

# A first attempt at a comprehensive Own Voice Qualities (OVQ) questionnaire

Niels Søgaard Jensen<sup>1</sup>, Patrick Maas<sup>1</sup>, Claus Nielsen<sup>1</sup>, Søren Laugesen<sup>1</sup> and Mark Flynn<sup>2</sup> – <sup>1</sup>Oticon Research Centre, Eriksholm and <sup>2</sup>Oticon A/S

## Introduction

It seems to be a common conception that open fittings will remove occlusion and thereby eliminate all the hearing-aid (HA) users' problems related to own voice. We think this is a misconception!

We are convinced that there are other issues to own voice besides occlusion. We mainly have our evidence from previous studies at Eriksholm where HA users have participated in detailed interviews concerning own-voice issues.

In order to be able to convince others, the OVQ questionnaire was developed to probe into the various own-voice issues that we have identified, including but not restricted to occlusion.

The OVQ is supposed to be able to demonstrate both the significance of occlusion, and that some HA users have own-voice issues – even when their occlusion problems have been essentially solved.

## OVQ development approach



Trying to avoid the researcher's suppositions



Using hearing-aid users' own statements

## Administering the OVQ



The OVQ is filled in during an interview

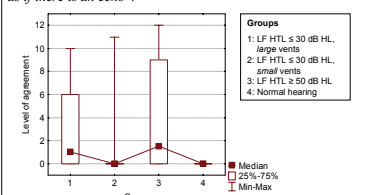
### Sound Quality

Here is a series of statements that use figurative language to describe the sound of your own voice when you are wearing hearing instruments. To what extent do you agree that these statements describe your voice?

Statement	Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree	NA									
I find that my own voice sounds as if...															
I am speaking from inside a barrel	0	1	2	3	4	5	6	7	8	9	10	11	12	<input type="checkbox"/>	<input type="checkbox"/>
I am speaking through a tunnel	0	1	2	3	4	5	6	7	8	9	10	11	12	<input type="checkbox"/>	<input type="checkbox"/>
I am speaking in a bathroom	0	1	2	3	4	5	6	7	8	9	10	11	12	<input type="checkbox"/>	<input type="checkbox"/>
I am hearing myself on a tape recorder/video recording/answering machine	0	1	2	3	4	5	6	7	8	9	10	11	12	<input type="checkbox"/>	<input type="checkbox"/>
I am hearing myself on the telephone	0	1	2	3	4	5	6	7	8	9	10	11	12	<input type="checkbox"/>	<input type="checkbox"/>
...there is an echo	0	1	2	3	4	5	6	7	8	9	10	11	12	<input type="checkbox"/>	<input type="checkbox"/>
I am speaking in a large room	0	1	2	3	4	5	6	7	8	9	10	11	12	<input type="checkbox"/>	<input type="checkbox"/>

More below the flap...

Example from pilot study: B6: "I find that my own voice sounds as if there is an echo".



• Low median scores but high max. scores in all HA user groups, most pronounced in group 3. This problem is not experienced at all by the NH group.

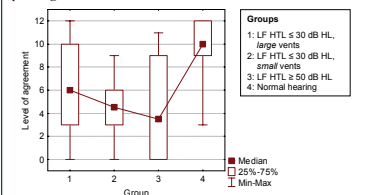
### Speak & Hear

Here is a series of statements about situations where you are participating in a conversation, a discussion, or a meeting with a group of people that you know well. Imagine that your surroundings are otherwise calm. To what extent do you agree that these statements apply to you when you are wearing hearing instruments?

Statement	Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree	NA									
When I am in a group of people, I find that my own voice blends naturally into the soundstage with the other voices	0	1	2	3	4	5	6	7	8	9	10	11	12	<input type="checkbox"/>	<input type="checkbox"/>
When I am in a group of people, I find that the level of my own voice is equal to the level of the other voices	0	1	2	3	4	5	6	7	8	9	10	11	12	<input type="checkbox"/>	<input type="checkbox"/>
I can easily follow and participate in a discussion with quick, ping-pong-like word exchanges	0	1	2	3	4	5	6	7	8	9	10	11	12	<input type="checkbox"/>	<input type="checkbox"/>
I can easily follow and participate in a heated discussion where everyone is speaking simultaneously	0	1	2	3	4	5	6	7	8	9	10	11	12	<input type="checkbox"/>	<input type="checkbox"/>

More below the flap...

Example from pilot study: D5: "I can easily hear what people are saying to me if they interrupt me before I am finished speaking".



• Low minimum scores – but also quite high maximum scores – in all three HA user groups. The scores in the NH group are significantly higher (p<0.05).

## OVQ contents

All questions in the OVQ are formulated as statements to which the respondent has to state his or her level of agreement (on a scale from 0 to 12). The questions are grouped in sections (A-N), addressing different overall own-voice topics:

- A: General own-voice questions
- B: Sound quality (descriptive language)
- C: Sound quality (single words)
- D: Speak and hear
- E: Level control
- F: Strategies used for level control
- G: Whispering
- H: Localization of own voice
- I: General own-voice questions
- J: Own voice when having a cold
- K: Sound quality (when having a cold)
- L: Own-voice in the period just after receiving hearing aids
- M<sup>2</sup>: Supplementary questions about hearing aids
- N<sup>2</sup>: Own voice without use of hearing aids

<sup>1</sup>Only for non-users of hearing aids, <sup>2</sup>Only for hearing-aid users

## Pilot study

All data are taken from an OVQ pilot study, which has been carried out at Hörzentrum Oldenburg, Germany. 30 experienced HA users and 10 normal-hearing (NH) people were divided into four groups of 10 test subjects – according to their low-frequency (LF) hearing loss and HA vents. The HA users used a variety of HA models. All groups were matched for age.

- Group 1. LF HTL ≤ 30 dB HL, large vents (> 2.5 mm)
- Group 2. LF HTL ≤ 30 dB HL, small vents (< 1.5 mm)
- Group 3. LF HTL ≥ 50 dB SPL, vents > 0.8 mm
- Group 4. Normal-hearing control group

**Hypothesis:** Group 2 will have more occlusion-related own-voice problems than group 1 and group 3 – and groups 1-3 will in general have more own-voice issues than group 4.

**Some preliminary observations from the study**

- In general, the OVQ makes people talk – about their own voice!
- Median scores indicate no or minor problems on many scales – but individual scores indicating major problems are also present.
- Some individual scales show interesting results.
- We did not always observe the predicted differences between HA user groups – and between HA users and NH people.

**Potential explanations for unexpected observations**

- Self-selection between groups 1 and 2. People accepting small vents may be less prone to occlusion problems, and that will reduce the expected difference between the groups.
- HA users and NH people may use different internal references when filling in the OVQ.

**Please remember!** This is a pilot study. All analyses and conclusions are preliminary!

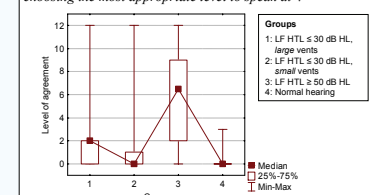
### Level Control

Here is a series of statements about the level of your own voice in different situations. To what extent do you agree that these statements apply to you when you are wearing hearing instruments?

Statement	Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree	NA									
When I raise my voice, it booms me	0	1	2	3	4	5	6	7	8	9	10	11	12	<input type="checkbox"/>	<input type="checkbox"/>
Other people often tell me that I speak too softly	0	1	2	3	4	5	6	7	8	9	10	11	12	<input type="checkbox"/>	<input type="checkbox"/>
Other people often tell me that I speak too loudly	0	1	2	3	4	5	6	7	8	9	10	11	12	<input type="checkbox"/>	<input type="checkbox"/>
It is embarrassing to unintentionally speak too softly	0	1	2	3	4	5	6	7	8	9	10	11	12	<input type="checkbox"/>	<input type="checkbox"/>
It is embarrassing to unintentionally speak too loudly	0	1	2	3	4	5	6	7	8	9	10	11	12	<input type="checkbox"/>	<input type="checkbox"/>
At times, it can be a problem finding an appropriate level of my own voice when I participate in a quiet conversation in otherwise calm surroundings	0	1	2	3	4	5	6	7	8	9	10	11	12	<input type="checkbox"/>	<input type="checkbox"/>

More below the flap...

Example from pilot study: E11: "When I give a speech, presentation, or anything of the like, I am not sure if I am choosing the most appropriate level to speak at".



• The problem is most pronounced in group 3 – but high scores are also present in the two other HA user groups. Only low ratings are seen in the NH group.

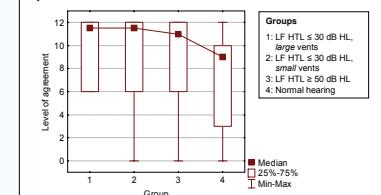
### General Questions

Here are three overall statements about your own voice when you are wearing hearing instruments. To what extent do you agree with these statements?

Statement	Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree	NA									
The sound of my own voice is a problem for me	0	1	2	3	4	5	6	7	8	9	10	11	12	<input type="checkbox"/>	<input type="checkbox"/>
The sound of my own voice is important to me	0	1	2	3	4	5	6	7	8	9	10	11	12	<input type="checkbox"/>	<input type="checkbox"/>
The better I hear others, the less I strain myself for others to hear me	0	1	2	3	4	5	6	7	8	9	10	11	12	<input type="checkbox"/>	<input type="checkbox"/>

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Example from pilot study: I2: "The sound of my own voice is important to me".



• The sound of own voice is very important to most people – but also quite unimportant to some people. A tendency of higher scores among HA users is observed.

## The OVQ package

The OVQ package consists of three different versions of the questionnaire, appropriate for three different groups of respondents:

- Unilateral hearing-aid users
- Bilateral hearing-aid users
- Non-users of hearing aids

Furthermore, the package include written instructions to the interviewer and a suggestion of an introductory letter to the respondent.

The OVQ is at the present time available in Danish (original), English and German.

## How to get it?



You can get access to the entire OVQ package from Eriksholm

## Future

The current version of the OVQ is a first attempt. When more experience is gathered, it may be required to:

- reformulate questions
- skip individual questions or entire sections
- include new questions or sections
- modify the response scale
- make an abbreviated version intended for clinical use
- translate to other languages

A large-scale (N = 200) OVQ study is scheduled to take place this autumn in Oldenburg, Germany.

## Conclusion

In our opinion, the own-voice part of hearing-aid users' communication is neglected.

We suggest the OVQ questionnaire as a tool to demonstrate possible own-voice issues of HA users – including but not restricted to occlusion problems.

Preliminary data show that even though a lot of HA users do not report about own-voice problems, some HA users have a very distinct experience of one or more of the own-voice issues covered by the OVQ.

More data are needed to further improve our understanding of how HA users perceive their own voice – and to further improve the OVQ.

We offer the OVQ package to everyone interested.

See Søren Laugesen's presentation on Sunday for more on level control!

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We are convinced that there are other issues to own voice besides occlusion. We mainly have our evidence from previous studies at Eriksholm where HA users have participated in detailed interviews concerning own-voice issues.

In order to be able to convince others, the OVQ questionnaire was developed to probe into the various own-voice issues that we have identified, including but not restricted to occlusion.

The OVQ is supposed to be able to demonstrate both the significance of occlusion, and that some HA users have own-voice issues – even when their occlusion problems have been essentially solved.

Instead of developing the OVQ based on our own preconceived ideas about own voice, the contents have been based on actual statements made by HA users – using the exact same words and formulations as far as possible.

The user statements have been collected during:

- Clinical hearing-aid fitting practice
- A focus-group interview on own voice
- A number of individual interviews on own voice

The intention has been to avoid technical language and make the contents both easily understood and relevant to the respondents.



Using hearing-aid users' own statements

Inspired by the administration of the SSQ questionnaire (Gatehouse & Noble, Int J Audiol, 2004), the OVQ is filled in during an interview.

The interview approach has some clear benefits (e.g., as compared to sending the questionnaire to the respondents by mail):

- Reducing the risk of the respondent misunderstanding questions
- Reducing the risk of the respondent giving clearly erroneous answers
- Allowing more subtle questions
- Increasing the percentage of questions answered

However, the approach also has some drawbacks:

- It takes more time
- Interviewer may bias the respondent
- Different interviewers may be inconsistent with each other

The two latter points have been addressed by providing a comprehensive written instruction to the interviewer.

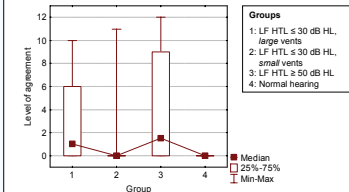
HA users use a lot of different words, expressions and metaphors to describe the sound quality of their own voice – and different people may very well use different words to describe the same sensation.

The OVQ includes two sections with a number of different descriptive statements about the sound quality of own voice.

One section (B – see the flap) includes metaphors and descriptive language commonly used by HA users in relation to own voice. The other section (C) includes 22 different single words which have been used to describe the sound of own voice, e.g., *dark, hollow, nasal, metallic and distorted*.

In both sections, it may very well be the case that a respondent only can relate to a subset of the statements while others yield a 0 response – or even N/A. Likewise, cultural differences may result in some of the statements being more relevant in some languages than others.

Example from pilot study: B6: "I find that my own voice sounds as if there is an echo".



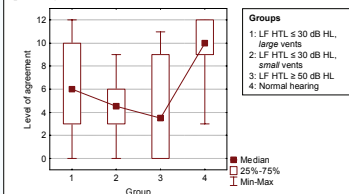
- Low median scores but high max. scores in all HA user groups, most pronounced in group 3. This problem is not experienced at all by the NH group.

Some HA users have reported that their own voice has a detrimental effect on their ability to hear others – particularly in ping-pong-like discussions.

This section (D) includes a number of statements about situations where the respondent speaks while being in a group of people who also speak. The other people in the group are supposed to be well-known to the respondent so interrupting each other should be no problem in terms of politeness.

The statements in the section partly deal with (the level of) own voice in comparison with the voices of others and partly the ability to follow a conversation while speaking. As a special condition, the ability to listen while eating is also included.

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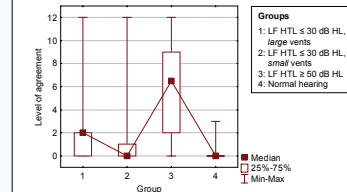
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Many HA users report problems in finding the appropriate level of own voice, e.g., when speaking in a background noise or when speaking across a distance.

Section E deals with different situations where different vocal levels have to be used. The statements address the respondent's own experience of the task of finding the right level for the occasion as well as other people's experience of the level of the respondent's voice.

The following section F asks about whether the respondent uses one or more of a number of different strategies to find the appropriate level of own voice.

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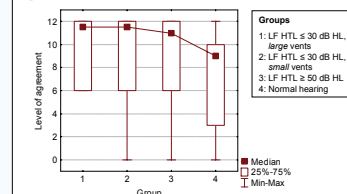
- The problem is most pronounced in group 3 – but high scores are also present in the two other HA user groups. Only low ratings are seen in the NH group.

The first section (A) of the OVQ includes three rather general questions about own voice: Whether own voice sounds good, whether own voice sounds unfamiliar, and whether the respondent feels confined or congested when speaking.

In a later section (I – see the flap) three other general questions are asked: Whether the sound of own voice is a problem, whether the sound of own voice is important, and whether the respondent strains herself less for others to hear her, the better she hears others.

While the questions in section A are rather straightforward, section I includes questions which may require some introduction to be understood and answered correctly. This explains the separation of the two sections and their respective positions in the questionnaire.

Example from pilot study: I2: "The sound of my own voice is important to me".



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At the present time, the OVQ has only been used in pilot studies at Eriksholm and in Oldenburg, Germany. The practical experience with the OVQ and the amount of collected data is thus still limited.

We are therefore very interested in distributing the OVQ for use by others – and we would be very curious to hear about their opinions and experiences. This will without doubt improve both the further development of the questionnaire and our understanding of own-voice issues.

The entire OVQ package can be obtained by everyone interested by sending an e-mail to:

Niels Søgaard Jensen at nsj@oticon.dk.

## Future

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- reformulate questions
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