

Tolerance to Cross-modal Asynchronies in Early Auditory Processing of Speech Declines in Older Adults

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In face-to-face conversations, listeners analyze and combine speech information obtained from both hearing and seeing a speaker. Access to audiovisual speech typically leads to more robust recognition of speech than listening alone. This audiovisual benefit can be found for younger and older listeners. Information from the two modalities does not have to arrive necessarily at the same time to be considered jointly when identifying speech. Rather, listeners tolerate some degree of asynchrony when auditory and visual information become available. How listeners' tolerance to audiovisual asynchronies in speech changes across the adult lifespan is, however, still largely unknown. One complicating factor is that results based on behavioral measures could reflect age-related differences in response bias rather than in sensitivity. To avoid problems with response bias, the present study measured event-related potentials (ERPs) to directly assess audiovisual interactions during early auditory perception. The first negative peak (N1) at around 100 ms after an acoustic onset is typically smaller when auditory speech is accompanied by visual speech than when presented alone. This reduction in N1 amplitude has been interpreted as reflecting more efficient auditory processing in the presence of visual speech. We tested older and younger adults' tolerance to audiovisual asynchrony for cross-modal interactions during this early auditory processing of speech. In a simultaneity judgment task, the spoken syllable /pa/ was presented audiovisually as originally recorded (in sync) or manipulated to be out of sync. Asynchronies were created by shifting the acoustic onset to either lead or lag the visual information. Two asynchronies were selected as they are most often reported as out of sync (300 ms auditory lead; 500 ms visual lead) and two others as they are most often reported as in sync (67 ms auditory lead; 233 ms visual lead). Additional trials with auditory-only or visual-only presentations of the syllable were interspersed. Our results replicate a prior report that older and younger adults show similar-sized N1 reductions for synchronous audiovisual speech, compared to auditory-only speech. The size of cross-modal interactions was modulated by asynchrony level, but differently so across age groups. Older adults and younger adults were similarly affected by auditory leads, but older adults were more sensitive than younger adults to visual leads. The time window during which leading visual information can facilitate early auditory processing of speech is therefore more limited in older listeners than in younger listeners.

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Poster Only