No Age-Related Differences in Recognition Memory for Predictable Words

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Introduction: Language comprehension is a highly predictive process in which individuals generate expectations of upcoming information based on context. Past research has shown that predictable but unencountered (i.e., unseen) words during a reading task result in false memory in a subsequent recognition memory test (Haeuser & Kray, 2022a; Haeuser & Kray, 2022b; Hubbard et al., 2019). Moreover, previous research has demonstrated that in the DRM paradigm, older adults typically have higher rates of false recognition and recall of lure words than younger adults (e.g., Balota et al., 1999; Norman & Schacter, 1997; Tun et al., 1998), suggesting age-related decline in recognition memory as a function of activation of related semantic features. Because constraining contexts have been shown to lead to pre-activation of relevant semantic features (Luke & Christianson, 2016; Karimi et al., 2024), older adults may be more susceptible to false memory as a function of lexical predictability. In fact, past research has shown age-related increases in false memory rates for predictable but not encountered lures (Haeuser & Kray, 2024). However, in all previous studies, predictable words are replaced with less predictable words to test recognition memory. For example, in *The hungry monkey peeled the* ____, *banana* is replaced with, say, *orange*, and then false memory rates for *banana* is measured. By virtue of having to process the less predictable word, readers necessarily: 1. pay an integration cost, and 2. need to suppress the more predictable word. Given that suppression of the activated lexical items relies on cognitive control, and that this cognitive ability declines with age (Dywan et al., 2001; Gazzaley and D'Esposito, 2007), elevated false memory for predictable words may arise from low cognitive control on the part of older adults. To investigate this, we manipulated sentence contexts by removing predictable words from the critical sentences, thereby eliminating the encoding and suppression costs, as illustrated in Table 1. We explored age-related differences in recognition memory for predictable words in self-paced reading task with target words which were either present or missing within the critical sentences followed by a surprise recognition memory test.

Method: 112 native English speakers (58 young adults, mean age = 18.8, and 54 older adults, mean age = 69.9) took part in the study. Participants read 100 critical sentences (and 60 fillers) at their own pace. The critical sentences varied in their degree of constraints for the target word, (Low vs. High constraint) as well as in the presence of the target word (*banana;* present vs. missing), as shown in Table 1. At the end of the experiment, participants completed a surprise recognition memory task, including 100 recognition memory words, in which they decided whether the given word was *new* (i.e., not seen during reading, such as *orange*) or *old* (i.e., seen during reading, such as *banana*).

Results: We used mixed-effects regression models to test the effects of age and predictability on recognition memory sensitivity (D-prime). As shown in Figure 1, D' sensitivity in high-constraint sentences (High Constraint) was significantly lower than that in low-constraint sentences (Low Constraint). This finding is consistent with previous studies, reporting greater false memory in highly constraining contexts (Hubbard et al., 2024). The main effect of age group (young vs. old) on D' sensitivity was not significant, suggesting no age-related differences in susceptibility to prediction-induced false memory. In addition, the interaction between age and predictability was not significant, meaning that age does not modulate the effect of contextual constraint on recognition memory. The results of the regression analysis are presented in Table 2.

General Discussion: The results indicate that predictable but unpresented words in a high constraint context lead to higher rates of false memory, which is consistent with previous research on prediction-induced memory distortions (e.g., Hubbard et al., 2019). Age did not have a significant effect in recognition memory as a function of contextual constraint. These findings suggest that prediction-induced false memory may be caused by diminished cognitive control, and/or the integration cost of less predictable words, rather than age per se. However, further research is needed as our sample of older adults were cognitively high functioning, and did not show significant declines in cognitive control relative to younger adults.

Table 1. Sample experimental sentence.

a) High constraint_present: The hungry monkey was trying to peel the banana at breakfast.
b) High constraint_missing: The hungry monkey was trying to peel the ### at breakfast.
c) Low constraint_present: My picky younger brother refused to eat the banana at breakfast.
d) Medium constraint_missing: Because of fruit flies, he threw away the ### at breakfast.

Figure 1. D Prime results by Age and Constraint

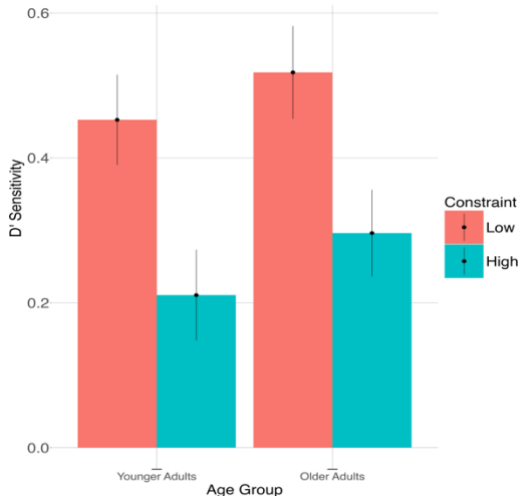

Figure 2. sample of a surprise recognition memory

Table 2. Regression results

Fixed Effect	Estimate	Std. Error	df	t value	Pr(>|t|)	Signif.
Intercept	0.48527	0.04416	214.92	10.988	< 2e-16	***
Age_Group_C	0.06543	0.08833	214.92	0.741	0.460	
Constraint High	-0.23184	0.05650	111.00	-4.103	7.81e-05	***
Age_Group_C: Constraint High	0.02023	0.11301	111.00	0.179	0.858	