

Speech rate and language processing in older adults: Is slow speech better?
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Older adults' declines in language processing abilities are sometimes attributed to a slowing in overall processing speed (e.g., Salthouse, 1985). On this account, language produced at a slower speech rate should be beneficial for comprehension. However, despite older adults' subjective opinions on the benefits of slower speech (e.g., Opler et al., 1991), classic studies on this topic have often been unable to show that slow speech is helpful for listeners in nonclinical populations (see Small et al., 1997 for a review). This is the case even with so-called "elderspeak"-- a style some talkers spontaneously adopt when speaking with older adults. E.g., in a study designed to isolate beneficial features of elderspeak, Kemper and Harden (1999) found that repetitions and elaborations were most helpful, and that acoustic-level factors such as exaggerated pitch and slower speech rates had no positive effect. Further, some research has reported that slow speech can hinder comprehension in individuals with low working memory capacity (Small et al.). This could arise from the "spacing out" of sentence elements in time (in turn making the task of integrating these elements more difficult), or from disrupting natural prosodic patterns. In the current study, we used a Visual World (VW) paradigm to conduct a contemporary exploration of the acoustic effects of elderspeak on older listeners' comprehension. Our focus was listeners' ability to use syntactic cues to resolve grammatical category ambiguities at the lexical level (e.g., *saw* [V] vs. *saw* [N]). Previous VW studies have shown that younger listeners are highly effective at using syntactic cues in an unfolding sentence to resolve ambiguities in real time (Magnuson et al., 2008). This type of lexical ambiguity therefore provides an intriguing test case. One possibility is that the slower speech rate of elderspeak might reduce the salience or accessibility of local syntactic cues due to the 'spacing out' of sentence elements (and the disruption to normal sentence prosody might also reduce otherwise helpful cues). If so, elderspeak may have a negative effect on listeners' ability to suppress the activation of the syntactically inappropriate option. Alternatively, elderspeak may provide listeners additional time to apply syntactic cues to resolve lexical ambiguity. Thus, listeners should show an increased ability to suppress the activation of incompatible alternatives with elderspeak. Participants (20 older adults, $M_{\text{age}} = 72.81$) viewed a display containing four photographs placed in a 2 x 2 grid (16 critical trials). Each display was accompanied by a recorded sentence (e.g., *George saw a car crash last evening*) and participants were instructed to click on the item mentioned in the recording (e.g., car crash, see Figure). In addition to the patient-target, the display contained the noun member (*saw*-tool) of a homophone pair for which the other member was the inflected main verb in the sentence (*saw*-past tense of *see*). Various fillers masked any contingencies arising in the critical trials. We also included control trials in which the competitor was replaced with an unrelated item. Sentences were recorded from a female native speaker of English who was asked to provide a version of all stimuli for either a younger adult (normal speech) or older adult (elderspeak), ensuring that sentences could be understood by both addressee (the pairing of items to conditions was cycled such that participants only heard a sentence at one of the two speech rates). The measure of interest was the likelihood of generating a fixation to the image of the noun homophone competitor within an interval spanning from verb onset to the average verb offset (440 ms) plus a 200 ms margin. Results showed listeners were in fact more likely to fixate the competitor in the normal sentence condition (38% of trials), compared to the elderspeak condition (17%, $p = .03$ in a logistic mixed-effect model). No differences were found with non-homophone controls ($p = .78$, $M = 21\%$), indicating the effect is not due to differences in the amount of available speech information. Together the results demonstrate that, by focusing on lexical-level factors and by using on-line implicit measures, the empirical evidence in fact supports the notion that elderspeak benefits real-time comprehension, consistent with older adults' subjective impressions.

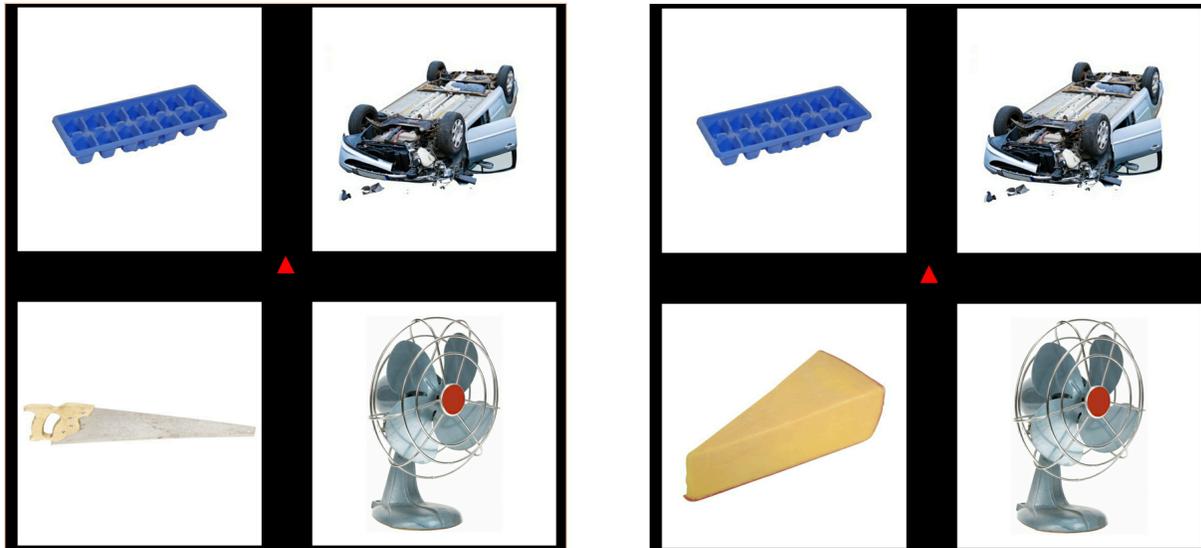


Figure. Example of experimental display in homophone-competitor condition (left panel) and control condition (right panel). Corresponding sentence is *George saw a car crash last evening*.

References

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