AGE DIFFERENCES IN THE EFFECTS OF LEARNING GOALS ON SELF-REGULATION IN READING

Matthew C. Shake, Joseph R. Miles, Soo Rim Noh, Adam D. Joncich, Susan J. Panfil, and Elizabeth A. L. Stine-Morrow
University of Illinois at Urbana-Champaign

RATIONALE

Age differences in memory for text are well documented (Johnson, 2003). However, the conditions that moderate age-related deficits in text recall are not well understood. It is plausible that there are age differences in the extent to which goals guide memory processing (e.g., West et al., 2001). Evidence also exists that memory beliefs may impact allocation of effort in reading difficult texts (e.g., Miller, & Gagne, in press). With this in mind, this study sought to address the following:

- Do older and younger adults self-regulate attentional resources so as to effectively meet learning goals?
- Are young and old adults' beliefs regarding their own memory processes and capacities predictive of this self-regulative effectiveness?

METHODS

	Young	Old
N	33	40
Age Range	19-26	51-80
Age † *	21.05 (1.45)	64.33 (8.14)
Working Memory † *	5.44 (1.20)	3.98 (1.04)
Vocabulary †	48.05 (7.18)	49.00 (10.38)
Education †	14.53 (1.43)	15.47 (2.71)

† Means reported with standard deviations in parentheses
* Significant group difference
1 Average listening and reading span (Stine & Hindman, 1994)
2 Wechsler Adult Intelligence Scale-Revised (WAIS-R; Wechsler, 1987)

Materials, Design, and Procedure

Younger and older adults read 36 18-word sentences about topics in nature, science, and history, in a self-paced fashion on a computer so that sentence reading time was measured.

Participants read each sentence twice in a judgment of learning (JOL) paradigm in which they made estimates of their memory performance (0%, 20%, 40%, 60%, 80%, 100%) in advance of actual recall (see Figure 1). Half of the sentences were read after instructions that emphasized the goal of Accuracy (i.e., "take your time and read each passage carefully . . . aim to remember 80-100% of the information from the passages") and half were read after instructions that emphasized a goal of Speed (i.e., "read as rapidly as possible . . . aim to remember 40-60% of the information from the passages"). Materials were counterbalanced across instructional goal condition and the order of instructional goal condition was counterbalanced across subjects.

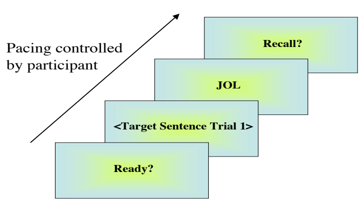

Figure 1. Illustration of stages in Judgment of Learning (JOL) paradigm. This sequence was performed twice for each sentence.

RESULTS

Reading Time Allocation and Recall Performance

Relative to younger adults, older adults showed less differentiation between the two instructional conditions, as indicated by significant Age x Goal interactions in both reading time allocation (Figure 2), $F(1,71) = 7.13$, $p=.009$, and recall performance (Figure 3), $F(1,71) = 13.82$, $p<.001$.

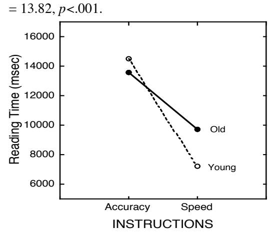

Figure 2. Reading Time as a function of age and instruction.

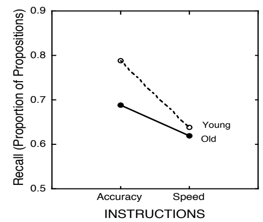

Figure 3. Recall Performance as a function of age and instruction.

Effective Reading Time

To further explore age differences in how time allocation paid off in terms of memory performance, a single index of Effective Reading Time (ERT) was computed by dividing Reading Time by the number of propositions recalled to yield a measure of the time required to encode one proposition. This analysis revealed that younger adults became especially efficient in the speed condition for the Age x Goal interaction, $F(1,71) = 6.23$, $p = .02$. Both older and younger adults were equally efficient in the Accuracy goal, $t(71) = 1.18$, $p = .68$. Older adults were only marginally more efficient in the Speed goal than the Accuracy goal, $t(71) = 1.81$, $p = .08$ (see Figure 4).

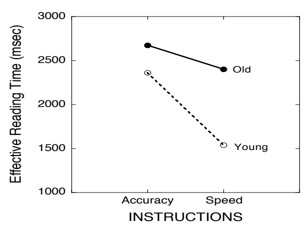

Figure 4. Effective Reading Time as a function of age and instruction.

Memory Monitoring and Self-Regulation

Gamma correlations between JOLs and Recall were significantly different from zero for both younger and older adults on the first trial ($M_o = .37$, $M_y = .32$), showing effective monitoring of memory. This was unaffected by age, $F(1,45) = .067$, $p=.80$, or goal condition, $F(1,45) = 1.75$, $p=.19$. Gamma correlations between JOLs on Trial 1 and Reading Time on Trial 2 and Pearson correlations between Recall on Trial 1 and Reading Time on Trial 2 were significantly negative for both older and younger adults ($M_o = -.24$, $M_y = -.30$; $M_o = -.30$, $M_y = -.32$), indicating that both young and old used a discrepancy reduction heuristic, in which relatively more effort is allocated to unlearned items. However, there were no effects of age, $F(1,60) = .01$, $p = .94$; $F(1,71) = .30$, $p = .59$, or goal condition, $F(1,60) = .16$, $p = .69$; $F(1,71) = .10$, $p = .75$ on either measure, suggesting that neither age nor learning goal affected the use of discrepancy reduction.

Memory Beliefs and Performance

Older adults' beliefs about their own memory capacities were correlated with Recall and Effective Reading Time, suggesting that older adults with more negative beliefs about their memory are less efficient in encoding text. Younger adults, on the other hand, demonstrated less consistent relationships between beliefs and text memory performance (See Table 1 below).

	MIA Subscales[1]					
	Task	Capacity	Change	Anxiety	Locus	Achieve
Older Adults						
Recall	0.28	0.45 **	0.51 **	-0.42 **	0.48 **	0.05
ERT	-0.19	-0.48 **	-0.54 **	0.37 *	-0.33	-0.03
Younger Adults						
Recall	-0.20	0.11	0.05	-0.18	0.12	-0.03
ERT	-0.38 *	-0.10	-0.20	-0.10	-0.14	-0.31 *
All Participants						
Recall	0.06	0.33 **	0.38 **	-0.28 *	0.28 *	-0.03
ERT	-0.30 **	-0.36 **	-0.49 **	0.16	-0.21	-0.07

Table 1. Correlations between subscales of the Metamemory in Adulthood Questionnaire (Dixon, Hultsch, & Hertzog, 1988) and Overall Recall (proportion of propositions) and Effective Reading Times.

1 The MIA subscale of Strategy was not included because none of the correlations were significant at $p<.05$
* $p<.05$
** $p<.01$

CONCLUSIONS

- Older learners appear to be less flexible in the allocation of effort to meet specific goals in learning information from text.
- However, younger learners may allocate relatively more effort than needed when faced with high-accuracy goals (i.e., show a "labor-in-vain" effect, Nelson & Leonesio, 1988)
- Relative to younger adults, older adults showed a stronger relationship between memory beliefs and text memory performance. Among older adults, memory beliefs affected encoding efficiency more than they affected the allocation of time, per se.

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Contact Information: E-mail: eals@uiuc.edu