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Subjective and objective evaluation methods of complex hearing aids

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Background:

Hearing aids and their components are evaluated with different methods at several stages during their development. The evaluations are done by the manufacturers themselves as well as by external research and clinically oriented partners. Electroacoustical measurements based on current standards do not reflect the abilities of complex hearing aids. Therefore, new objective methods which reflect as much as possible subjective judgements by patients should be applied as evaluation methods for today's signal processing algorithms as they are crucial for the success of the devices.

Methods:

Subjective evaluation methods include speech intelligibility tests, sound quality judgements and questionnaires. Objective measures are based on a comparison of the output of the hearing aid to its input. They determine primarily the effect of compression and noise reduction algorithms. Within this study, those algorithms were implemented on a PC and different evaluation tools were applied.

Results:

The comparison between objective and subjective evaluation methods shows a dependency between most of them. The highest correlation was found for the dynamic compression algorithm under controlled laboratory conditions. Subjective and objective assessments of noise reduction algorithms vary and depend strongly on the focus of the subjective rating, e.g. speech quality vs. noisiness. In addition, subjective judgements are influenced by the hearing loss which is not yet included in all objective methods. Own results are compared to findings from other research groups.

Conclusions:

New evaluation tools are necessary for the analysis of complex hearing aids. Several reasonable approaches have been proposed by different research groups which can be applied under certain conditions. Still under discussion is the transfer of the results in the laboratory to real world environments.

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