

Listening effort and speech intelligibility in simulations of cochlear implants

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Purpose: Besides improving speech intelligibility, there may be additional ways that cochlear-implant (CI) processing can benefit CI users, for example by reducing listening effort. The purpose of the present study was to develop a method to quantify listening effort and to show that best speech intelligibility and lowest listening effort could be observed at different program settings.

Methods: A dual-task paradigm was used to evaluate changes in speech intelligibility and listening effort with varying numbers of spectral channels of CI simulations. The primary and secondary tasks, performed simultaneously, compete for limited cognitive resources. An increase in effort associated with the primary task results in decreased performance on the secondary task, providing a measure for effort. In the present study, response times on a linguistic (rhyme judgment) and a non-linguistic (mental-rotation) secondary task reflected changes in effort associated with the primary intelligibility task.

Results: Increasing the spectral resolution improved both intelligibility and listening effort. However, while intelligibility reached a plateau at about 6 channels, response times on the secondary tasks continued to decrease until 8 channels.

Conclusion: Listening effort benefits in CIs could vary in a different way than the intelligibility benefits, and may therefore not be observed with intelligibility tests alone.

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