AGING AND TEXT INTEGRATION ACROSS SENTENCE BOUNDARIES: AN EYE-MOVEMENT STUDY

Xuefei Gao[1], Matthew C. Shake[2], & Elizabeth A. L. Stine-Morrow[1]
[1]Beckman Institute and Department of Educational Psychology, University of Illinois at Urbana-Champaign, Urbana, IL 61801;
[2]Department of Psychology, St. Bonaventure University, St. Bonaventure, NY 14778

INTRODUCTION

※ One account of age differences in text memory (Johnson, 2003) is that older adults are less likely to construct a distinctive, integrated, and resilient semantic representation of the ideas from the text (i.e., textbase), but that their representation of the situation model is relatively robust (Radvansky & Dijkstra, 2007; Stine-Morrow, Miller & Hertzog, 2006). However, there is very little empirical literature that examines how differential construction of these representations affects online comprehension. We investigated this question in an eye-movement paradigm in which younger and older participants read texts in which a single target word was constrained by either the propositional content (textbase) or implied situation of the earlier context.

METHODS

Participants

※ Participants were 29 community-dwelling old and 31 university students. The age groups did not differ in vocabulary, but younger adults had better working memory (WM) than the old, t(58)=6.58, p<.001 (see Table 1).

Table 1 Individual Difference Measures for Two Age Groups

Age Group	Age Range	Mean Age	WM (SE)	Vocabulary (SE)
Young	19-37	23.3	6.5 (0.2)	47.8 (1.0)
Old	61-83	69.0	4.3 (0.2)	46.4 (1.5)

Materials and Design

※ Materials were 36 two-sentence passages varying in the level of contextual constraint imposed by the first sentence for a target word (underlined) in the second (Yang et al., 2007) (Table 2).

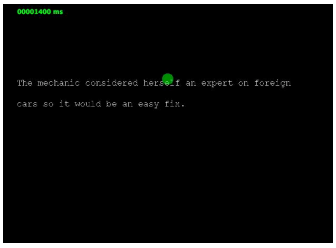
Table 2 Samples of Experimental Materials

Paraphrase (textbase)	After being dropped from the plane, the bomb hit the ground and blew up. The explosion was quickly reported to the commander.
Inference (situation model)	After being dropped from the plane, the bomb hit the ground right on target. The explosion was quickly reported to the commander.
Control	After the bomb was stored on the ground, the plane dropped off the crew and left. The explosion that occurred last week was already forgotten.

※ Materials were counterbalanced across conditions so that participants read only one version of each passage. Three stimulus lists were created in which passages were presented in a single random order for all subjects.

Procedure

※ Participants read passages on a computer screen while their eye movements were monitored by an Eye-Link II eye-tracker (see *Demo* below). Occasionally, after reading some passages a randomly selected third of the passages, participants answered a Yes/No comprehension question to assure that they read for meaning.



RESULTS

※ Dependent variables were Gaze Duration (GD; the sum of fixation durations when first encountering the critical word, reflecting early lexical access) and Regression Path Duration (RPD; the sum of all fixation durations at the critical word before going forward, including regressive fixations, reflecting later conceptual integration processes) on the critical word.

※ GD on the target was shorter for textbase condition than for the control, F(1,58)=3.98, p=.05. Although the age by condition interaction did not reach significance, F(1,58)=2.31, p=.13, textbase-level facilitation on lexical access was reliable for the younger adults, t(30)=2.53, p<.01, but not for the older adults, t<1. In contrast, both age groups were facilitated by situation-level context in the early stages of lexical encoding, F(1,58)=10.00, p<.01 (Figure 2). This effect was reliable for the old, t(28)=1.94, p<.05, and for the young, t(30)=2.48, p<.01.

RESULTS (cont.)

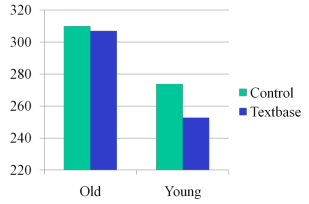


Figure 1. Textbase facilitation for GD (in *ms*)

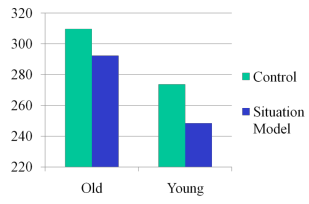


Figure 2. Situation model facilitation for GD (in *ms*)

※ RPD on the target word was facilitated by textbase-level context (see Figure 3), F(1,58)=20.46, p<.001, and situational context (see Figure 4), F(1,58)=22.48, p<.001, relative to the control. Both younger and older readers demonstrated contextual facilitation in both conditions, p<.01, for all comparisons, F<1, for both age by condition interactions.

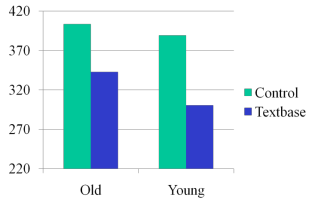


Figure 3. Textbase facilitation for RPD (in *ms*)

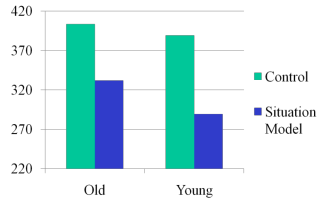


Figure 4. Situation model facilitation for RPD (in *ms*)

Comprehension

※ There was no age difference in comprehension accuracy, F<1. Comprehension for control condition was worse than the other two conditions, F(2,116)=24.87, p<.001, but this trend did not vary with age, F<1 (Table 3).

Table 3 Mean (SE) Comprehension Accuracy Across Experimental Conditions

	Old	Young
Textbase	0.93(0.02)	0.96(0.02)
Situation Model	0.92(0.03)	0.91(0.03)
Control	0.76(0.03)	0.81(0.03)

CONCLUSIONS

※ Younger readers use the textbase representation to guide lexical access and meaning integration.
※ Older readers can use textbase context to constrain comprehension, but it occurs more slowly, affecting later integration processes more than early lexical processing.
※ At situation model level, there is age equivalence in contextual facilitation in both lexical access and integration.
※ These data are consistent with the Radvansky et al. (2001) "textbase scaffolding" hypothesis, that older readers do construct a textbase representation that is available at least briefly to support situational comprehension.

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Email: gao5@illinois.edu