

How Do Spoken Sentence Predictability and Cognitive Load Affect Cognitive Spare Capacity in Elderly Adults?

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Listening effort is needed to understand speech that is degraded by hearing loss and/or a noisy environment, and this in turn reduces cognitive spare capacity (CSC), the amount of cognitive resources available for allocation to other, concurrent tasks. Predictive contexts aid speech perception accuracy, but how sentence context affects CSC is not known. Here, we compare the impact of predictive sentence context and cognitive load on behavioral measures of CSC in elderly adults with and without hearing loss. Participants listened in a noisy background to spoken sentences in which sentence-final words were either predictable or not predictable. Cognitive load was manipulated by asking participants to remember sequences of visually-presented digits during each trial. Digit sequences were either short (low load) or long (high load). Participants were required to pass a screening test for cognitive impairment and were divided into low or high cognitive capacity groups based on a pre-test of working memory. Accuracy and response times for both words and digits were facilitated by sentence predictability, indicating that CSC was greater when sentences were predictable. In addition, response times for both words and digits and accuracy for digits were impaired under cognitive load, reflecting decreased CSC under high cognitive load. Participants' hearing status and baseline cognitive capacity generally did not moderate these effects. However, participants with hearing loss responded more slowly to words and less accurately to digits than participants with normal hearing. Results suggest that predictable sentence contexts support CSC and thereby improve ease of listening in elderly adults.

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