Error-based Syntactic Priming Effects in Neurologically Intact Middle-aged and Older Adults

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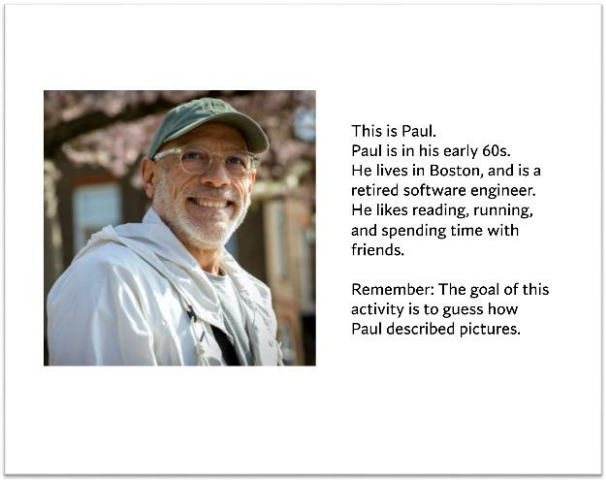
Syntactic priming, which is the tendency to repeat recently encountered sentence structures (Bock, 1986; Pickering & Ferreira, 2008) can be a therapeutic tool for improving sentence production and supporting recovery of impaired sentences in people with aphasia (PWA). While broadly studied in younger populations, less is known about syntactic priming in middle-aged and older adults, which is the most age-appropriate comparison group for understanding sentence processing in people with aphasia (PWA), as strokes tend to occur after the age of 40 (Simmons-Mackie, 2018). Additionally, forced prediction may increase the salience of prediction errors , leading to enhanced error-based implicit learning (Gruter et al., 2021), which may be especially useful in aphasia therapy (Middleton & Schwarts, 2012). Therefore, we adapted the paradigm developed by Gruter et al. (2021) to examine whether engaging middle-aged and older adults in explicit predictions to enhance their prediction errors through a guessing game (GG) condition would lead to stronger priming effects compared to a classic repetition condition. Similar to what Gruter et al. (2021) found in their L2 learners, we expected our participants to show increased priming in the GG condition.

Sixty-four neurologically intact English-native adults aged 40 – 91 years (M = 60) participated in a two-session experiment. They were randomly assigned to either a guessing game (GG) or control condition (CC). Both conditions used a picture-description task that focused on the alternation between prepositional object (PO) and double object (DO) dative constructions. In the GG condition, participants guessed how a virtual interlocutor ("Paul") would describe pictures before hearing the actual description (prime sentence), requiring them to predict the sentence structure before hearing it, to encourage prediction errors and, in turn, error-based learning. In the CC condition, they simply repeated Paul's prime sentence and then described the target pictures themselves. Both conditions included baseline, priming, immediate post-test (session 1), and delayed post-test (session 2) phases. Production of DO constructions was analyzed across the two sessions.

Contrary to our expectations, mixed-effects logistic regression analysis revealed no significant differences in immediate priming or longer-term adaptation between conditions, nor significant priming effects in either the GG and CC groups. While not significant, the effects were numerically in the expected direction, with the GG condition showing larger increases in DO production. Exploratory analyses found no significant correlation between age and priming effects, nor differences across task phases.

Several factors may account for these results. First, explicit nature of the guessing task may have engaged declarative memory processes, potentially interfering with the implicit learning mechanisms associated with syntactic priming (Chang et al., 2012; Heyselaar et al., 2017). Second, the absence of lexical overlap between prime and target sentences may have reduced the overall priming effect. Finally, the absence of linguistic insecurity (Preston, 2013) among our native English-speakers may have diminished the effectiveness of the priming task compared to the L2 learners in Grüter et al.'s (2021) study.

A



B

Figure 1. Prime trial in the guessing-game (GG) condition (A: the screen where "Paul" is introduced to the participant. B: a sample prime trial where participant should guess how Paul described the picture before hearing the actual description (prime sentence). This required them to predict the sentence structure. .)

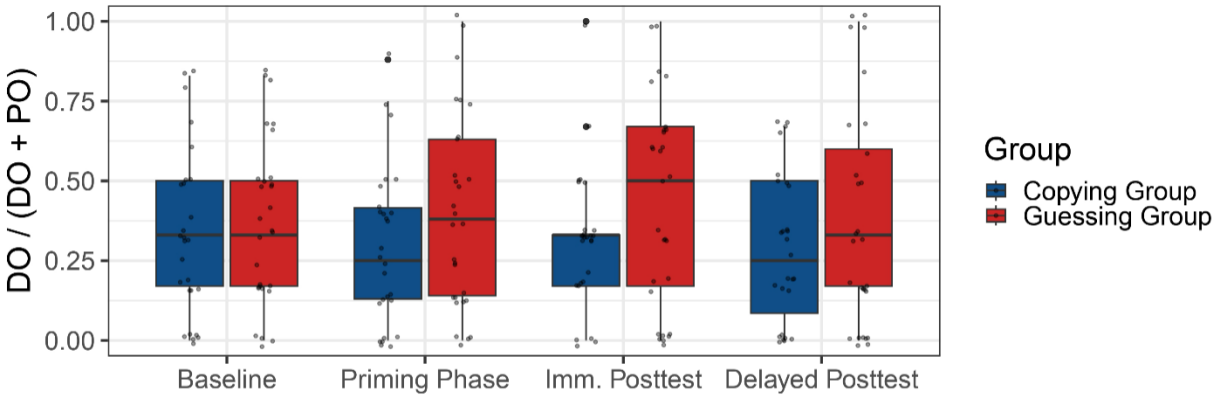


Figure 2. Box and whisker plot of accuracy scores (proportion of DO constructions) by group and task phase.

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