**Cognitive factors contribute to speech perception: Implications for sound change actuation**

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Human verbal communication is a social process that involves interactions between a talker and an interlocutor. In order for effective communication to occur, the interlocutor must correctly perceive the talker's intended message. Speech perception is a crucial factor in communication, and ultimately sound change (Lindblom, 1990), because individual differences in perceptual abilities impact on communication success. A challenging aspect of human communication is that each human talker possesses a unique vocal tract that directly affects the way their speech is produced (e.g., Fant, 1973). Listeners are sensitive to these differences in talker identity, but nevertheless understand speech quite effectively, but talker variability may place demands on working memory (Nusbaum & Morin, 1992). If that is the case, then we would expect a greater influence of talker variability on speech perception in individuals with poorer or less available working memory abilities. We performed two experiments to test the potential influence of cognitive factors on speech perception.

In Experiment 1, we examined the effect of talker variability on word identification in non-native speakers, whose cognitive resources in L2 speech processing are expected to be reduced due to reduced L2 proficiency relative to native speakers. A native English monolingual group, and a group of native Chinese learners of English completed a word-spotting task in which a random sequence of words was presented, and participants pushed a response button whenever a particular target word was heard. Crucially, half of the blocks contained speech from a single talker, whereas the other half contained speech from multiple talkers. The Chinese group was both slower to identify target words and missed more targets than the native English subjects. In Experiment 2, 22 older adults completed the same word monitoring task and a battery of cognitive tests, comprised of the Mini-Mental State Exam (MMSE), and the Auditory Working Memory subtest from the Woodcock-Johnson III Tests of Cognitive Abilities. Older adults were chosen because they showed reduced working memory relative to younger adults. The older adults were slower in the mixed condition than in the blocked, however, but did not differ in their number of misses across the two conditions. Crucially, Auditory Working Memory scores correlated with the number of target words missed in the more difficult mixed-talker condition, $r(16) = -.477$, $p = .045$.

The present series of experiments has demonstrated that talker variability increases cognitive load in a word monitoring task. Effects of this increased load were observed both in slower recognition times as well as in the number of missed word targets in blocked- versus mixed-talker conditions. Experiment 1 demonstrated the effect of talker variability on language proficiency. Nonnative listeners were more affected by talker variability than native English speakers. Experiment 2 provides converging evidence for the argument that talker variability increases cognitive load by demonstrating that performance in a word monitoring task with blocked and mixed talker presentation conditions correlates with working memory ability.

The findings demonstrate that subject-internal cognitive factors (working memory in this case) are associated with the extent to which talker variability influences speech perception. As how listeners perceive speech ultimately affects phonetic category membership, we hypothesize that working memory is a driving force of actuating sound change.