October 22nd, 2020

How does the brain organize sound?

New groundbreaking EEG research

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Swiss Hearing Day

oticon
life-changing technology
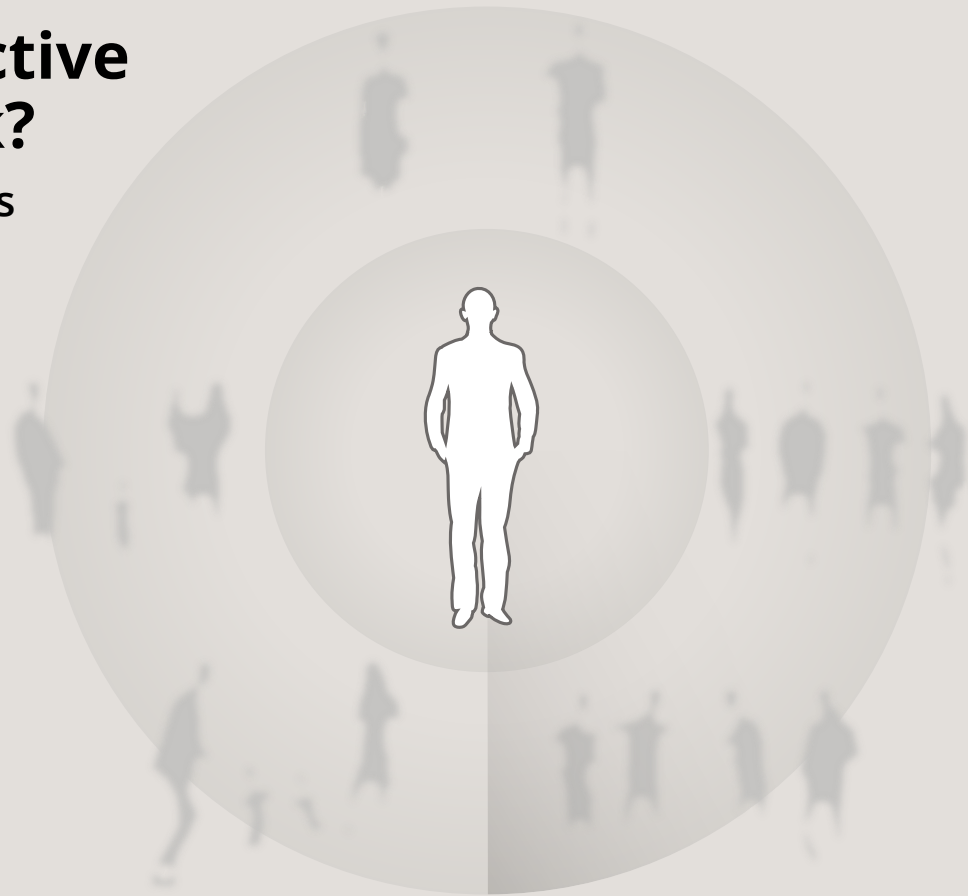
How does selective attention work?

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A process that allows us to prioritise relevant over irrelevant
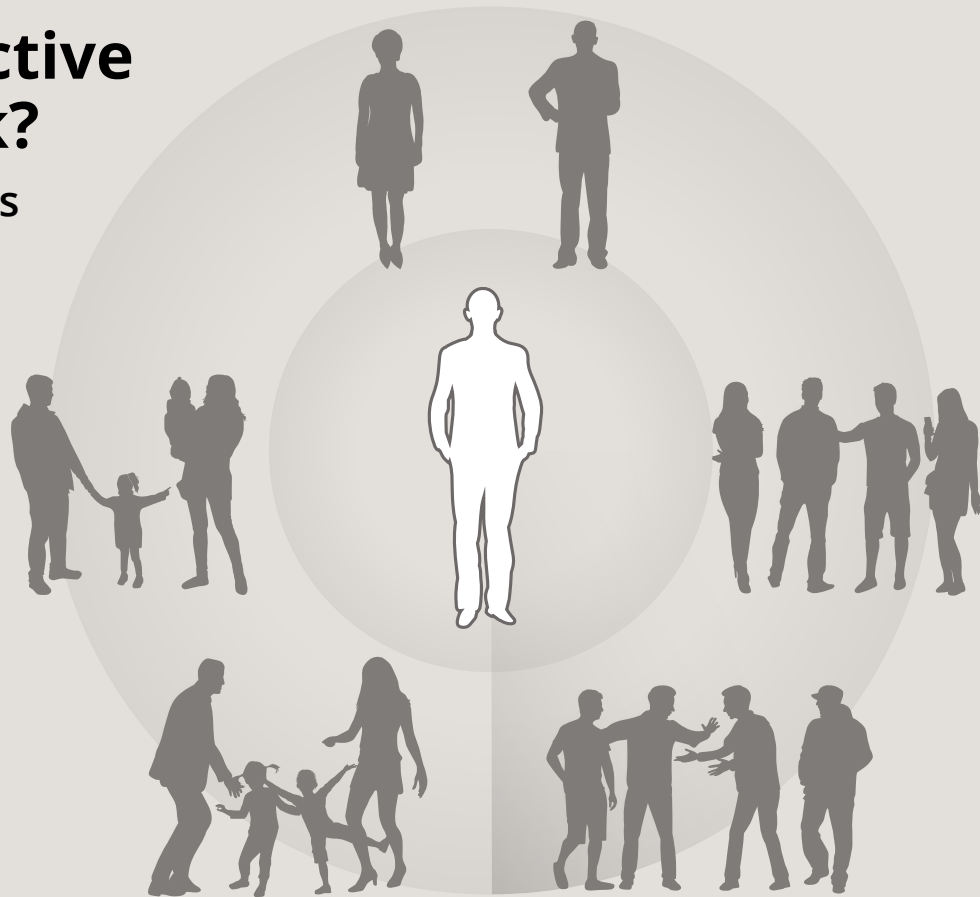
→ **Search**

Filter

Focus

oticon

How does selective attention work?

A process that allows us to prioritise relevant over irrelevant
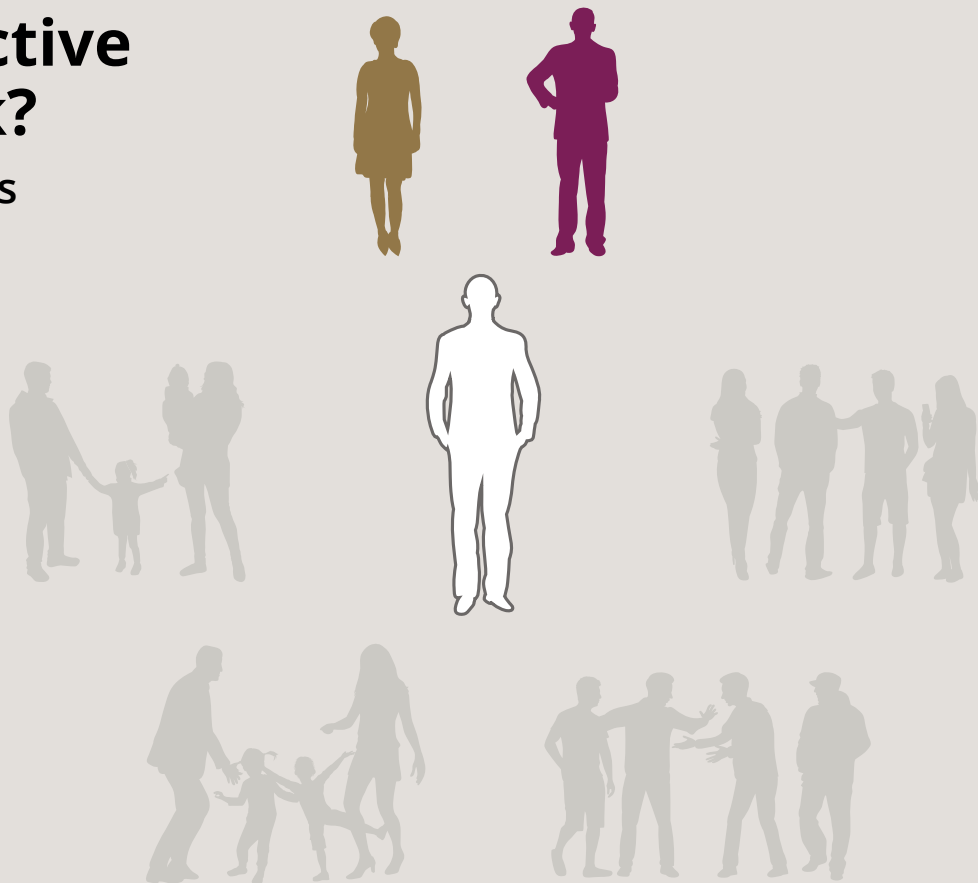
Search

→ **Filter**

Focus

oticon

How does selective attention work?

A process that allows us to prioritise relevant over irrelevant

Search

Filter

→ **Focus**

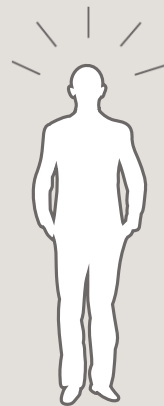**Want** to hear

May want to hear

Don't want to attend to

oticon

What happens with hearing loss?

Failiure of selective attention with hearing loss

The brain is "trapped" and has to fight for meaning
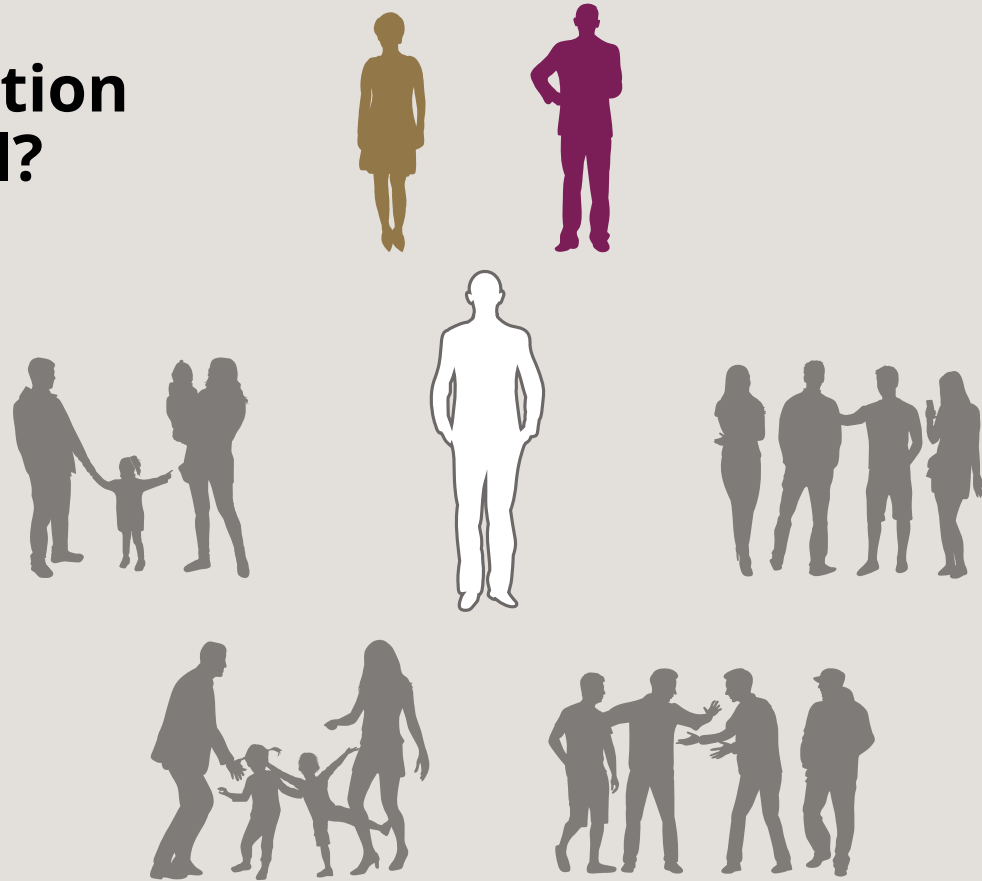
| New groundbreaking EEG research

Want to hear

May want to hear

Don't want to attend to

oticon

Can we bring selective attention back to normal?

Want to hear

May want to hear

Don't want to attend to

oticon

The new groundbreaking EEG research

The EEG study
Eriksholm Research Centre

Purpose:

To investigate the ability to selectively attend to different speakers in background noise through auditory attention detection using EEGs
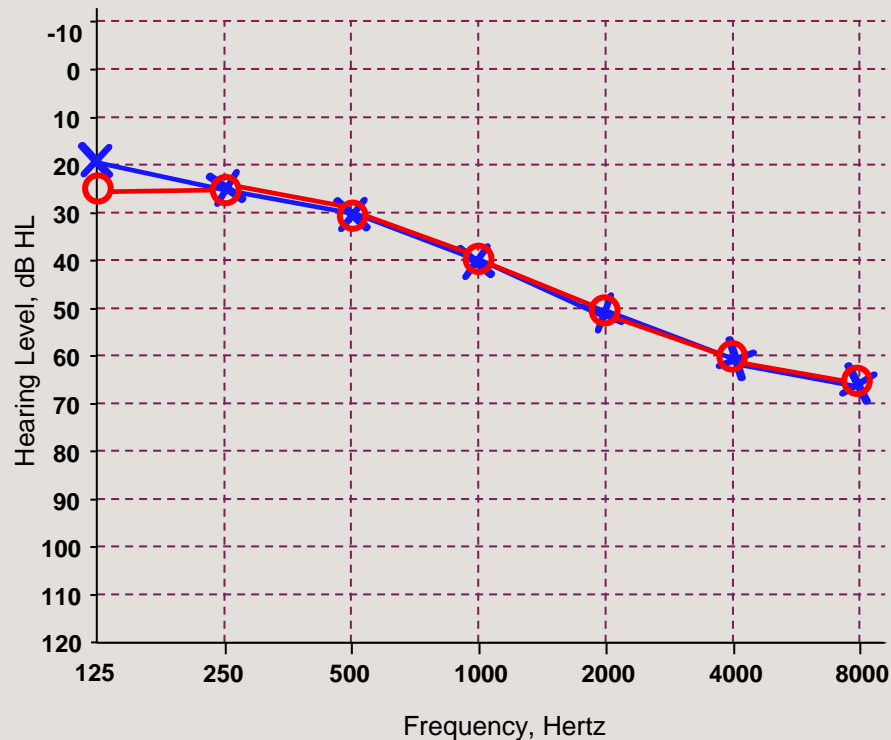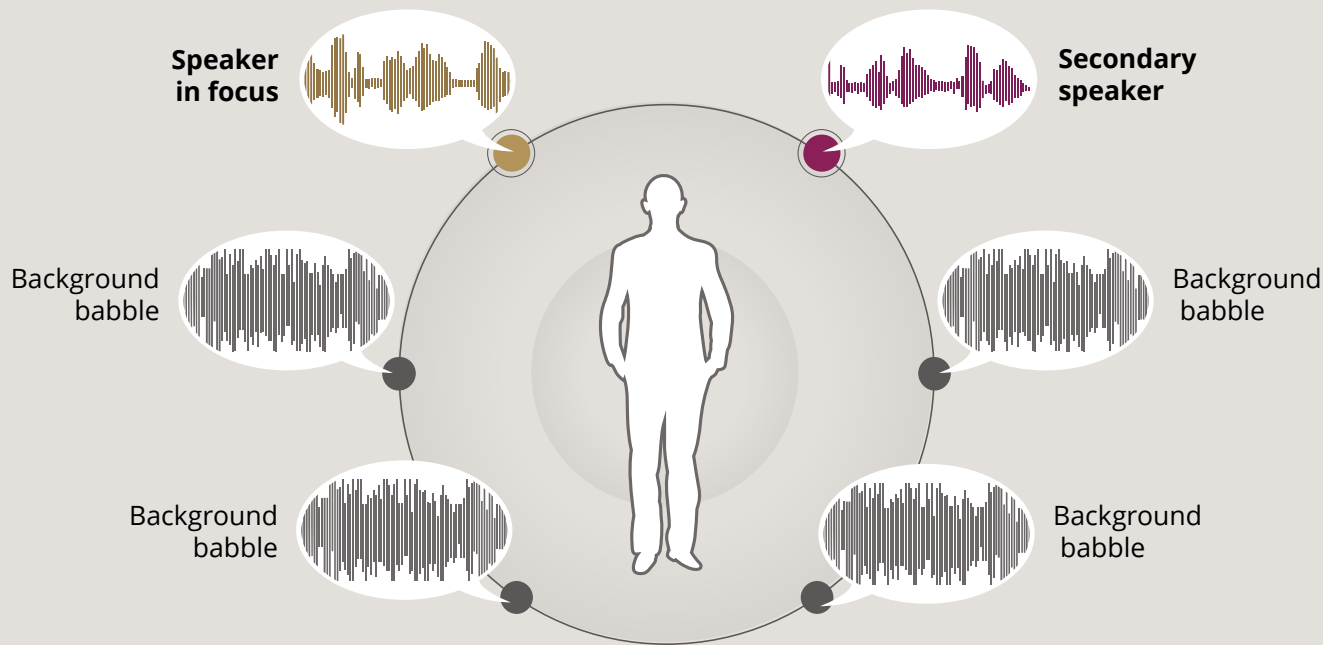
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Background

Participants:

- 22 experienced hearing aid users

- Mean age: 67 years

- Mild to moderate sensorineural hearing loss

Hearing aid settings:

- Fitted with Oticon Opn S (VAC+)
  - OpenSound Navigator ON
  - OpenSound Navigator OFF
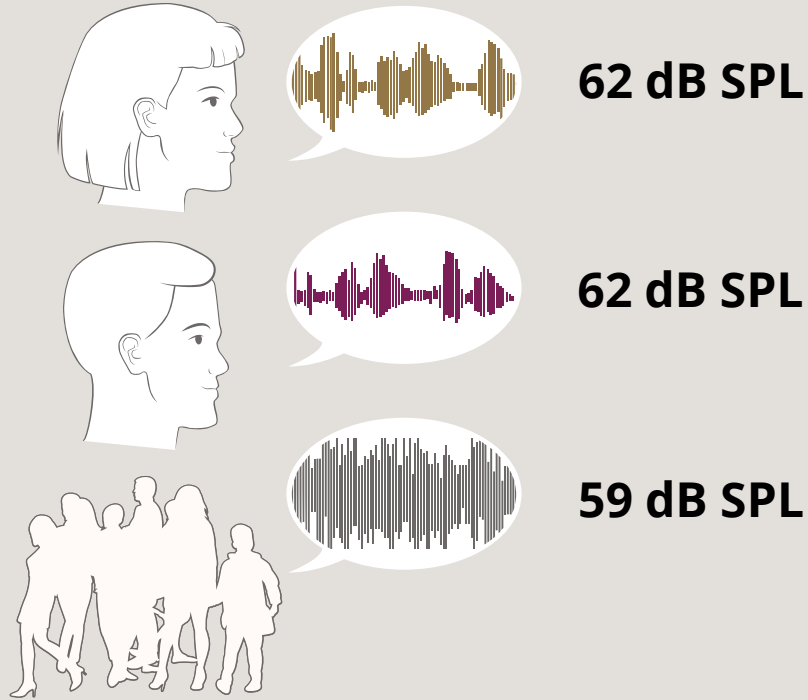
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Test setup

Speaker in focus

Secondary speaker

Background babble

Background babble

Background babble

Background babble

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Test levels

+3 dB signal-to-noise ratio (SNR)

62 dB SPL

62 dB SPL

59 dB SPL

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Test flow

News clip

16-talker babble

2-choice question

-5   0   33   Time (s)

Trial onset   Speech onset   Speech end

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The EEG test flow

Heartbeat
Eye blink
Movement
Interference from light
Etc.

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The EEG raw data

An example

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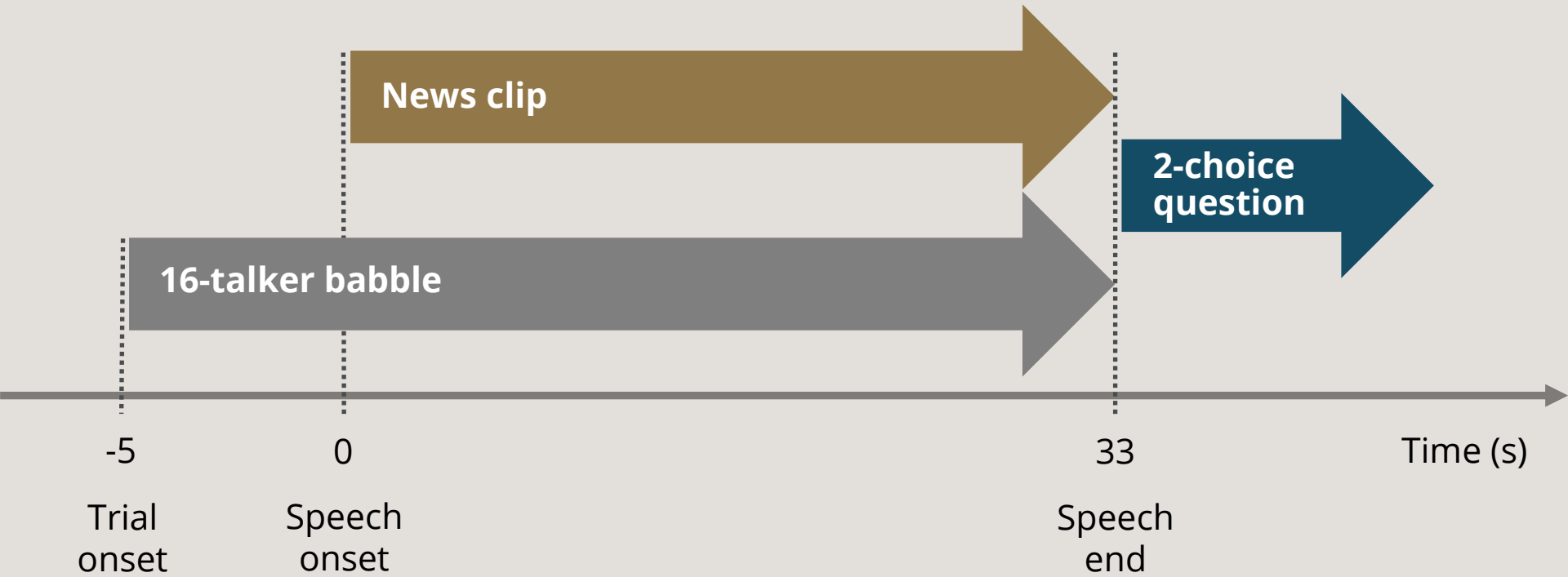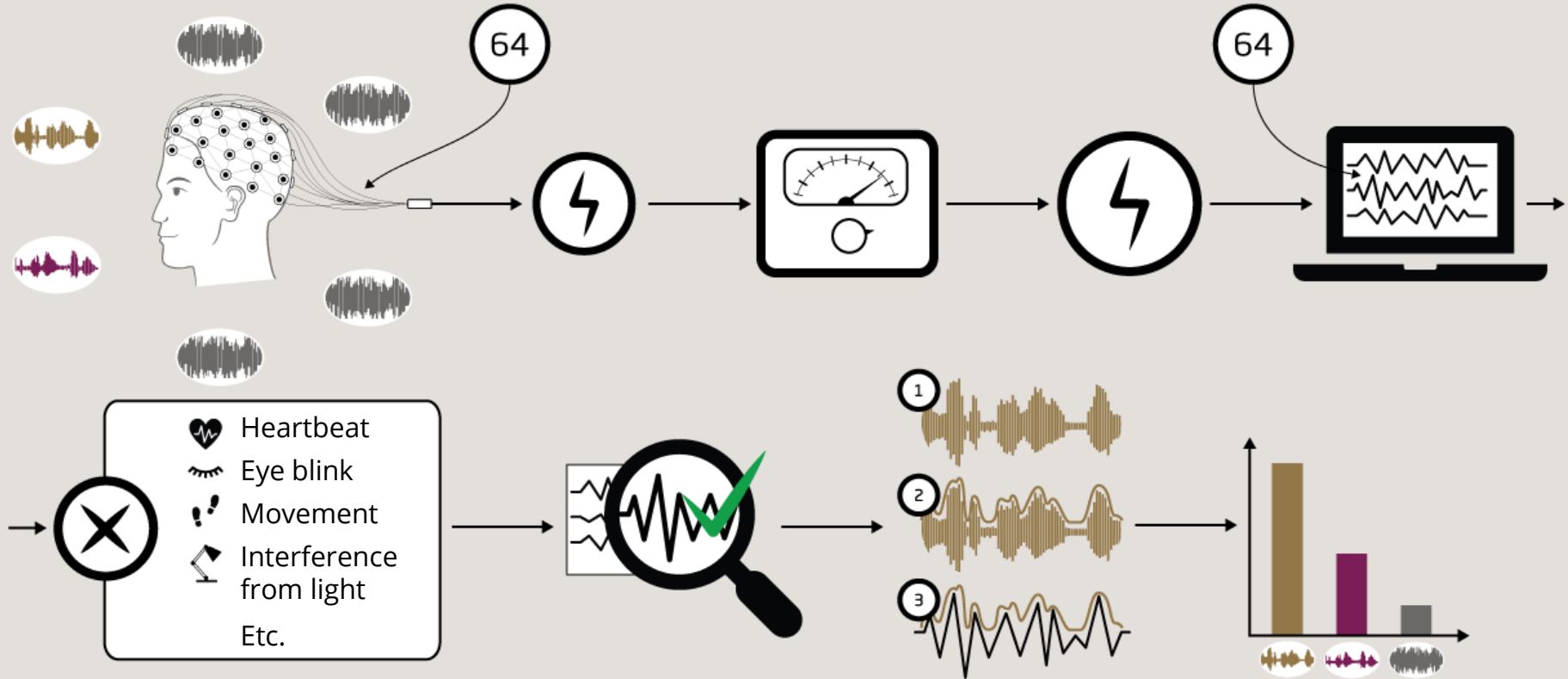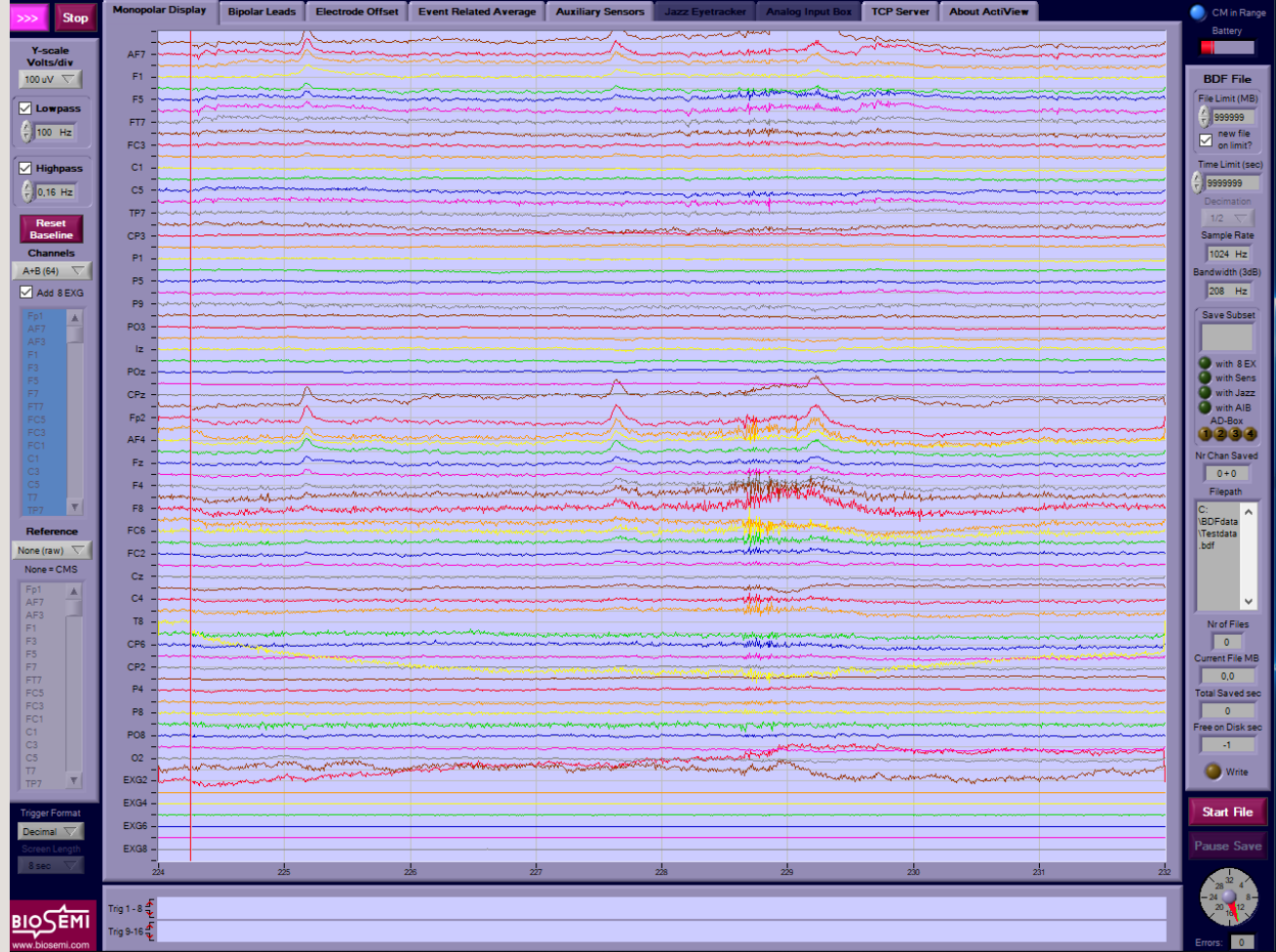
The EEG raw data

An example

Time

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The EEG
An example

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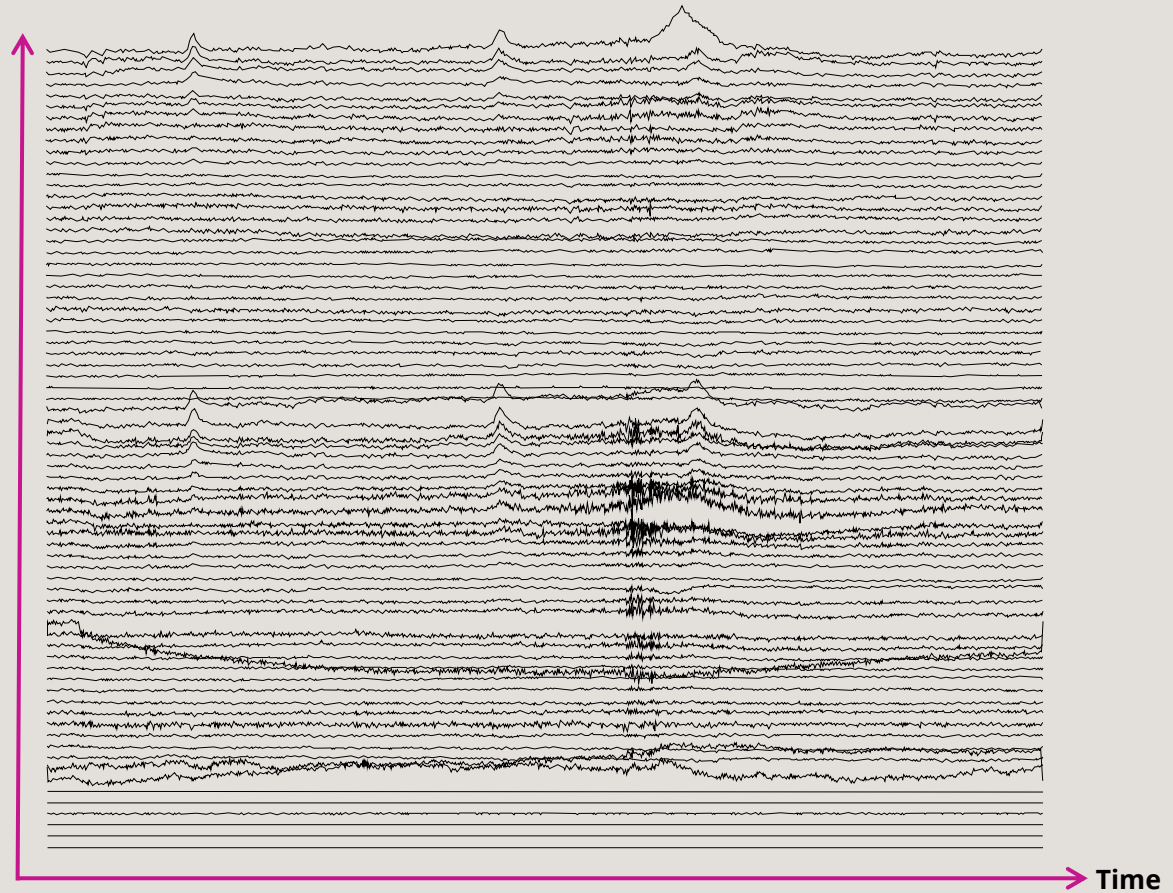
Stimulus reconstruction

An example
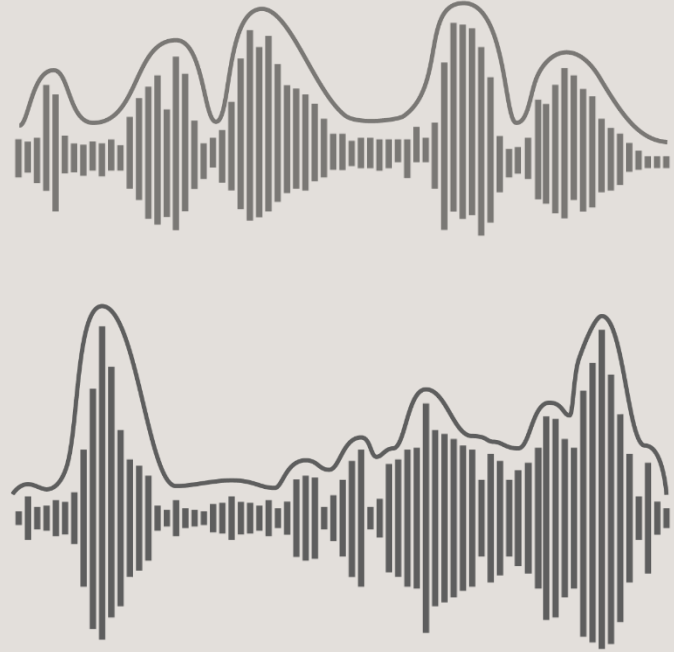
Stimulus reconstruction

An example

Uncorrelated

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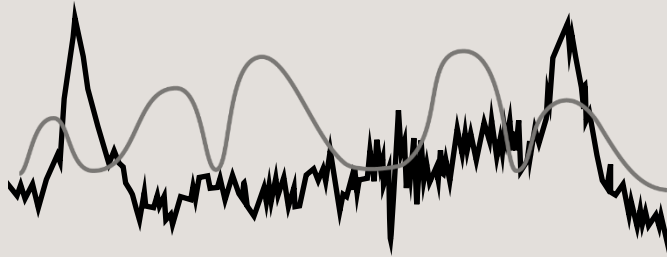
Stimulus reconstruction

An example

Correlated

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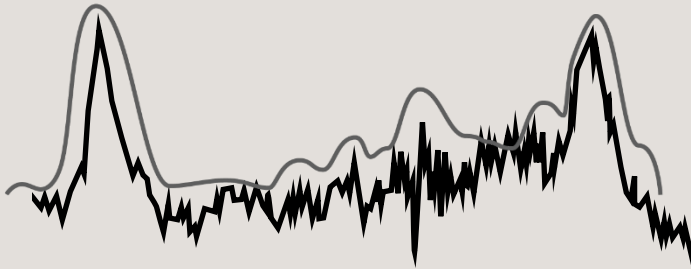
Results

How were the speakers represented in the brain?

oticon
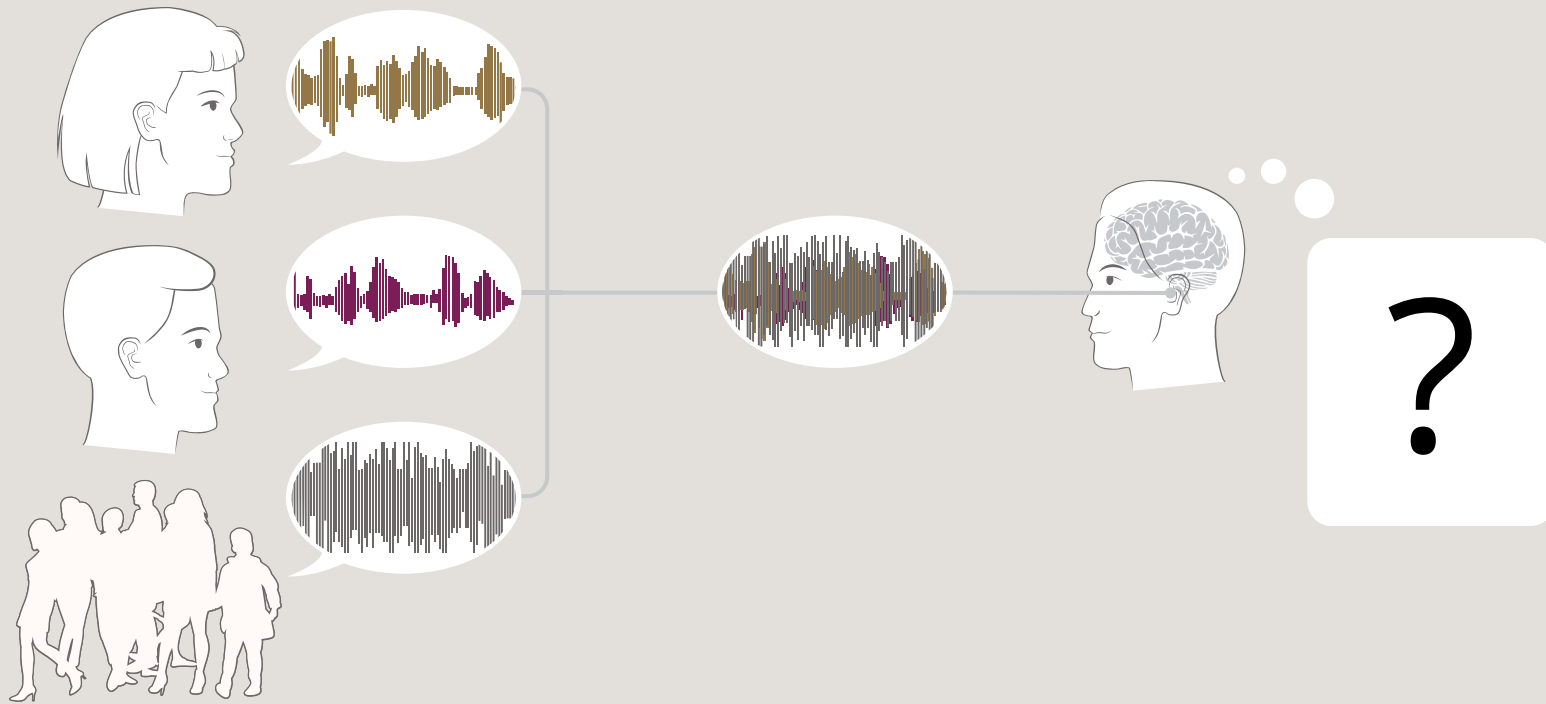
Results

Without OpenSound Navigator

- Clear representation of **focus speaker** in the brain

- **Secondary speaker** and **background babble** are equally represented in the brain

Strength of EEG signal

High

0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01

Low

Speaker in focus · Secondary speaker · Background babble

Very hard to distinguish

Without OpenSound Navigator

Secondary speaker

Background babble

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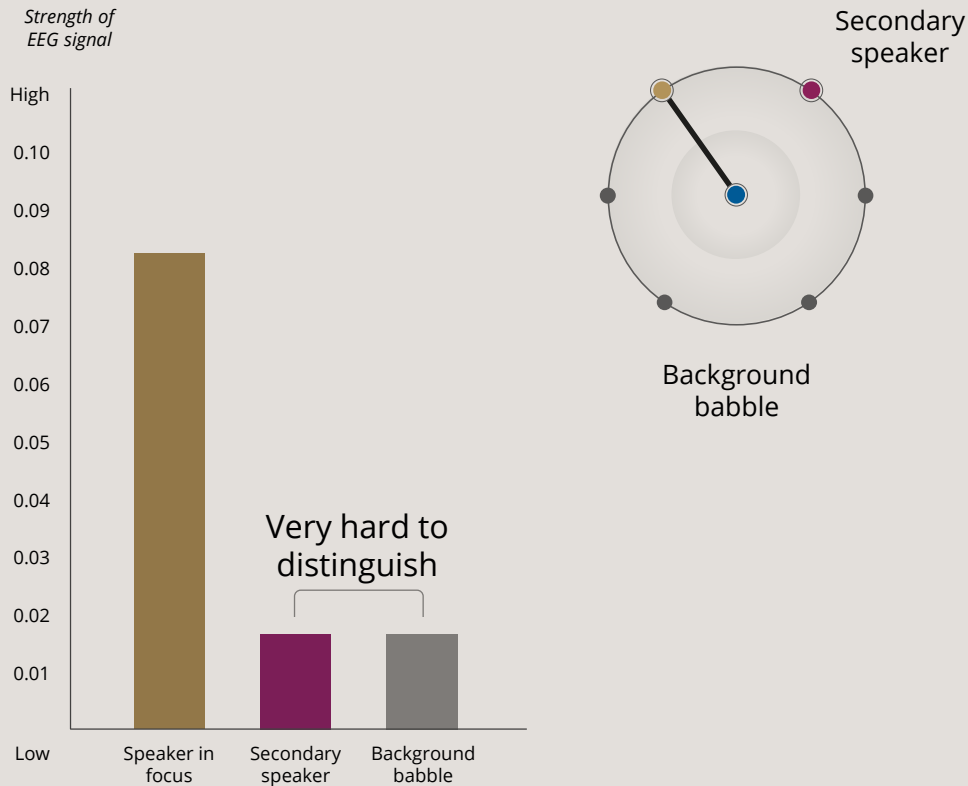
What happened when adding OpenSound Navigator?

Strength of EEG signal

High

0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01

Low

| Speaker in focus | Secondary speaker | Background babble |

Very hard to distinguish

Without OpenSound Navigator

Speaker In focus

Secondary speaker

Background babble

oticon
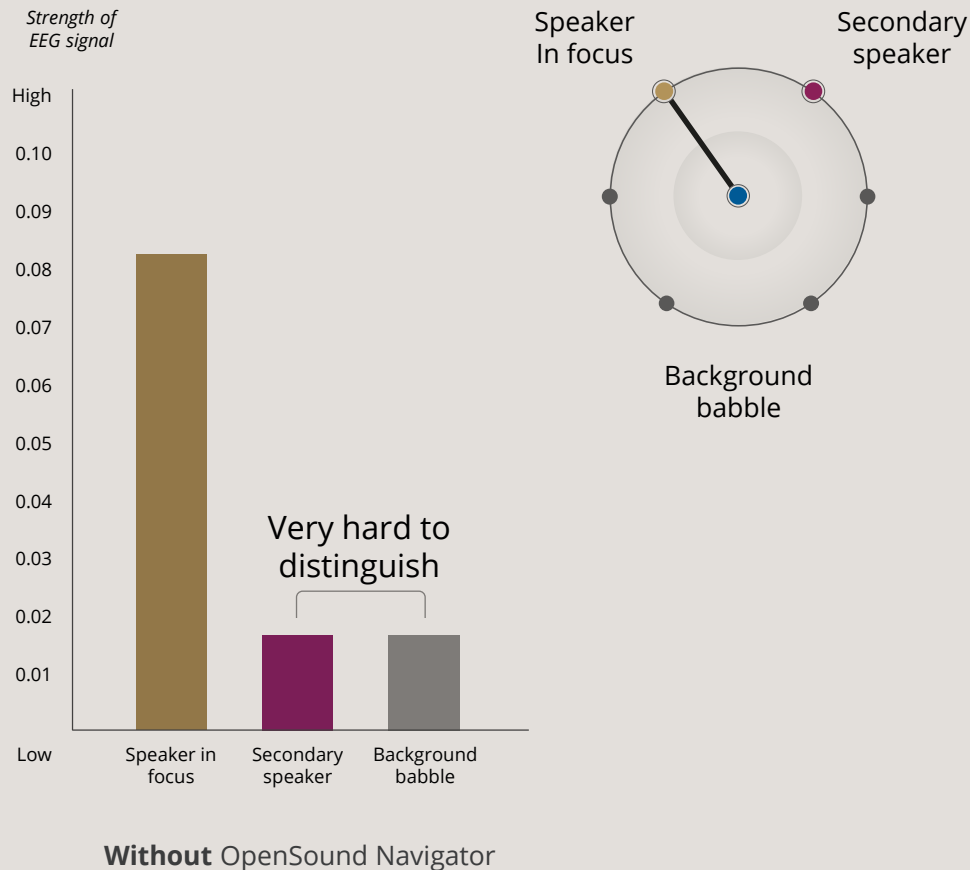
Results

With OpenSound Navigator

- **Focus speaker** was significantly more distinct in the brain

- **Secondary speaker** was much clearer represented in the brain

- **Background babble** was reduced by the brain

Strength of EEG signal

High
0.10 — **+10%**
0.09
0.08
0.07
0.06
0.05
0.04
0.03 — **+95%**
0.02
0.01 — **-50%**
Low

Speaker in focus · Secondary speaker · Background babble

Much easier to distinguish

With OpenSound Navigator

Speaker In focus · Secondary speaker · Background babble

oticon
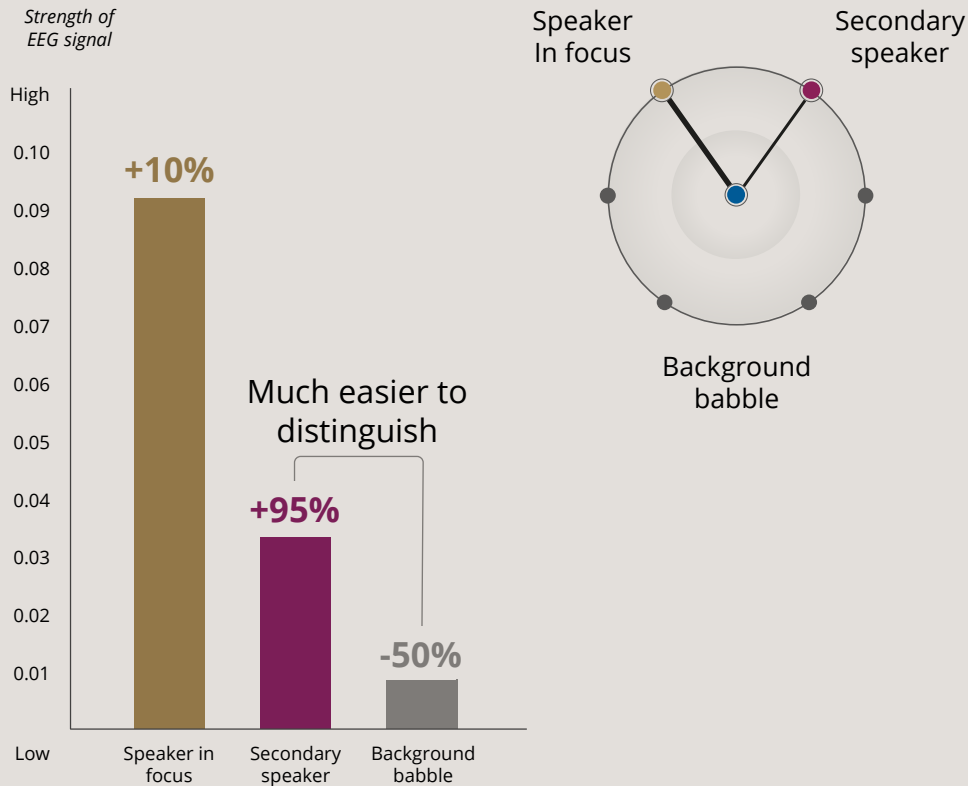
This means...
With OpenSound Navigator

- **Sounds are better organized in the brain** allowing the user to choose the speaker they want to listen to

- **Background is less disturbing** allowing for social participation

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