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Eye gaze steering works miracles* for hearing aid users in noisy environments

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Do people with hearing loss **desire** to have technology that allows them to **steer sound with their eyes**? In this study, a golden standard device was used to steer the sound of video recordings on an 88” TV screen. We recorded the users’ reactions and measured benefit by interview and a questionnaire.

Figure 1. Physical setup of the study.

Introduction

- Literature shows many studies on testing steering of sound by cognitive control [a,b,c,d]
- Focus of studies is: types of steering and impact on speech intelligibility
- Testing is done in unnatural lab settings as technology is under development
- Current study:
  - ➢ Simulating noisy real life situation without and with the help of **idealized sound enhancement** by eye gaze steering
  - ➢ **What do hearing aid users think of it?**

Methods

Participants
- N=7
- Mild to moderate hearing loss
- Diverse wrt age, gender, aetiology and hearing aid experience
- Binaurally fitted with state-of-the-art hearing aids

Equipment
- Vicon motion tracker and Dikablis eye-tracker system
- 88” TV screen showing people life size

Test material
- 3 minute videos with simultaneous monologue and dialogue
- 4-talker babble, set individually so participant could distinguish single words of the conversation in the no-steering condition

Sound enhancement
- 12 dB enhancement for the speaker that was looked at (steering condition only)

Procedure

Measurements
- Interview
- Speech comprehension questions
- Questionnaire with visual analogue scales on speech understanding, effort and motivation

Test flow
- Mix of interview and watching video’s
- 2 conditions: no-steering and steering respectively
- 1½ hours visits

Results

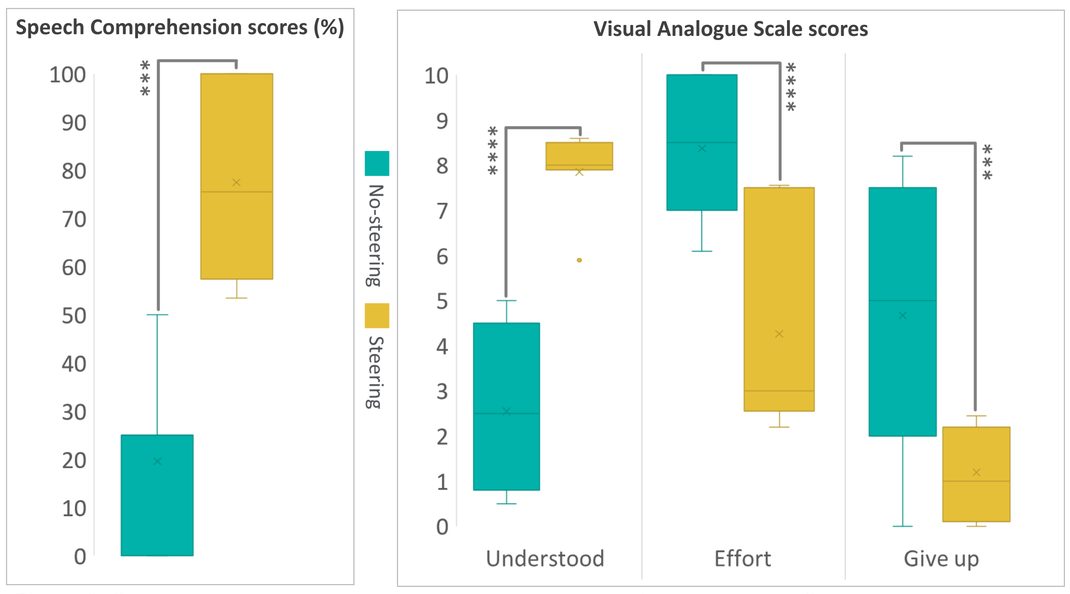

Figure 2. Comparison of the no-steering and steering conditions. Left hand figure: Speech comprehension scores of 6-8 open questions on the content of a 3 minute video. Right hand figure: Visual analogue scores showing the subjective evaluation of how much speech was understood, how much effort it took and the proportion of time the subject gave up trying to understand the speech.
Box plots show median and 1st and 3rd quartile. Whiskers show minimum and maximum. N=7. Student’s t-test, *** p<0.01, **** p<0.001.

User	Reaction to eye gaze steering
1	This was a big difference Suddenly I could hear again
2	I use my hearing more than lipreading It’s more relaxing
3	This is in fact what I’m trying to achieve when I use lipreading. But now the sound also comes along It’s fantastic!
4	Awesome Before I could not hear. Now I can hear I want this!
5	Yes, now one can hear
6	It was pleasantly relaxing. I could hear it all
7	I didn't notice the noise generator any more. It was completely out of focus

***** Follow the link and learn why the word ‘miracle’ is mentioned in the title of this poster.

Concluding

When controlling sound with the eyes, all users reported a marked increase in speech intelligibility. Some also spontaneously commented on using less effort when trying to understand the speech. 5 users were rather thrilled by the contrast between the no-steering and steering condition. The findings were supported by the speech comprehension scores and outcomes of the VAS scales.

The results of this study can be of interest for decision makers that need evidence-based information when evaluating research applications regarding cognitive controlled hearing devices.

Information

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