

Title: Age-related deficits in Spanish-accented speech understanding for cochlear-implant listeners are partially overcome with audiovisual presentation

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When auditory and visual speech cues are presented together, listeners typically obtain an *audiovisual (AV) benefit*, or a boost in speech understanding compared to auditory-only (AO) or visual-only (VO) presentations. Because cochlear-implant (CI) users receive degraded speech input through their sound processors, they tend to utilize visual cues more readily than normal-hearing (NH) listeners (i.e., they show relatively larger AV benefits). Two such factors could potentially diminish AV benefit in CI users: foreign-accented speech and aging. The former is a stimulus-related factor, which alters temporal auditory and visual cues, and the latter is a listener factor that is associated with temporal processing deficits. In particular, the effect of aging is important to consider because most adult CI test populations are middle-aged and older.

The AV benefit for speech understanding was measured using IEEE sentences recorded in English by one native English and one native Spanish talker. The sentences were presented in auditory-only (AO), visual-only (VO), and AV conditions. We tested a group of 15 CI listeners and a control group of 15 age- and performance-matched NH listeners. Performance-matching was achieved by processing speech with a noise vocoder and testing the NH participant with the number of channels that best reproduced their age-matched CI listener's baseline speech understanding score.

Results revealed that when auditory speech information was degraded by CI sound processing or vocoding, the presence of visual cues improved speech understanding (i.e., the AV benefit was observed). While understanding of Spanish-accented speech was poorer than unaccented speech understanding, listeners achieved the same magnitude of AV benefit for both types of talkers. No difference in performance between the CI listeners and NH listeners presented vocoded speech was observed. Older age was associated with poorer speech understanding for CI users, and this effect of aging was particularly prominent for the accented speech condition. Finally, access to visual cues partially helped the CI listeners overcome these age-related decrements.

In summary, in addition to auditory information, visual information is useful for understanding both unaccented and Spanish-accented speech for CI users. This is particularly true for older CI listeners who demonstrate more difficulty with understanding of Spanish-accented speech. Given that we live in a multicultural society where we are often interacting with individuals with accents, this information could be useful for improving speech understanding and communication outcomes for CI users.

Acknowledgement of Funding: This research is supported by NIH/NIA grant R01 AG051603.

Poster Only

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