Effects of hearing aids on music perception

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Motivation for PhD

- Many hearing-aid users complain that they are not satisfied with their hearing aids for listening to music.
- Hearing aid signal processing and fitting has mainly been designed to optimise speech intelligibility.
- Speech and music signals differ. Music signals are more varied depending on type of instruments and types of music. Some music has much larger dynamic range than speech.
- Expectations are different for music and speech. Speech is essential for daily communication whereas music is for pleasure.

Aims and Design of survey

Aims of study:
- To assess the extent to which hearing aids improve or worsen the experience of listening to live and reproduced music, and to establish the nature and prevalence of any problems.

Study design:
- The questionnaire was generated using Survey Monkey and was active on the Internet from 13th March 2013 to 21st January 2014.
- The survey consisted of 21 multiple-choice and one open question.

Study Population

1077 respondents

209 Normal-hearing
58 Used hearing aids less than 1 hour per day
273 Did not answer the questions related to music
14 Used at least one BAHAs or CI
20 Did not answer the questions related to music

1077 respondents

Only results from these 523 respondents will be presented here.

Respondent Demographics

- Slightly more female respondents.
- Most respondents were aged 21-40 years.

What age are you? (in years)

Percentage of respondents

Female

Male
More than half of the respondents did not have any musical training.

Nearly half of the respondents reporting having a sensorineural hearing loss.

More than half reported that they had greater hearing loss at high than at other frequencies.

87% of the respondents had a hearing loss for more than 5 years.

88% of the respondents wore behind-the-ear hearing aids.
Experiences with loudness

- Only 28% reported that hearing aids helped them hear soft passages in music without the louder parts being too loud.
- 25% reported that their hearing aids make the loud parts too loud.
- This suggests a need to improve amplification strategy.

Experiences with distortion

- 53% “sometimes” or “often” experienced problems with distortion.
Experience with frequency response

When you listen to music using your hearing aids do you feel that the hearing aids:

- Make music louder
- Help hear soft passages
- Make loud parts too loud
- Make music sound more clear
- Make music sound less clear
- Make it easier to hear individual instruments
- Make it harder to hear individual instruments
- Sometimes make the music seem distorted
- Often make the music seem distorted
- Make music too bright or shrill
- Make the music lacking in bass

• 21% reported that their hearing aids make music sound brighter or shrill.
• 17% reported that their hearing aids make music seem lacking in bass.
• Too much gain at high relative to low frequencies

Experiences with Clarity, Tone Quality, and the Ability to hear out Individual Instruments

• Larger proportions found that their hearing aids make music sound more clear and that they make it easier to hear individual instruments.
• Smaller proportions found the opposite.
• However, slightly larger proportions found that hearing aids worsened tone quality than the proportions finding that hearing aids worsened tone quality.
• Indicates that many find that their hearing aids improve music enjoyment but also that some find that hearing aids worsen this.

Conclusions

- Most respondents find their hearing aids helpful when listening to music.
- But the results also indicate a need to:
  • Improve feedback cancellation systems
  • Improve the amplification strategy
  • Improve tone quality which perhaps could be done by improving the balance between gain at high and low frequencies

Limitations of the study

- The reliability of the responses is limited, especially with regards to information about hearing loss and hearing aids.
- The use of multiple-choice questions and the limited number of questions means that the information obtained is not very detailed.
- It is not possible to infer causality from survey data e.g. it is not possible to know to what extent the problems reported are caused by the hearing aids themselves and to what extent they are caused by poor fitting.

However, the study has revealed some interesting trends that can inspire more controlled studies and hearing aid development in the future.

More information...

Music and Hearing Aids
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Acknowledgements

Thanks for listening!