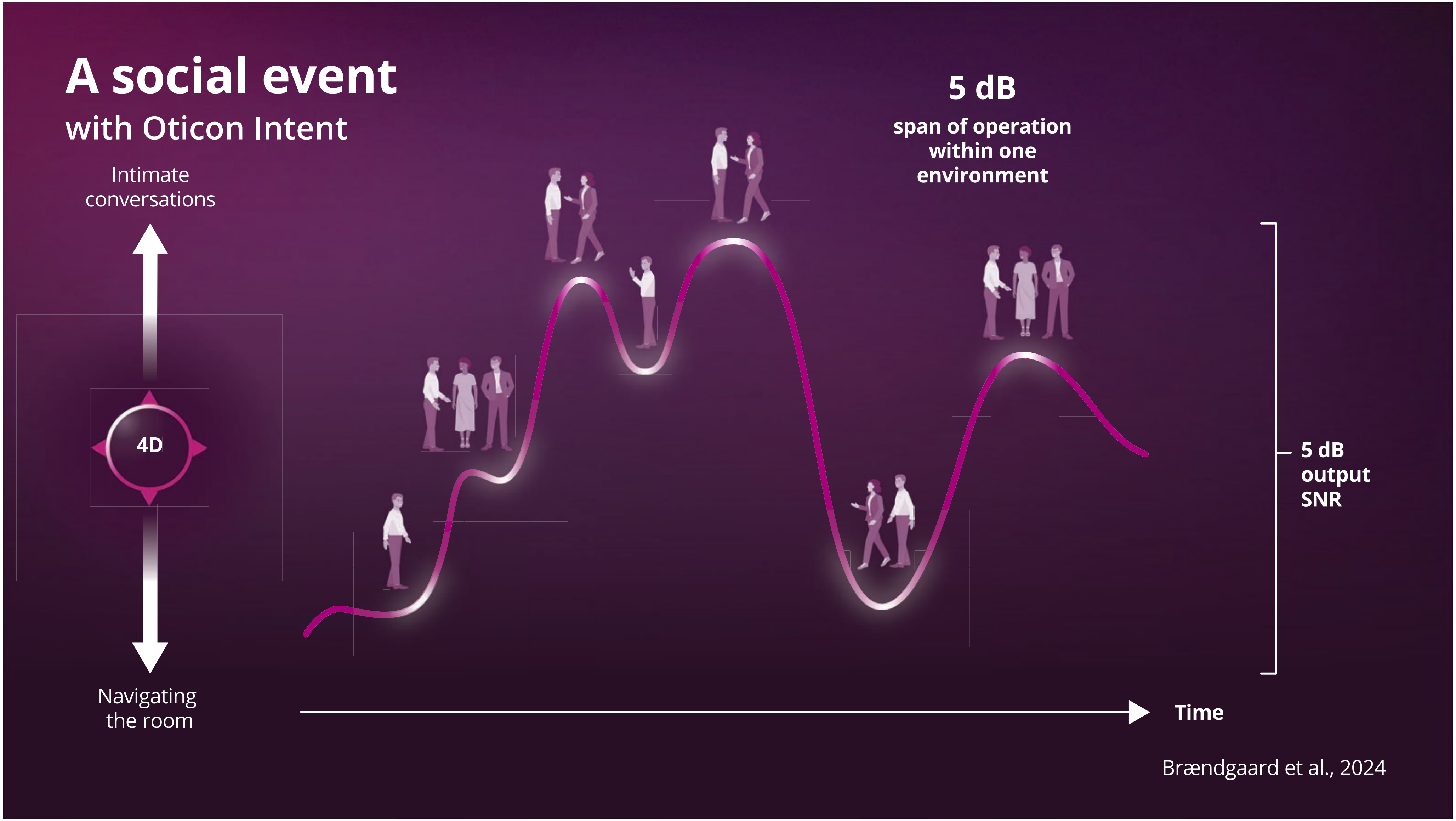
As complexity increases, we may lean forward, move closer, or turn our head slightly

In a group conversation, we tend to move our heads more


Introducing 4D Sensor technology
The world's first user-intent sensors
Conversation activity
Body movement
Head movement
Acoustic environment
Sensor Driven BrainHearing™ Technology

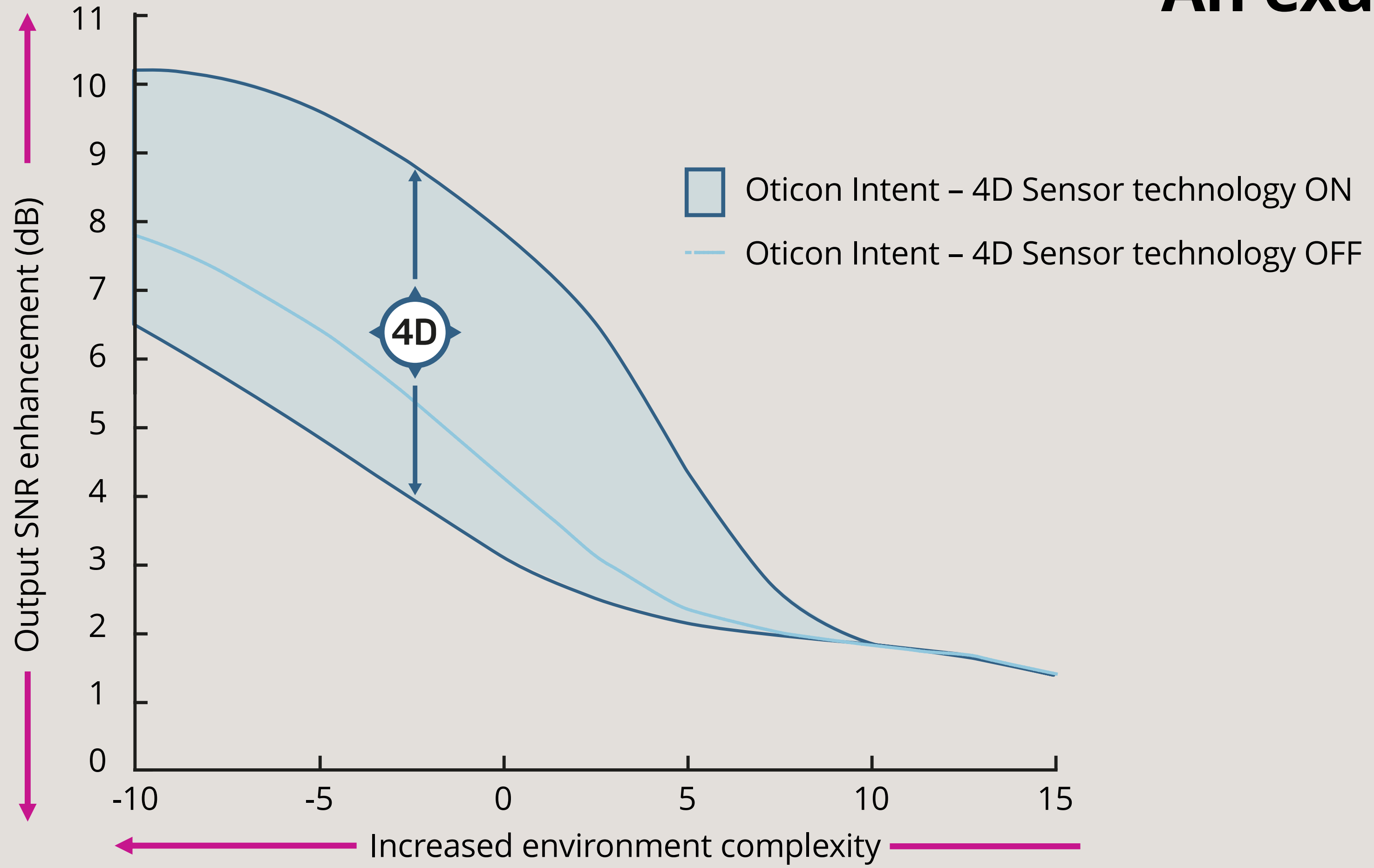
Capturing listening needs with 4D Sensor technology

Listening need	User behavior	Support needed
 **High conversation engagement**	**No/very little** head movements	**High clarity improvement** in complex environments
 **Monitoring**	Head movements	**Speech clarity and awareness** of surroundings
 **High awareness**	**Walking** / **running**	**Heightened** awareness of surroundings



A social event
with Oticon Intent
Intimate conversations
4D
Navigating the room
5 dB
span of operation within one environment
5 dB output SNR
Time
Brændgaard et al., 2024

An example



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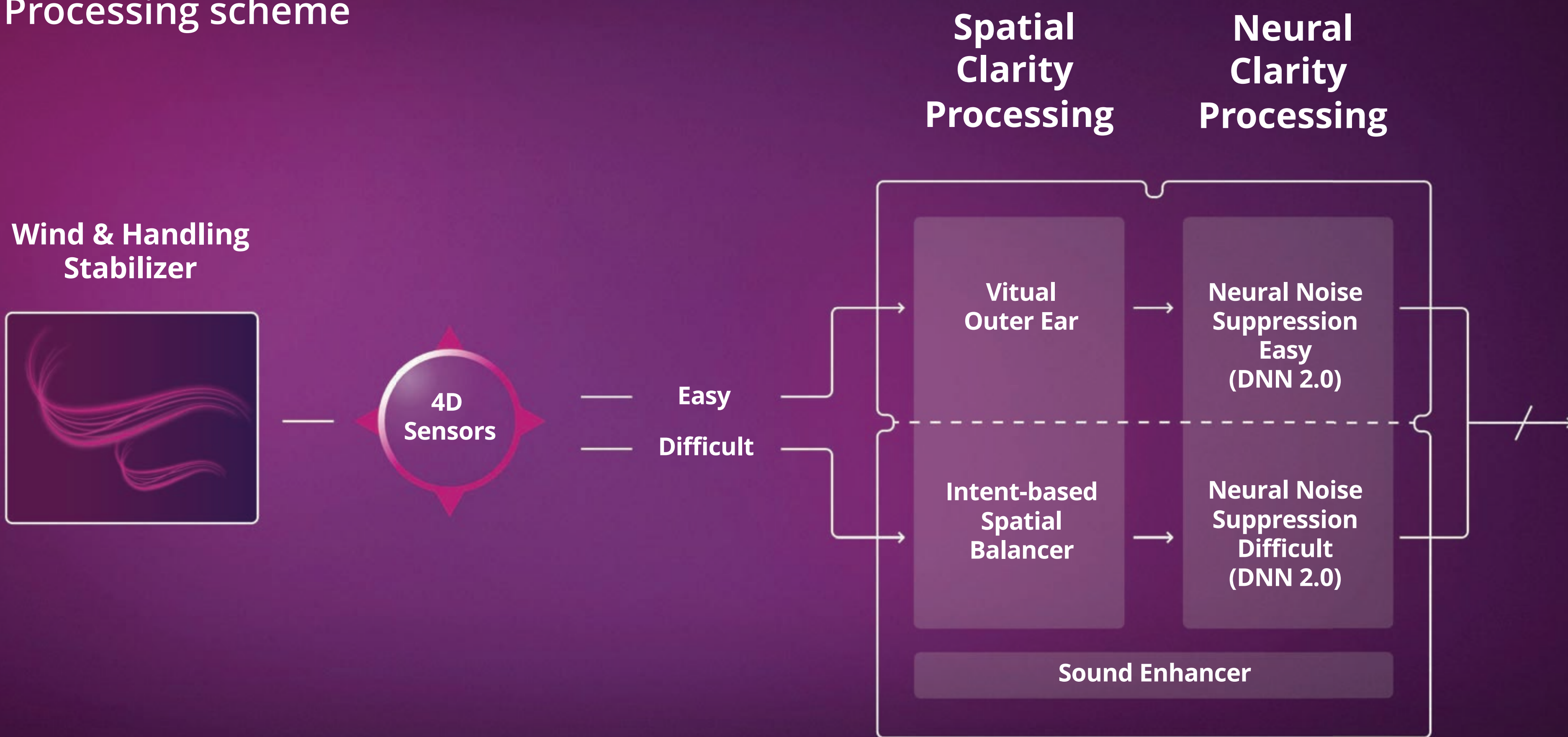
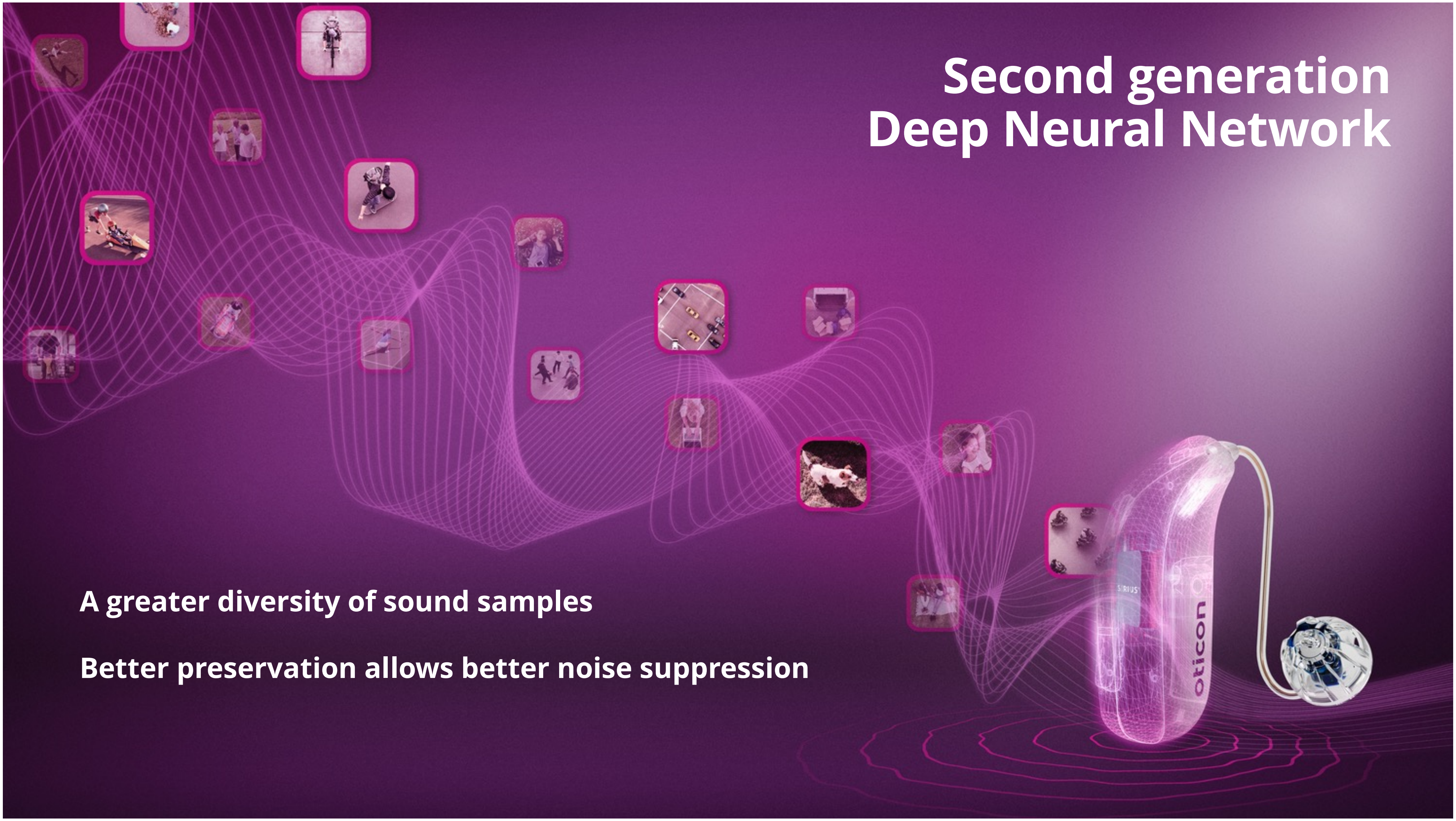
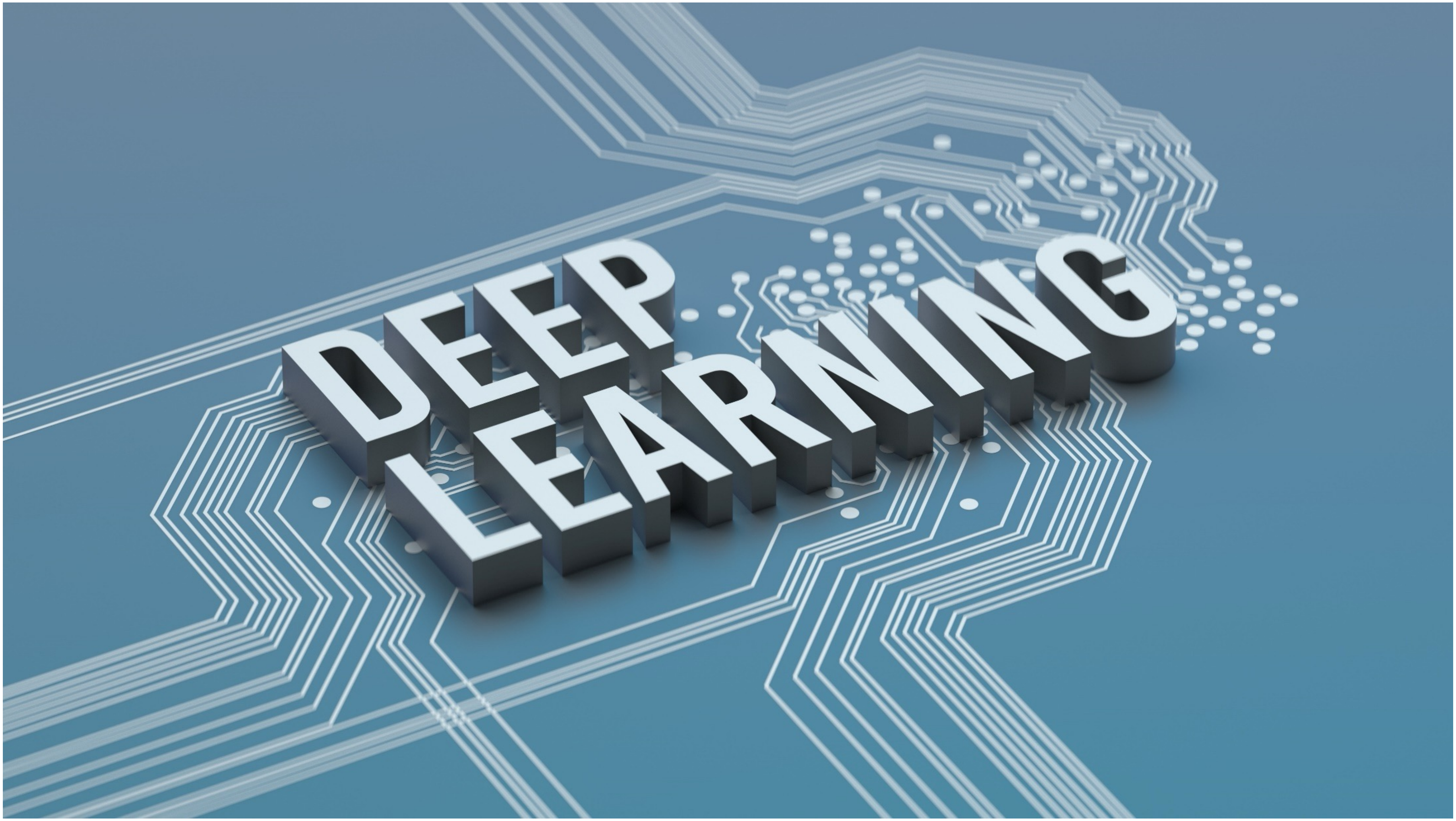
MoreSound Intelligence 3.0

Processing scheme





Second generation
Deep Neural Network
A greater diversity of sound samples
Better preservation allows better noise suppression
oticon


DEEP
LEARNING

Noisy
Sound

\+

Target
Sound

= Speech in Noise

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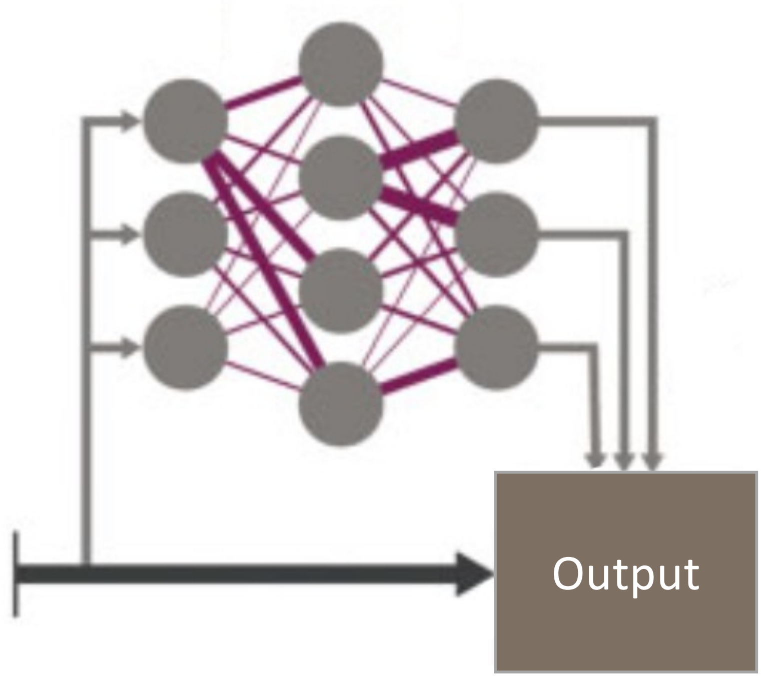
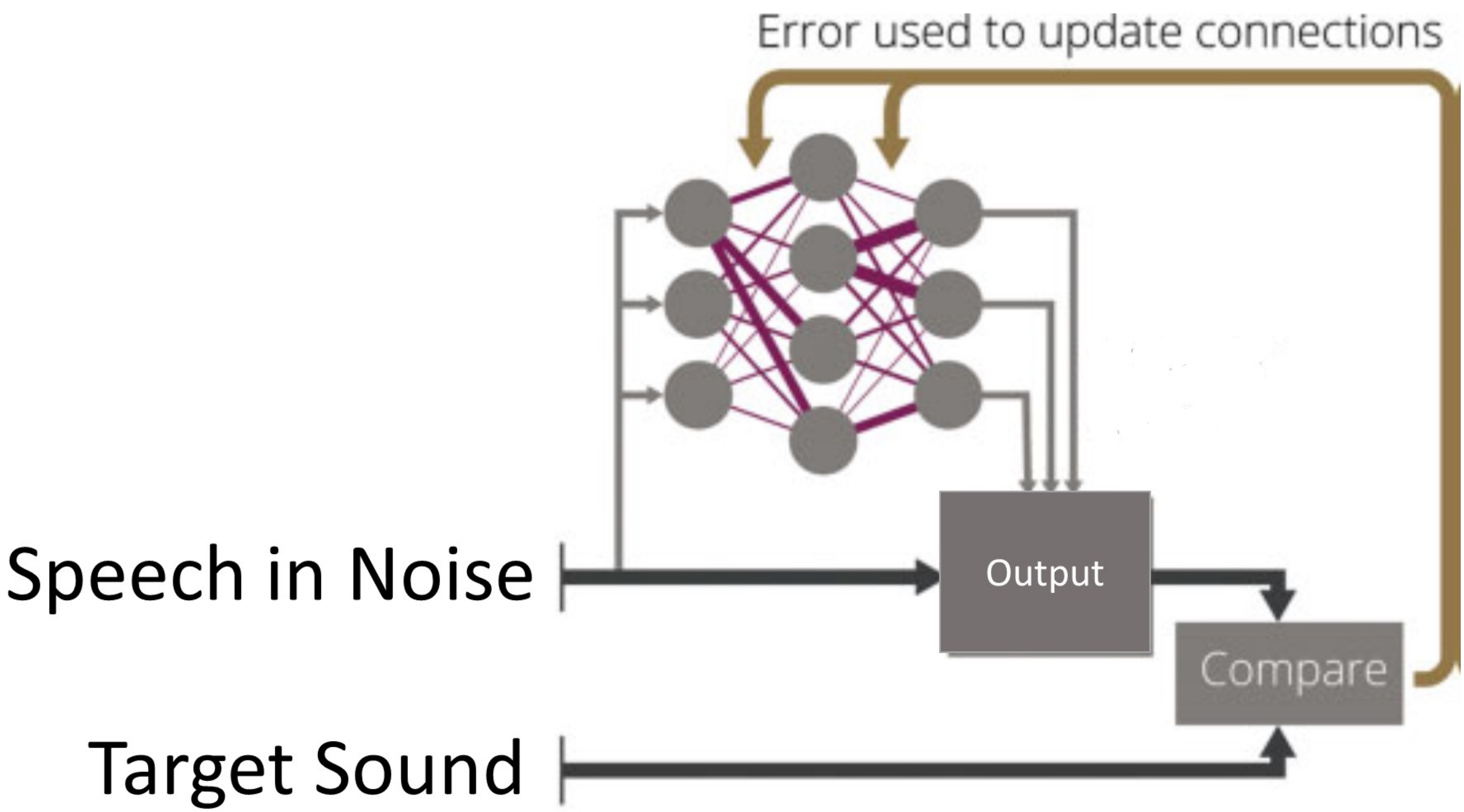
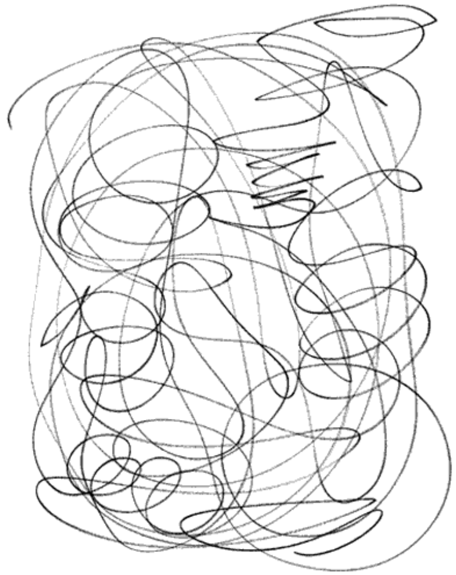
Speech in Noise

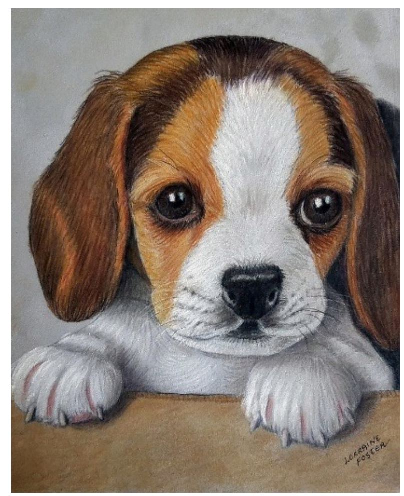


oticon

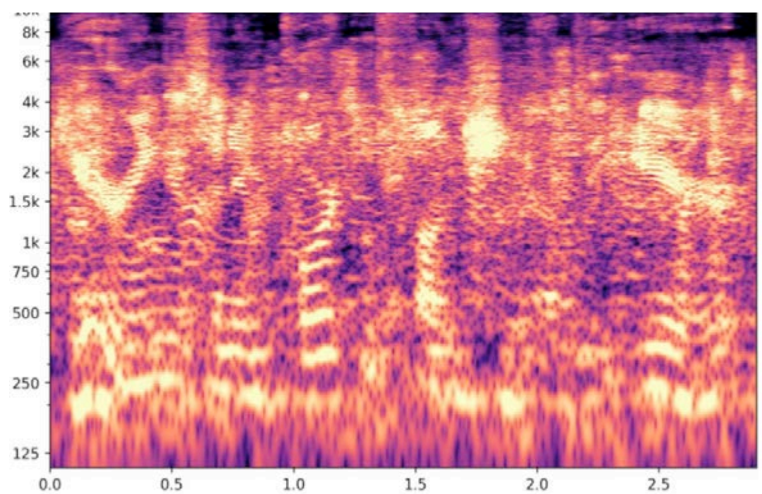

Error used to update connections
Speech in Noise
Output
Compare
Target Sound

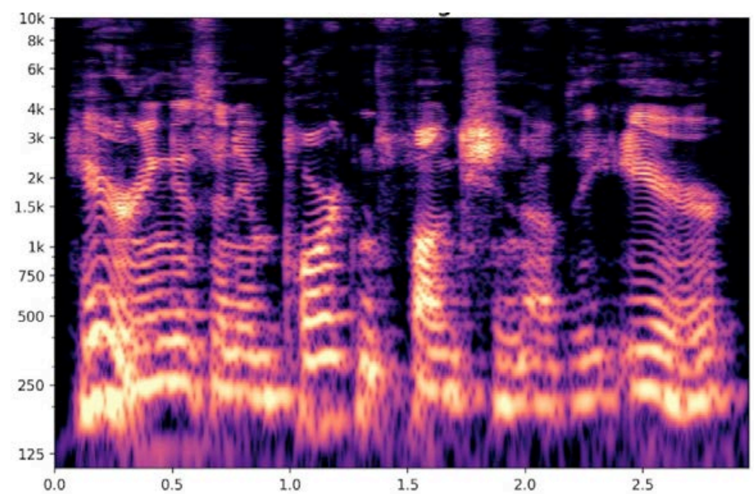
oticon



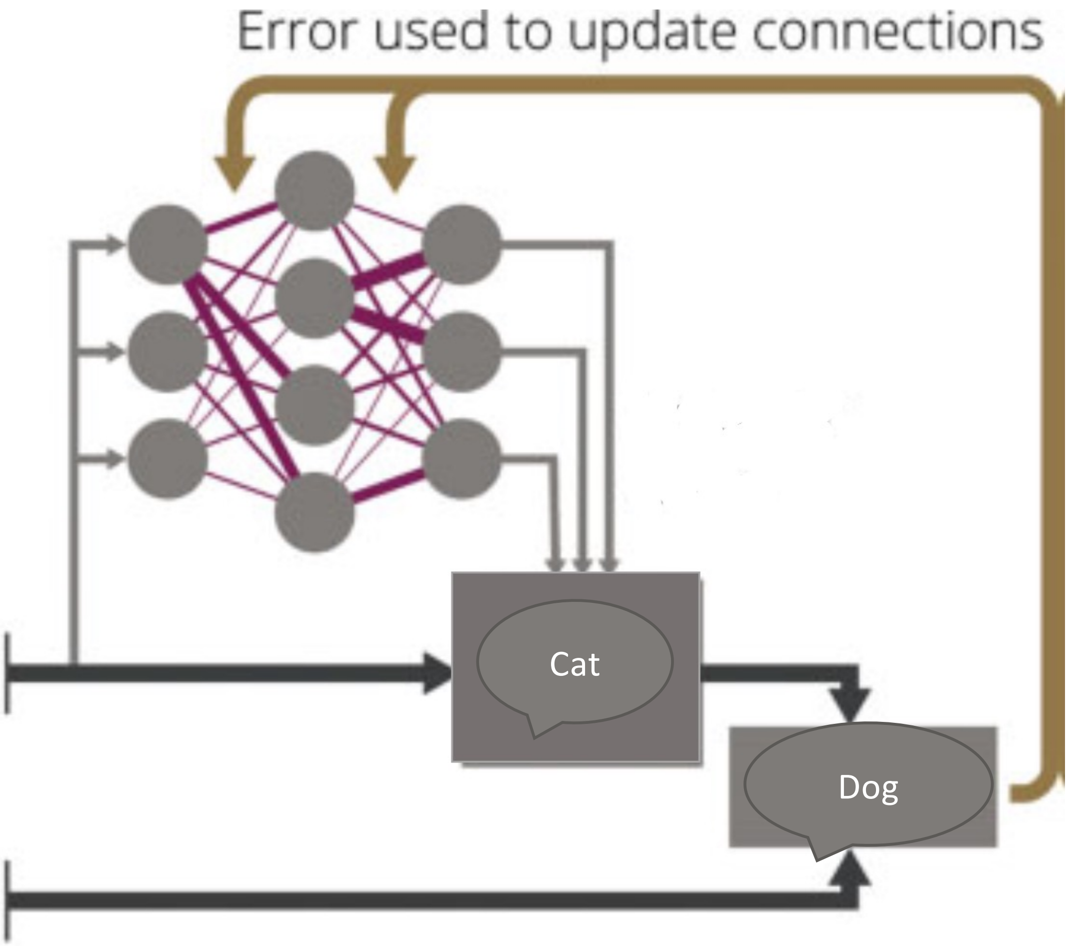


oticon

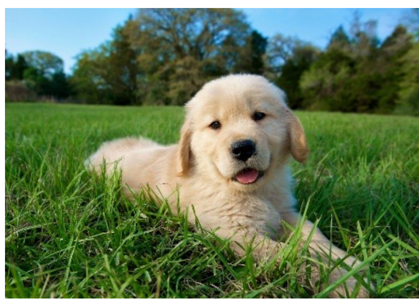

8k
6k
4k
3k
2k
1.5k
1k
750
500
250
125
0.0
0.5
1.0
1.5
2.0
2.5

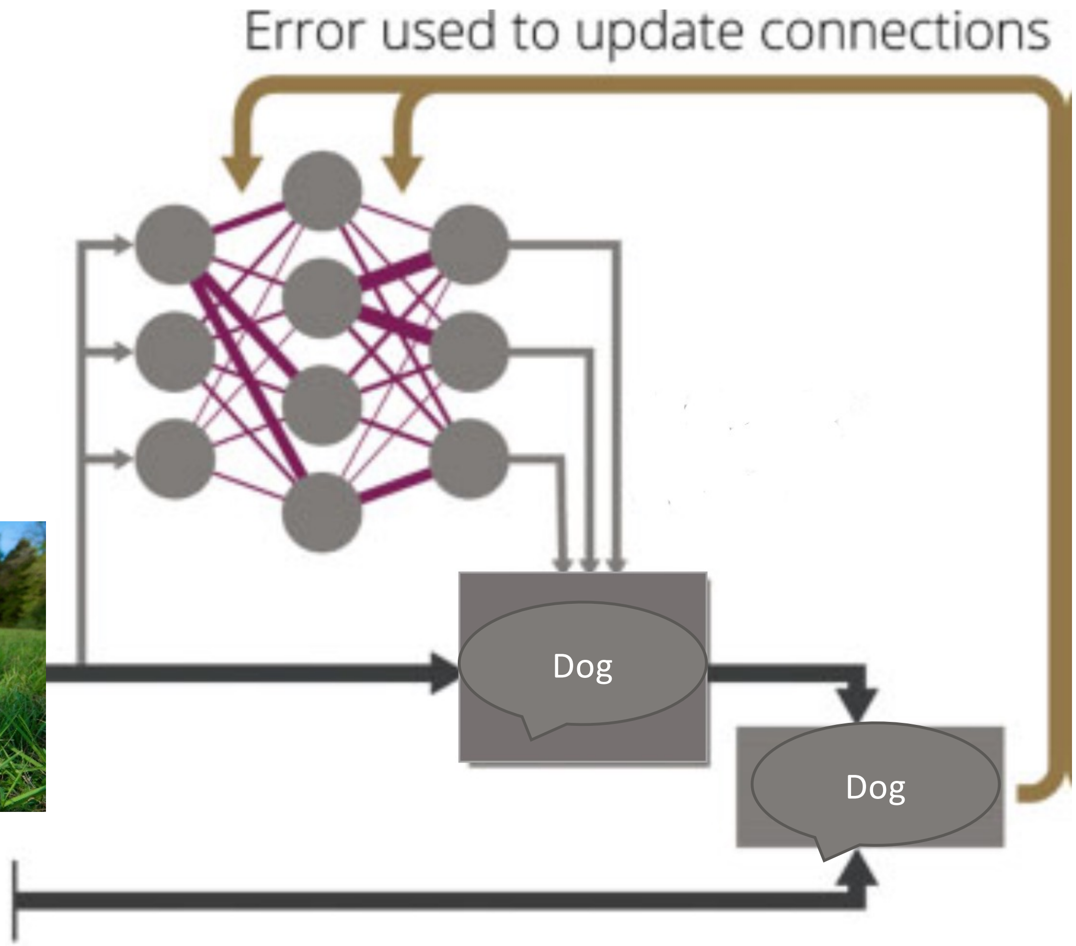

10k
8k
6k
4k
3k
2k
1.5k
1k
750
500
250
125
0.0
0.5
1.0
1.5
2.0
2.5

ticon



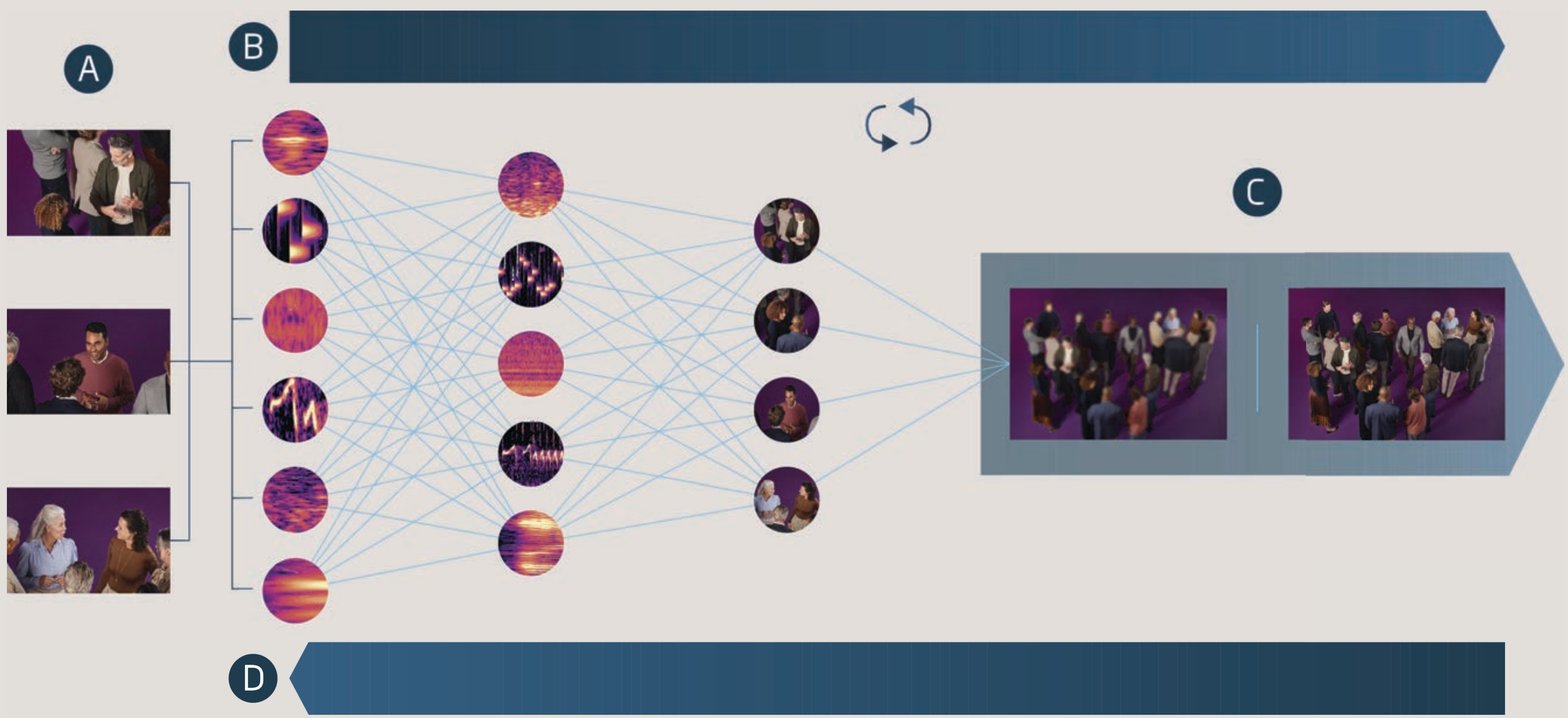
oticon




Error used to update connections
Dog
Dog

Training the Deep Neural Network

Behind the scenes



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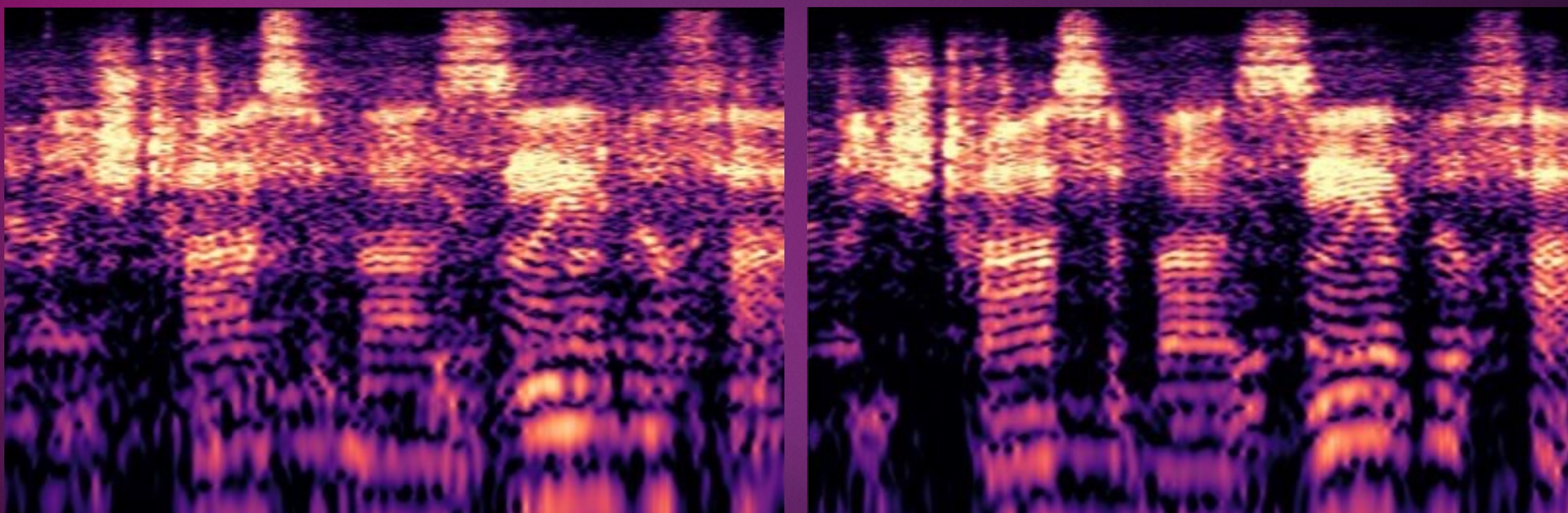
Oticon Real versus Oticon Intent

Difference in processing for intimate conversations



“The street was very busy"

precision medicine

“Most medical treatments are designed for the "average patient" as a one-size-fits-all-approach, which may be successful for some patients but not for others…The goal of precision medicine is to target the right treatments to the right patients at the right time.”

https://www.fda.gov/medical-devices/in-vitro-diagnostics/precision-medicine

Audible Contrast Threshold (ACT™)

A new standard in hearing care


Oticon BrainHearing™ Technology
Powered by POLARIS R™
The audiogram measures the **quantity** of hearing.
ACT measures the **quality** of hearing
Foundation for supporting the brain optimally

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Highlights of the ACT diagnostic test

Objective diagnostic evaluation of performance in noise

Quick to perform – approx. 2-3 minutes

Language independent

The test is performed using an **audiometer**

Above threshold and **true-to-life**

Personalized to each individual

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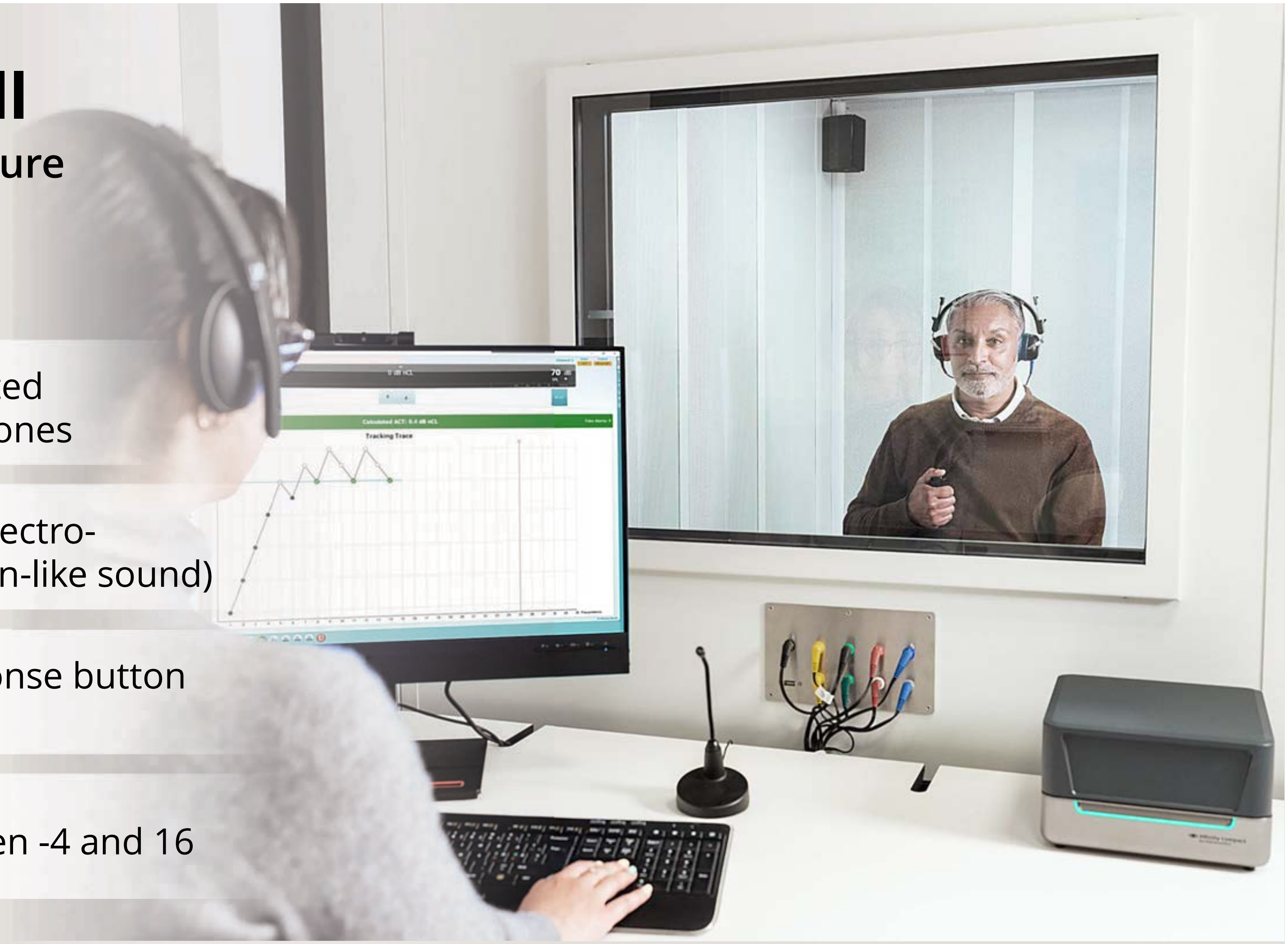
ACT in a nutshell

Basics of the ACT procedure



- Pink noise samples presented binaurally through headphones
- Some noise samples are spectro-temporally modulated (siren-like sound)
- Client must press the response button when the siren is heard
- The result is a value between -4 and 16

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Test stimulus

Binaurally presented

Background noise:

- Constant pink noise
- Level is based on hearing loss

Test stimulus:

- Spectro-temporally modulated noise
- Shaped based on audiogram

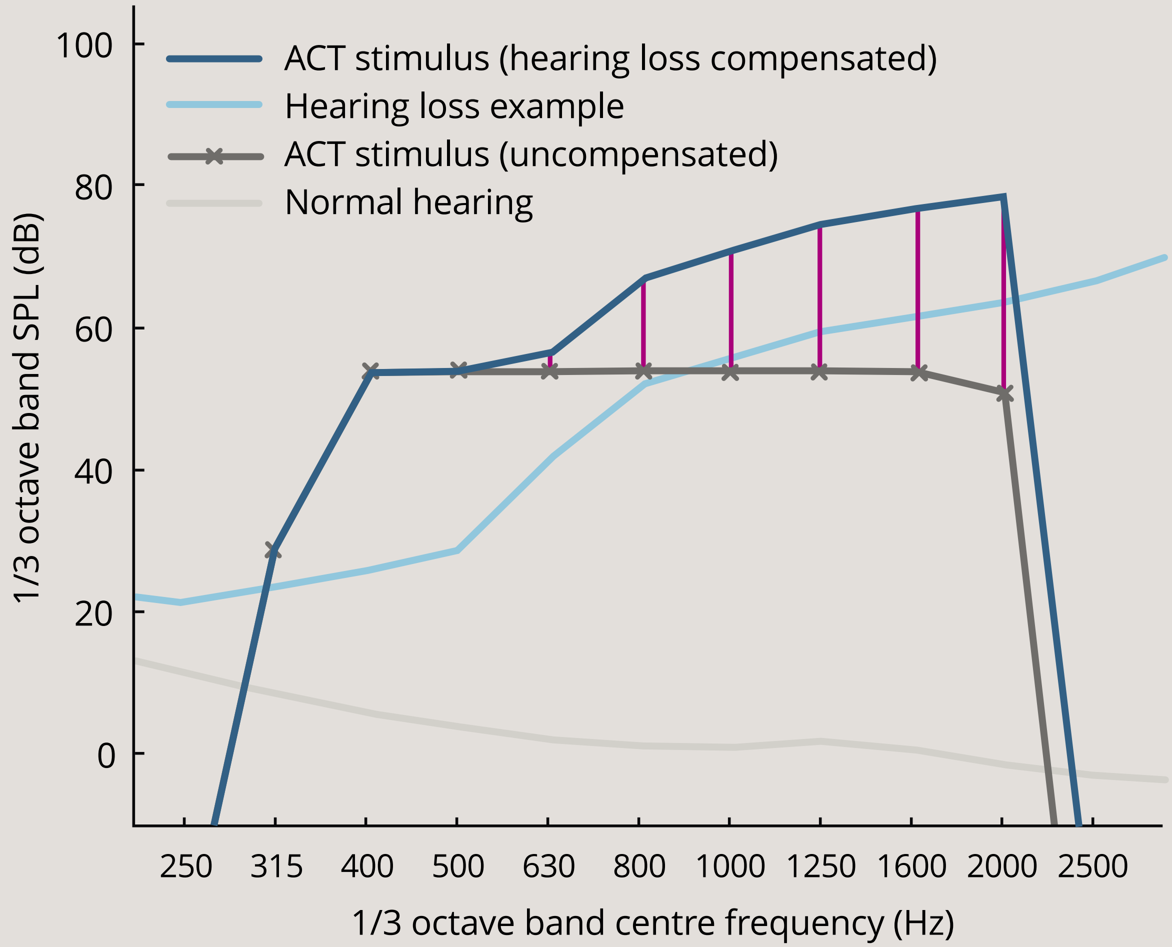
Compatibility

ACT™ currently is available for:

- Interacoustics Affinity Compact
- Interacoustics Callisto
- Grason-Stadler AudioStar Pro Version 2
- MedRx AVANT ARC, AVANT A2D+, AWRC, and AVANT (Stealth)

The test stimulus

Example



Santurette, S. & Laugesen, S. (2023)

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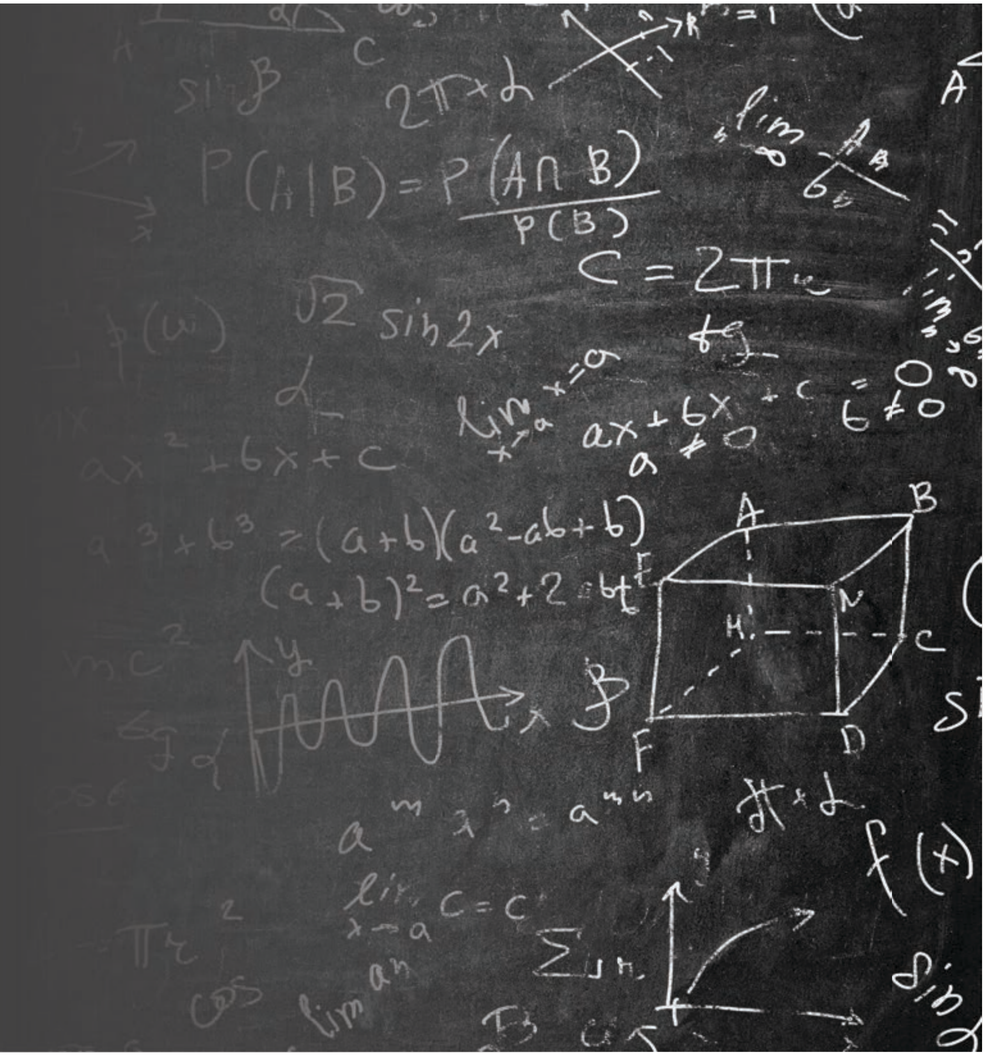
Normalised Contrast Level (dB nCL)

"Difference in modulation threshold compared to the threshold of young, normal hearing people (0 dB nCL)"



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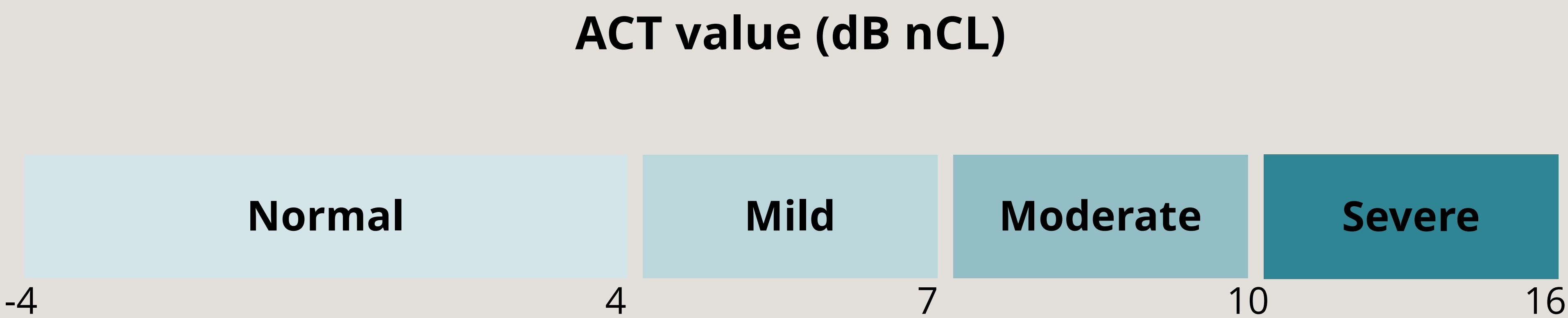
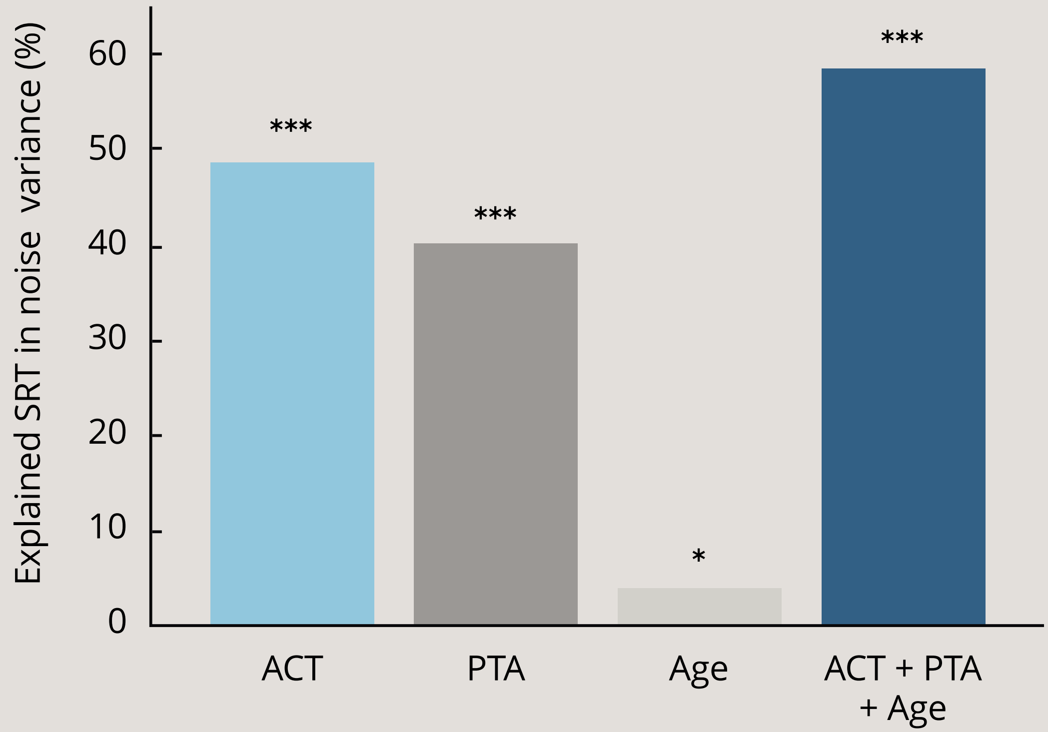
The ACT result

The ACT value



SRTs in noise explained by ACT, PTA, and age

The combination of ACT and PTA can predict a user's speech-in-noise ability **more precisely than PTA alone**



Santurette, S. & Laugesen, S. (2023)

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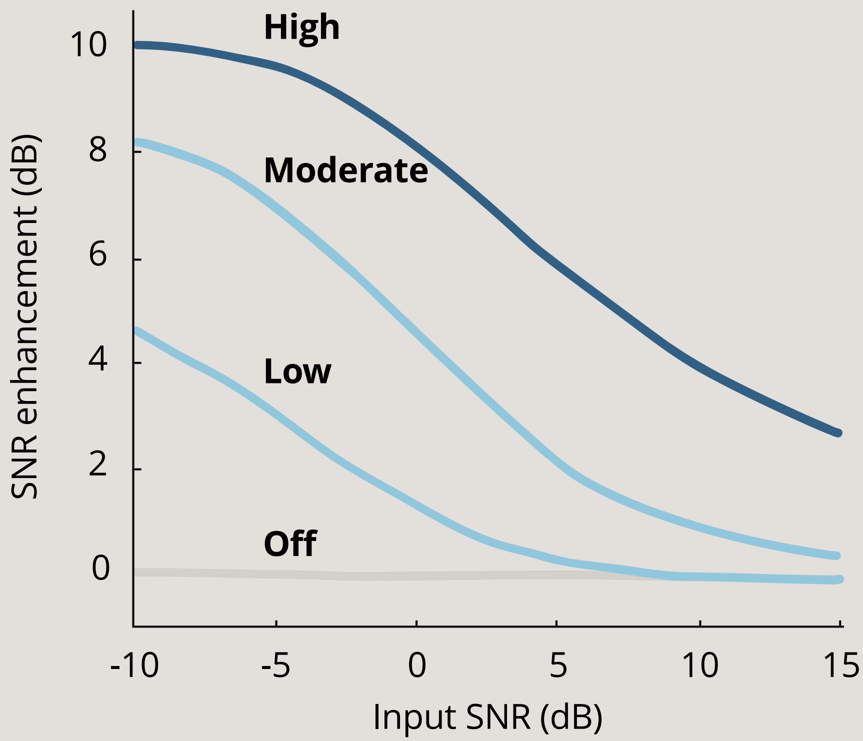
Verification of help levels



MoreSound Intelligence adapts the degree of processing progressively as the sound scene becomes more complex

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Verifying the prescription

Good speech-in-noise ability

Moderate speech-in-noise ability

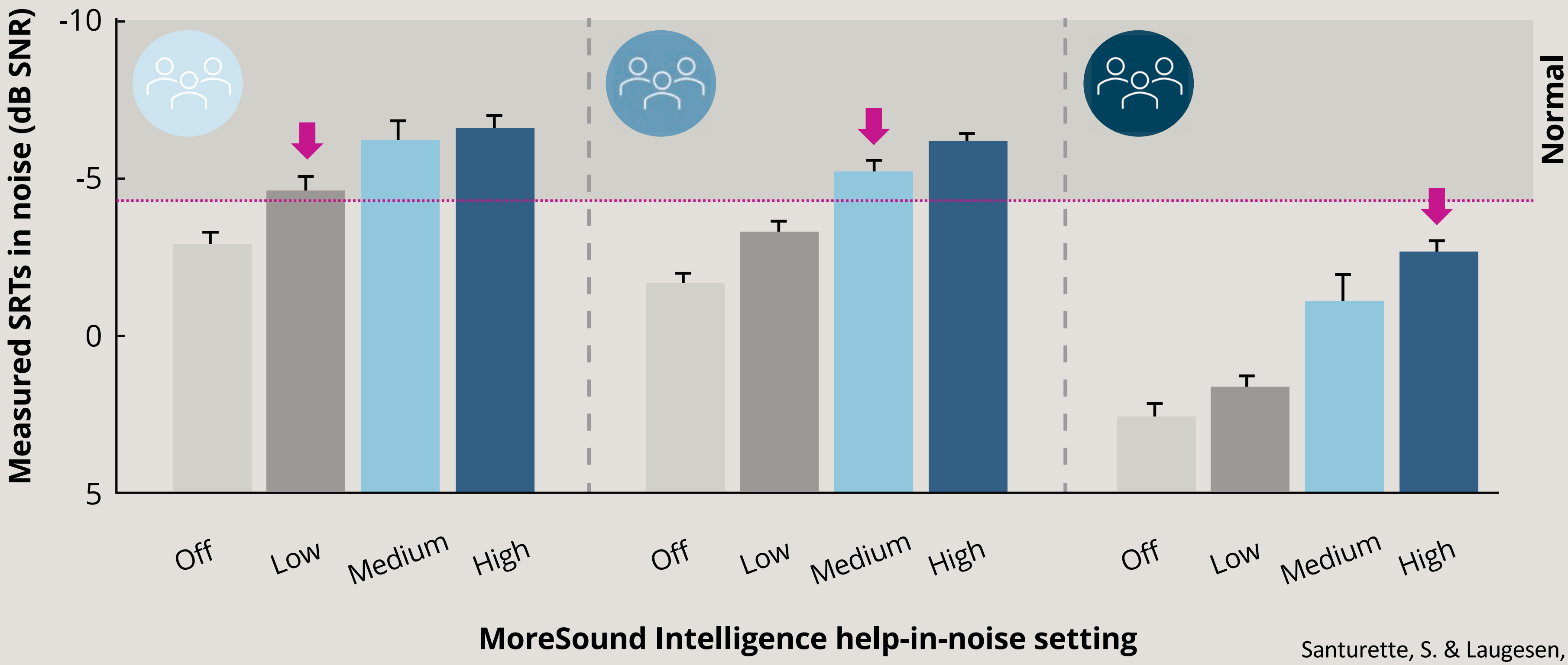
Poor speech-in-noise ability

Comparison of how the SRTs in noise changed when measured with 4 different help levels

Santurette, S. & Laugesen, S. (2023)

SRTs in noise of three user groups

Four MoreSound Intelligence help levels



Santurette, S. & Laugesen, S. (2023)

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Summary

ACT goes beyond the audiogram: quantifies a person's **ability to hear in noise**

ACT is **objective, language independent** and **quick**

ACT can be used to provide a **better hearing aid fitting as well as counselling**

Oticon Intent™ clinical evidence

BrainHearing™ benefits of the 4D Sensor technology

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life-changing technology

The research

Documenting the benefits of Oticon Intent

Technical study:
Adaptation support with Oticon Intent

Clinical study 1:
Listening intentions in the brain

Clinical study 2:
Speech comprehension

Clinical study 3:
Speech understanding

Technical study: Adaptation support with Oticon Intent

Background

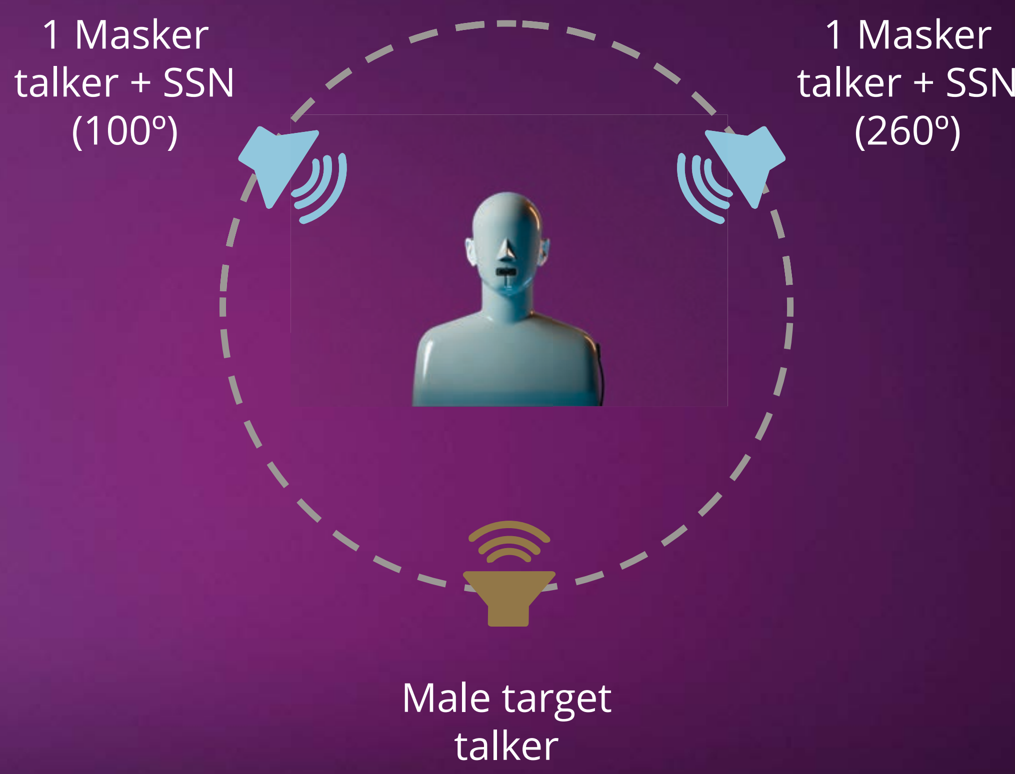
Technical evidence

Purpose:
To investigate the adaptation of support provided by Oticon Intent

Method

Test setup

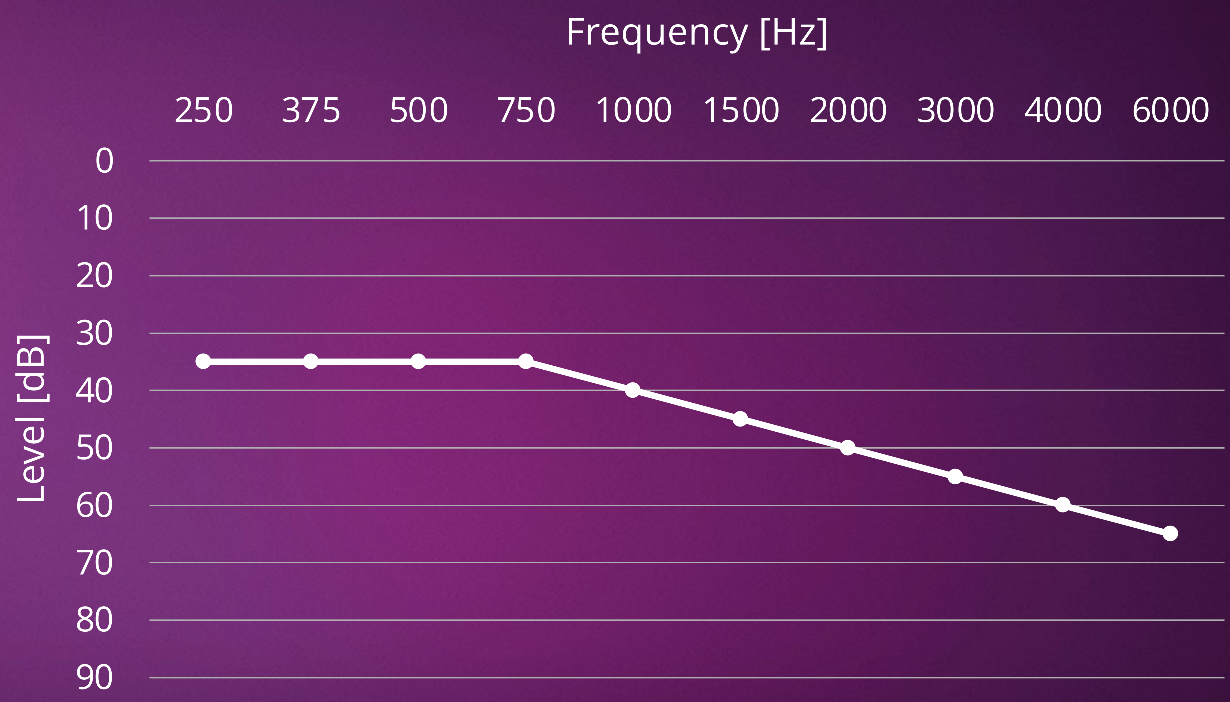
- Male talker from front at 65 dB SPL
- Masker talkers and steady-state noise at 100° and 260° (varying from 55 to 85 dB SPL)
- HATS in the middle (1.6 m from speakers)



Method

Hearing aid settings

- HATS with either Oticon Intent and Oticon Real
- Closed fitting
- Standard N3 hearing loss
- Linear amplification
- All features at default prescription



Metod

Areas of interest

Help in noise

Access to speech cues

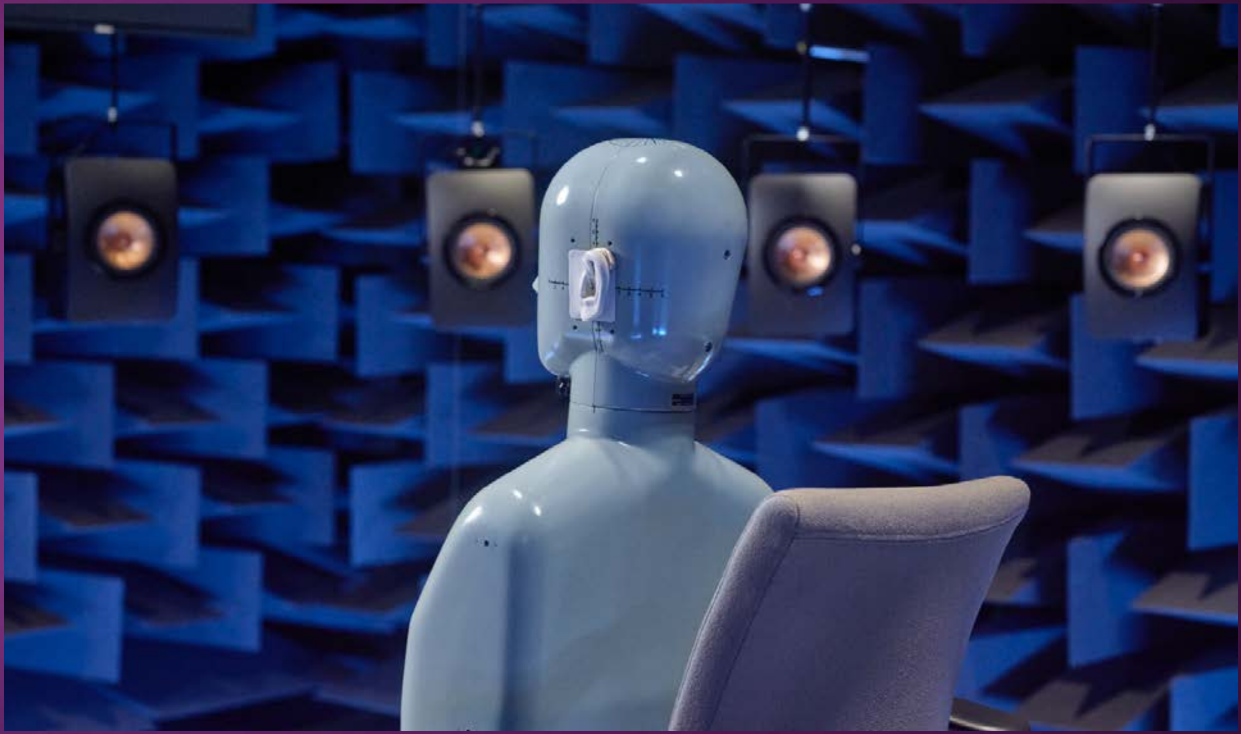
Method

Speech Intelligibility Index (SII)

Estimates the degree to which speech can be comprehended

Derived by comparing clarity of the speech, the background noise, and hearing ability

A higher SII indicates a greater chance of comprehension



Method

Test conditions

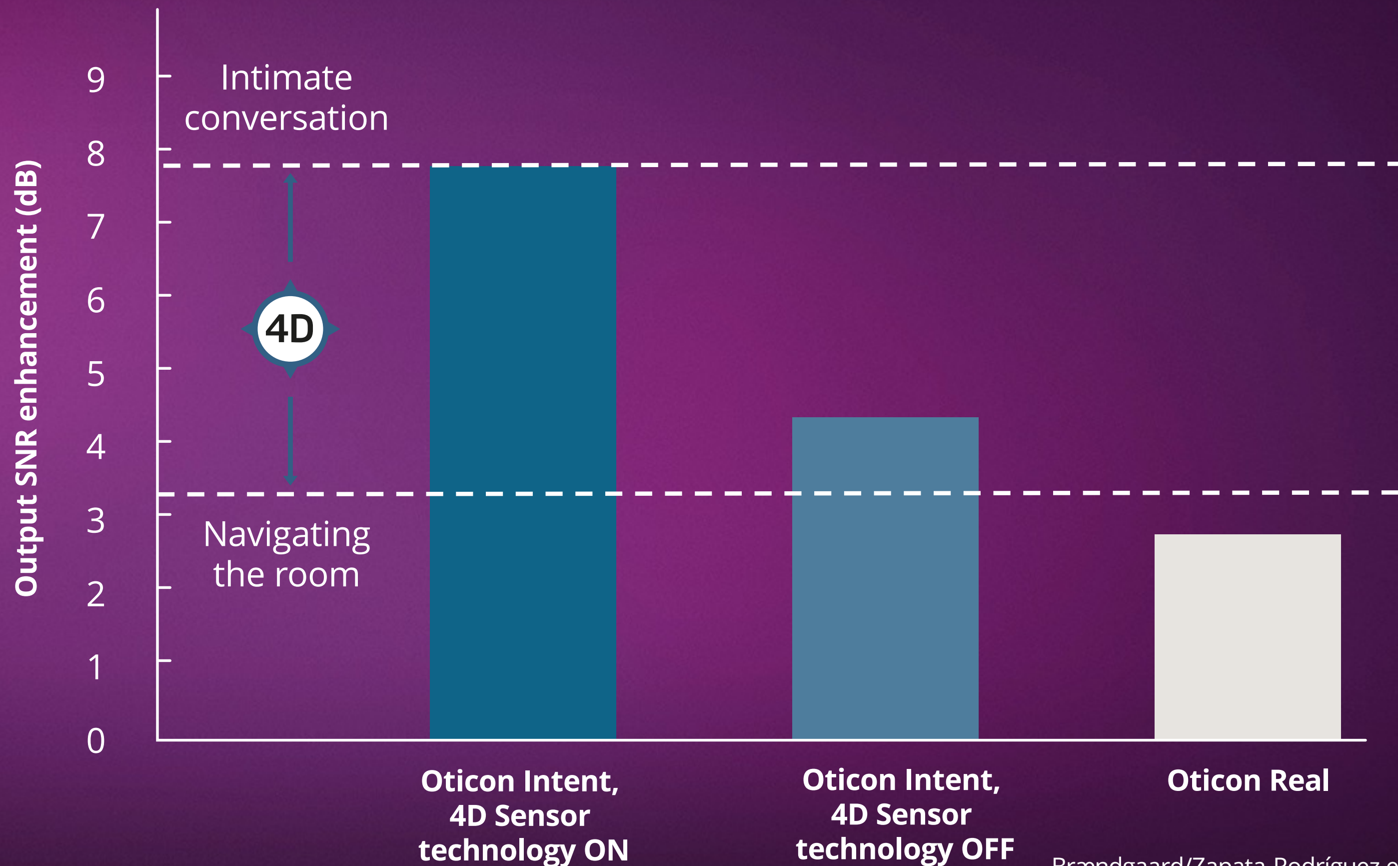
4D Sensor technology ON

4D Sensor technology OFF

Oticon Real

Results

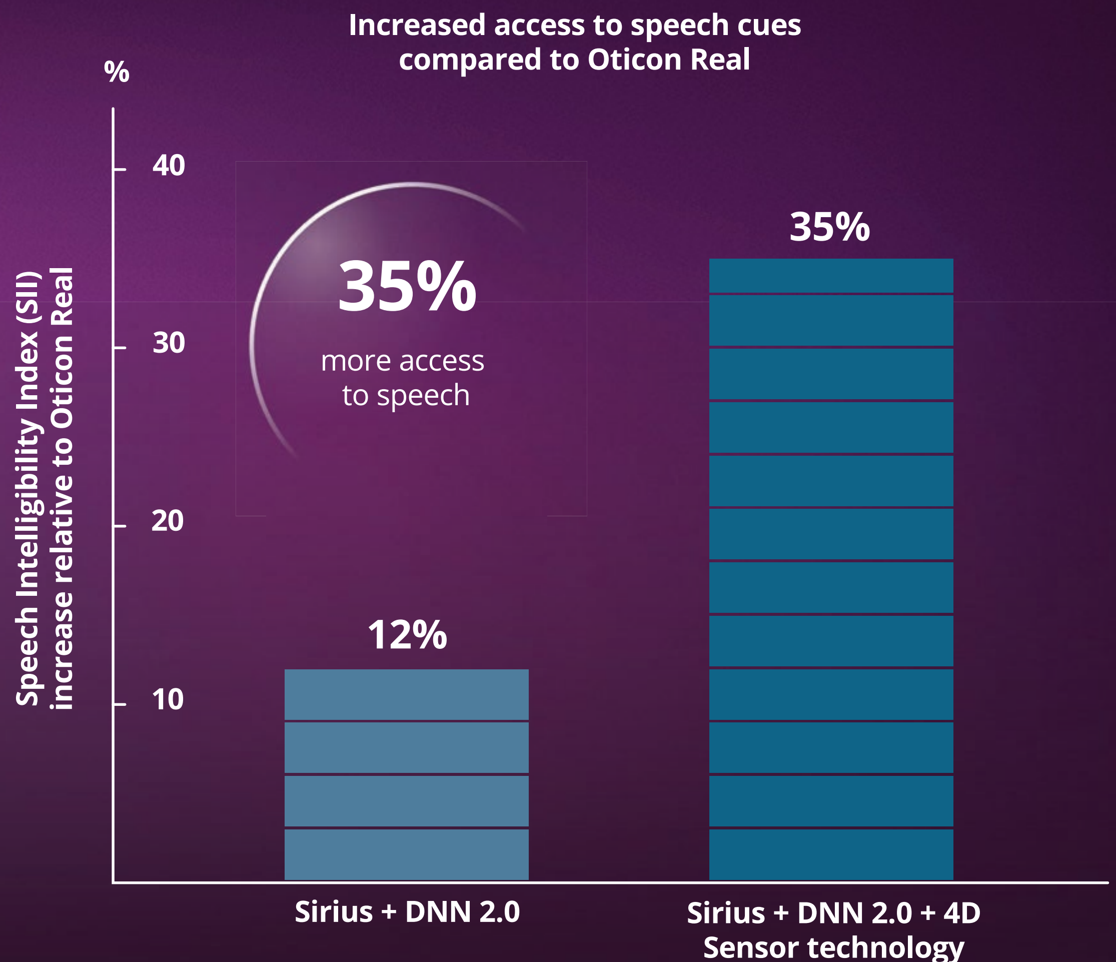
It outperforms previous generations



Brændgaard/Zapata-Rodríguez et al., 2024

Results

It outperforms previous generations



Brændgaard/Zapata-Rodríguez et al., 2024

Clinical study 1:
Listening intentions in the brain

Background

How do we evaluate whether Oticon Intent can provide the right support to the brain depending on the user intentions?

Neural tracking methods (EEG) can be used to evaluate how different sounds around a listener capture attention in the brain

Alickovic et al., 2019, Fiedler et al., 2023

Method

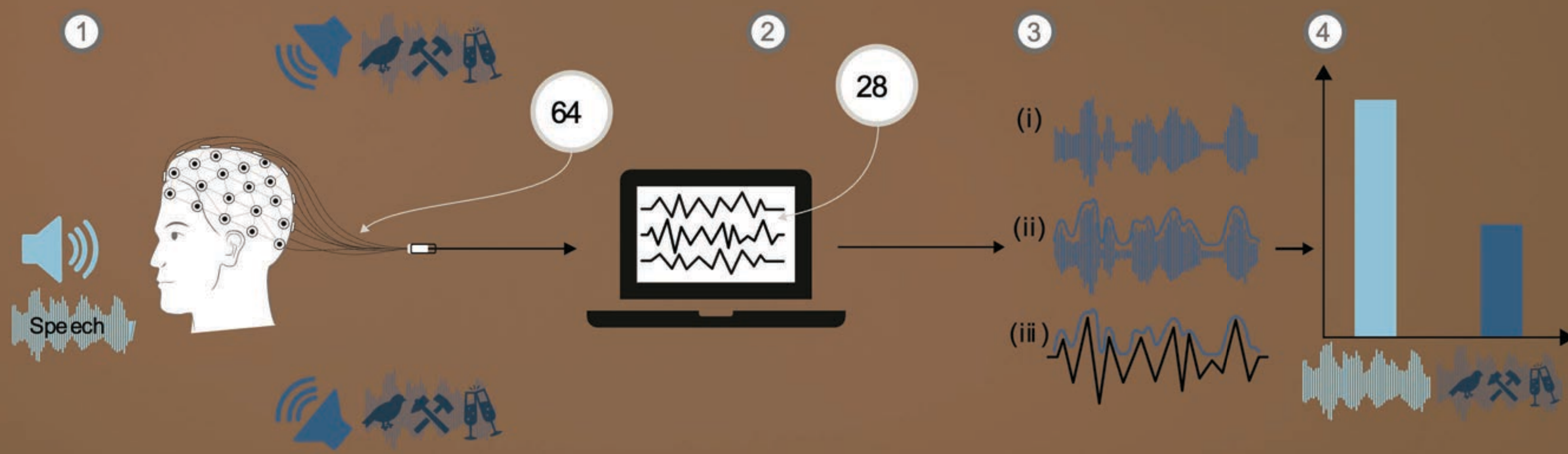
Participants:

- 30 experienced hearing aid users
- Age: 42-84 years (mean 70.5 years)
- Mild-to-moderate hearing loss

Hearing aid settings:

- Default prescription settings
- Two settings of 4D Sensor technology
- VAC+ fitting rationale

Test overview

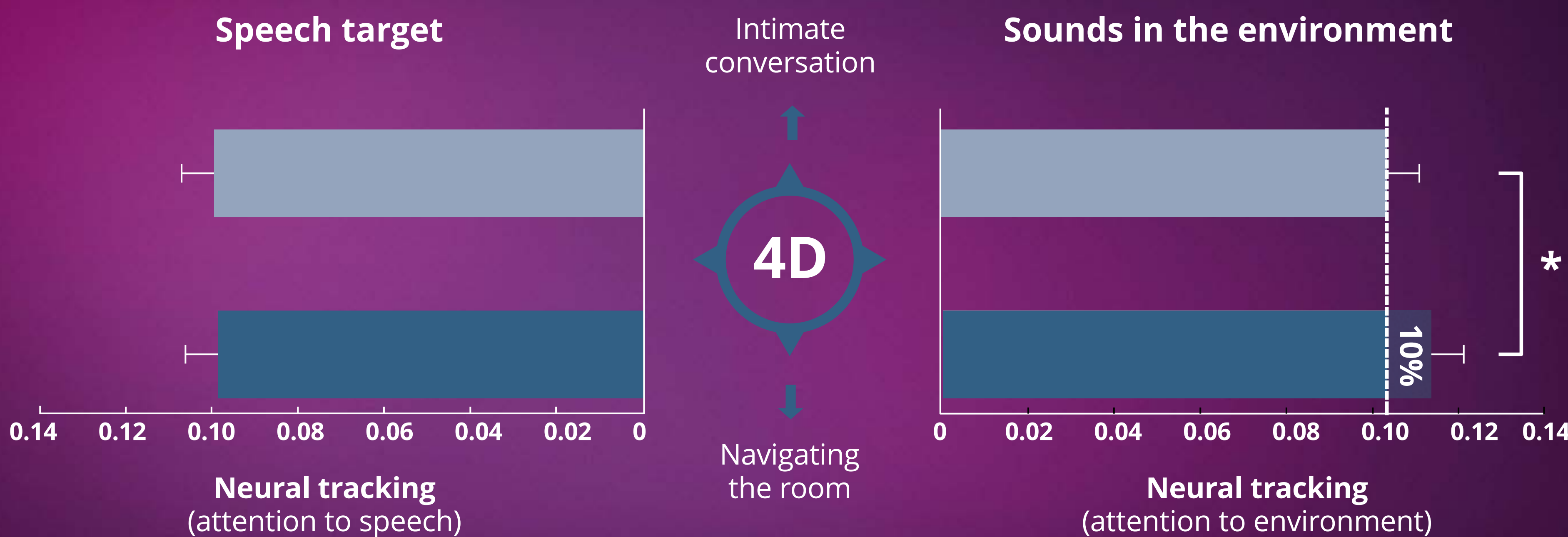


Trial flow

Continuous speech in stationary speech-shaped noise combined with sounds from the environment

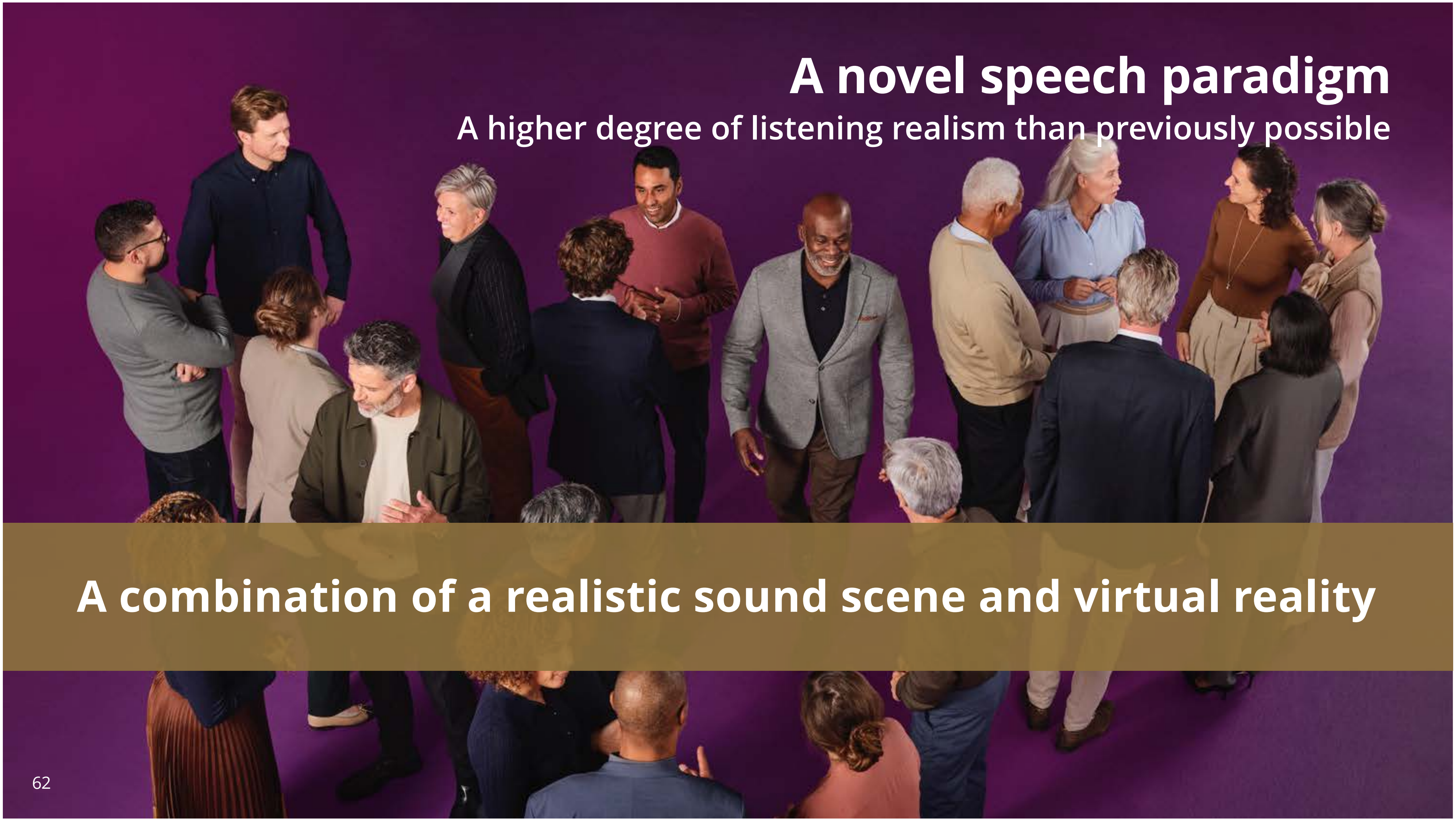
Results

Neural tracking of speech and environmental sounds



Bianchi/Eskelund et al., 2024

Clinical study 2: Speech comprehension


A novel speech paradigm
A higher degree of listening realism than previously possible
A combination of a realistic sound scene and virtual reality

Method

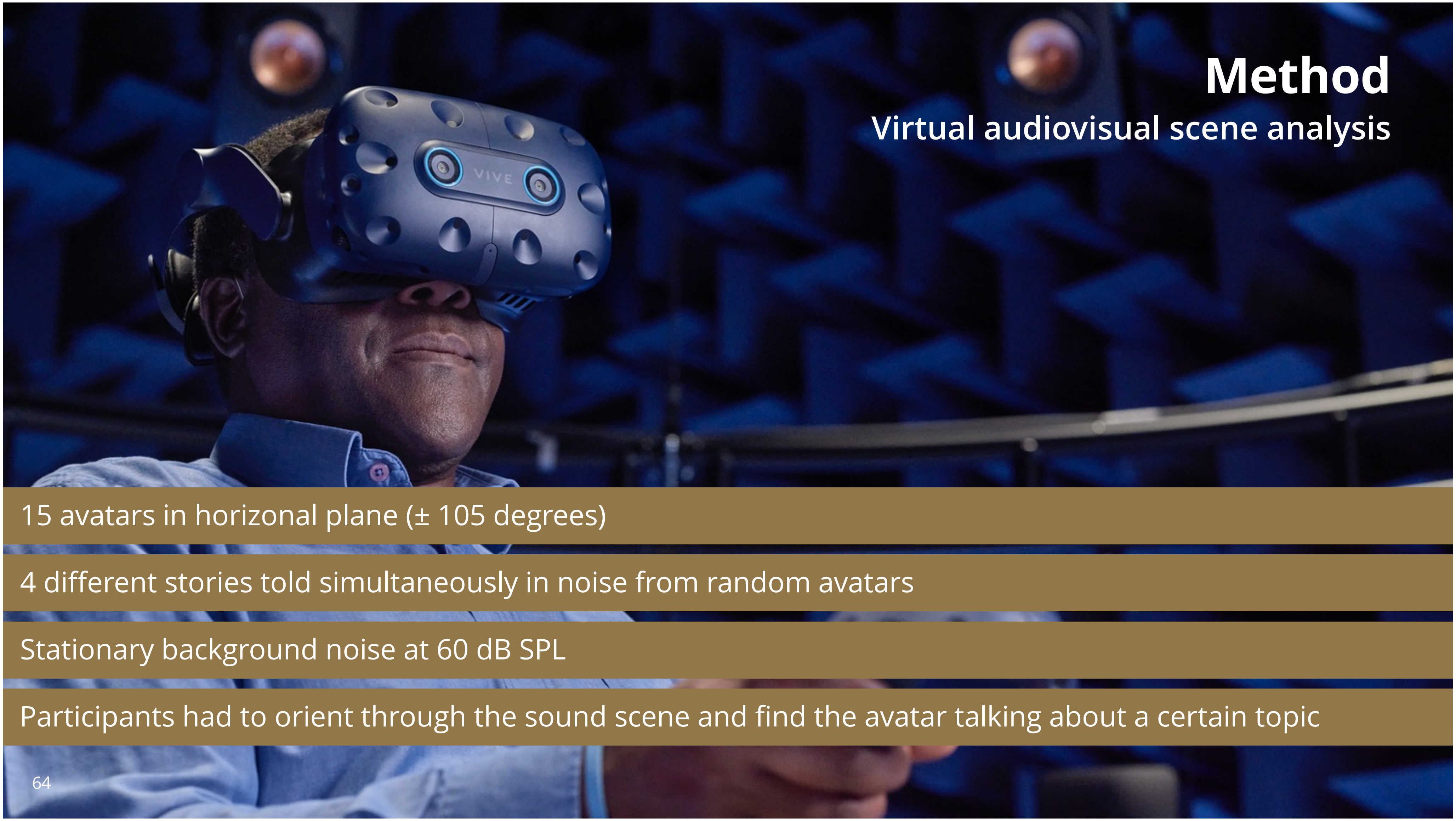
Participants and settings

Participants:

- 30 experienced hearing aid users
- Ages 48-79 years (mean 69.4)
- Mild-to-moderate hearing loss

Hearing aid settings:

- Default settings
- VAC+ fitting rationale
- 4D Sensor technology ON versus OFF



Method

Virtual audiovisual scene analysis

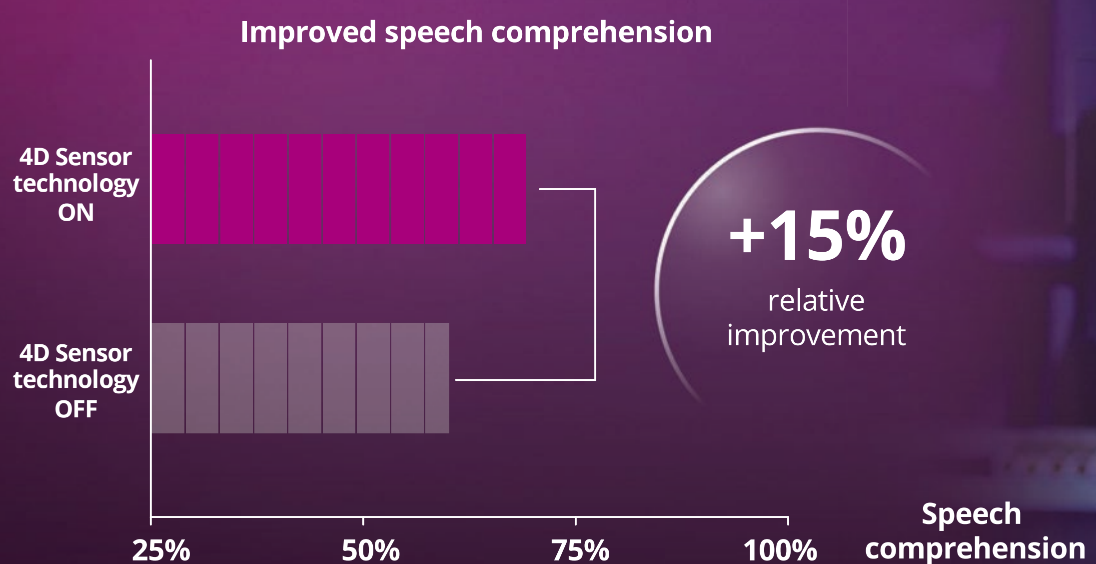
15 avatars in horizonal plane (± 105 degrees)

4 different stories told simultaneously in noise from random avatars

Stationary background noise at 60 dB SPL

Participants had to orient through the sound scene and find the avatar talking about a certain topic

4D Sensor technology improves speech comprehension



Bianchi/Eskelund et al., 2024

Clinical study 3: Speech understanding and sound quality

Part 1:
Speech understanding

Part 2:
Sound quality

Method

Participants

- 25 experienced hearing aid users
- Ages 63-81 years (mean 73.6)
- Mild-to-moderately severe hearing loss

Method

Test conditions (part 1)

- Concurrent OLSA test
- Oticon Intent versus Oticon Real

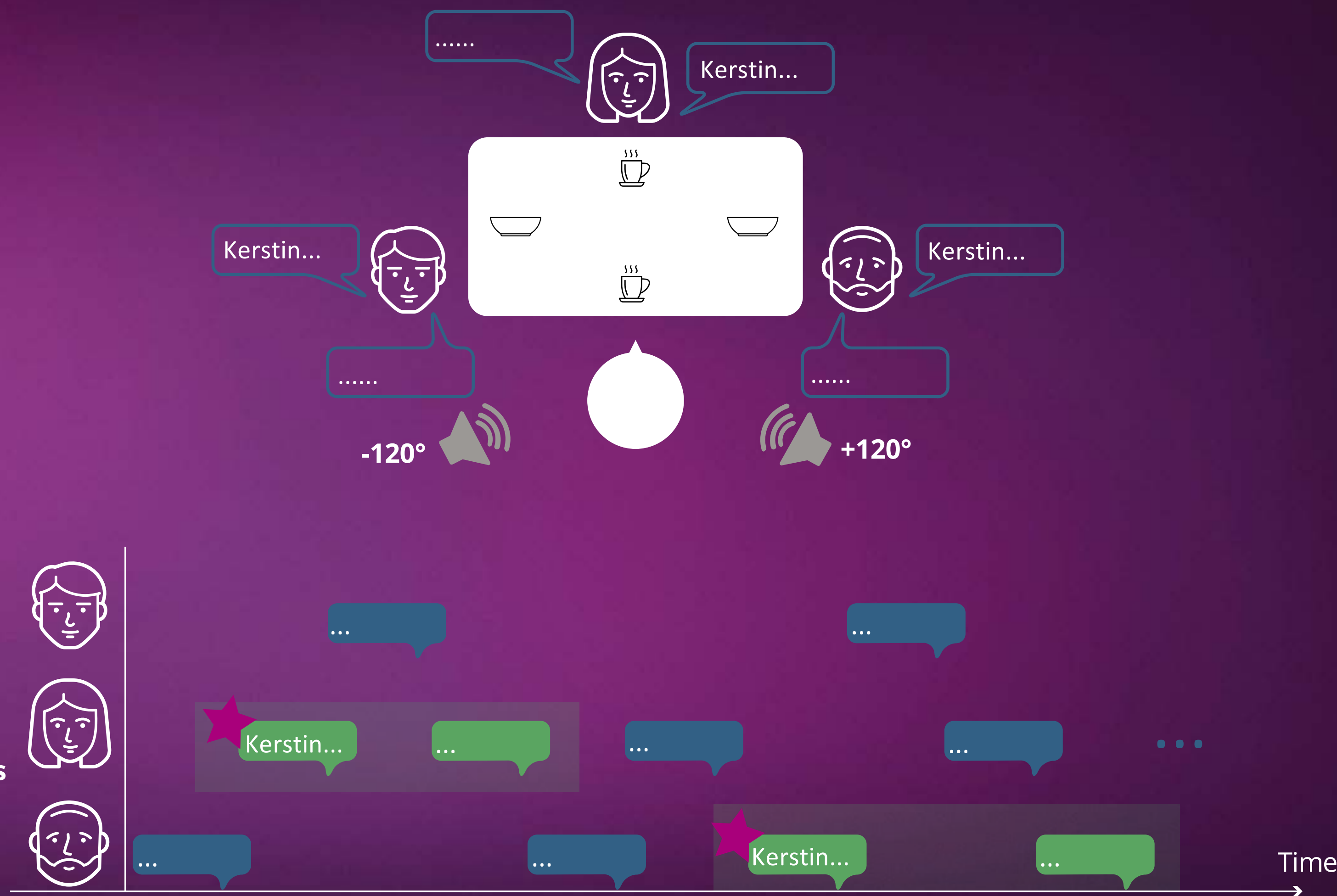
Default settings

Omni

Default settings

Method

Test setup (part 1)



Target OLSA sentences

OLSA sentences

Method

Test conditions (part 2)

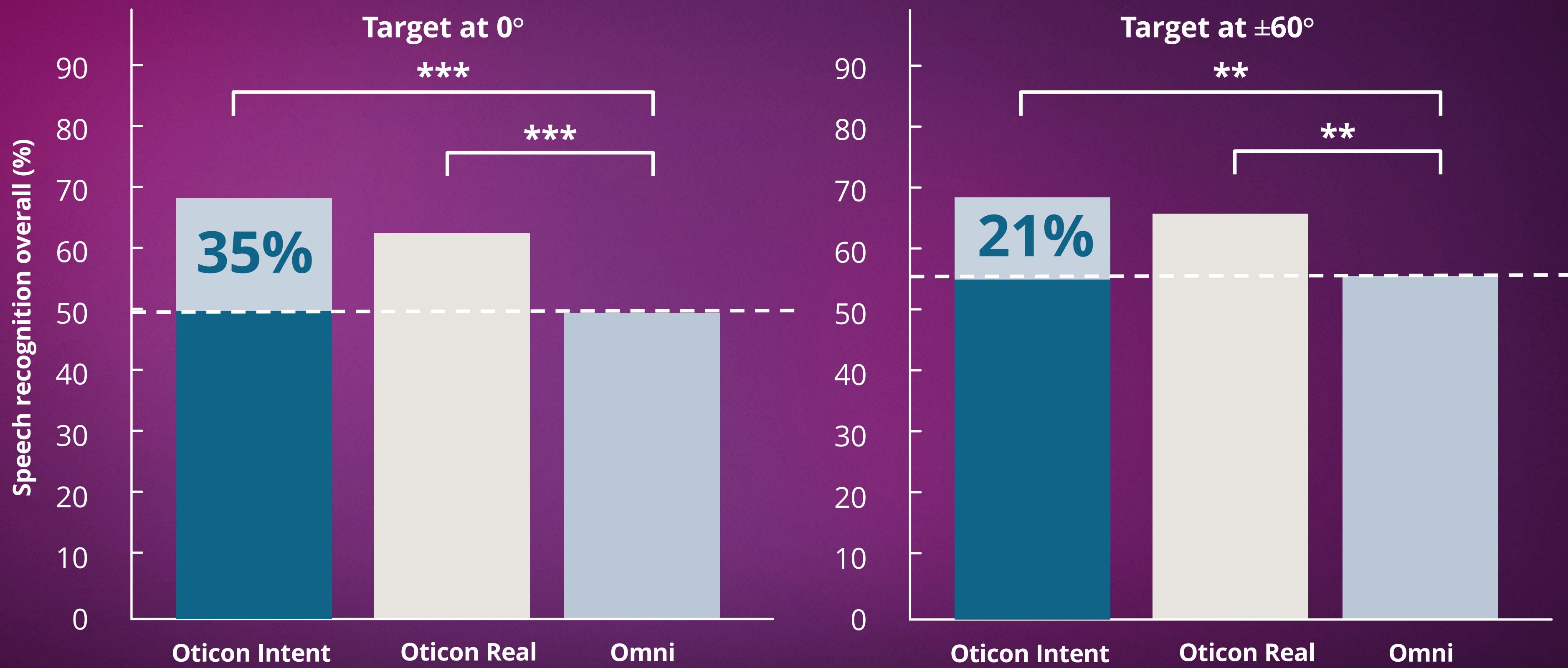
- Oticon Intent versus Oticon Real
- Subjective ratings of 6 sound scenes

Default settings

Default settings

Results (part 1)

Speech recognition



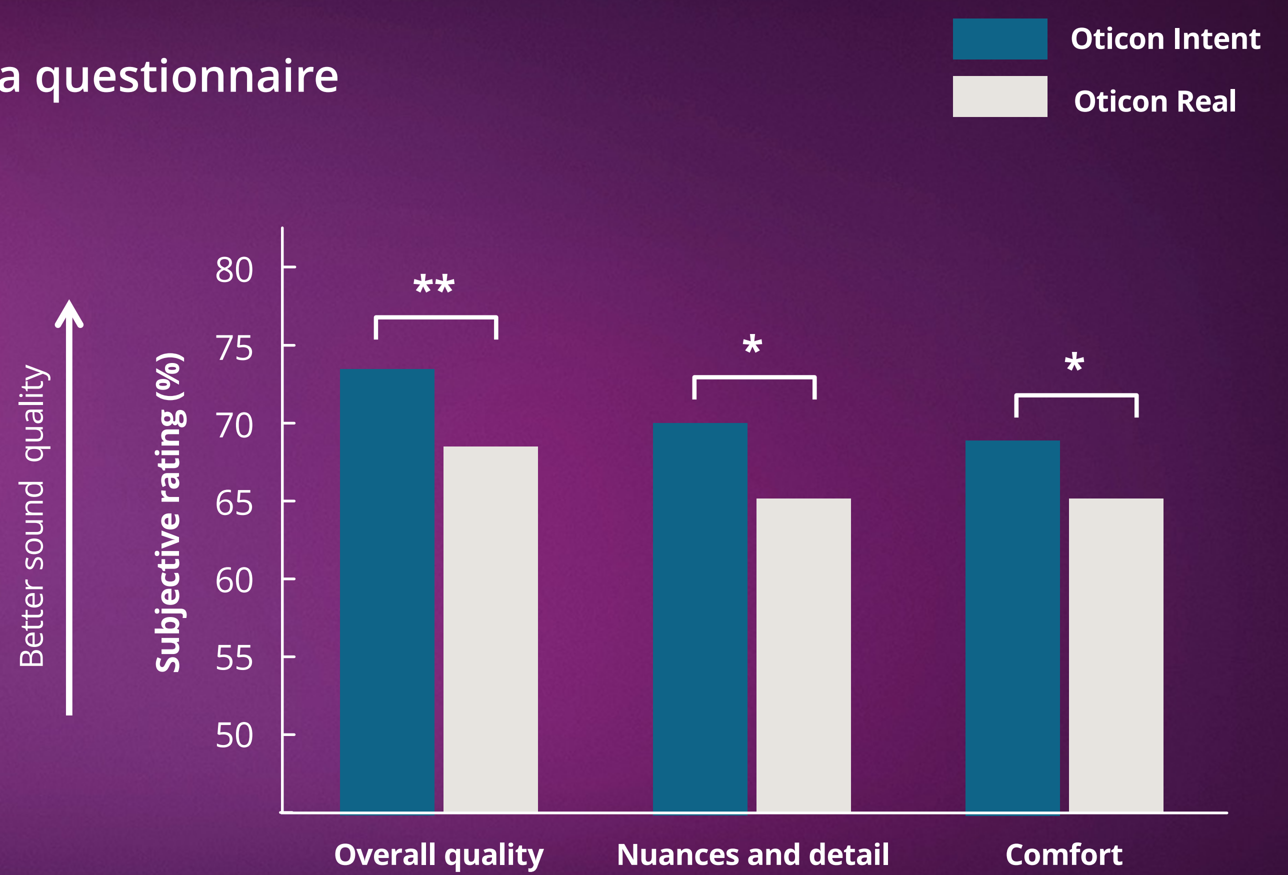
Bianchi/Eskelund et al., 2024

Results (part 2)

Sound quality evulation via questionnaire

Ratings of 6 sound environments:

- Sound quality
- Nuances and detail
- Comfort



Bianchi/Eskelund et al., 2024

Results (part 2)

Relative improvement with Oticon Intent for:	Forest	Speech in quiet	Speech in cafeteria noise	Speech in traffic noise	Speech at train station	Speech at a pub
Overall sound quality ($p = 0.003^{**}$)	8.4%	2.5%	10.7%	5.1%	8.0%	9.7%
Nuances and detail ($p = 0.013^{*}$)	4.1%	2.2%	7.0%	9.7%	13.1%	8.8%
Comfort ($p = 0.027^{*}$)	10.1%	1.7%	8.1%	3.4%	3.6%	8.8%

Bianchi/Eskelund et al., 2024

Oticon Intent outperforms previous generations

Up to

10%

Better sound quality*

Up to

13%

More nuances in the sound scene*

Up to

10%

Higher listening comfort*

*Compared to Oticon Real

Bianchi/Eskelund et al., 2024