

# AGE DIFFERENCES IN THE EFFECTS OF INSTRUCTION ON RESOURCE ALLOCATION IN READING

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## RATIONALE

Successful language performance is associated with strategic allocation of attentional resources (Stine-Morrow, Miller, & Hertzog, 2006), for example, conceptual integration at clause and sentence boundaries (wrap-up). Metacognitive controls, such as monitoring one's memory of the current state of learning and allocating effort efficiently, can play a role in reading (e.g., Miles & Stine-Morrow, 2004). We investigated age differences in the accommodation of reading strategies and effects on self-regulated reading by providing training in conceptual integration.

## METHODS

### Participants

	Young	Middle	Old
N	56	56	51
Age Range	18-37	40-59	60-83
Age <sup>†</sup>	23.43 (.69)	49.14 (.78)	70.10 (.75)
Education <sup>†</sup>	14.80 (.23)	16.29 (.37)	15.74 (.47)
Vocabulary <sup>†a</sup>	47.04 (1.26)	47.55 (1.42)	49.41 (1.10)
Working Memory <sup>†b*</sup>	5.36 (.16)	4.84 (.14)	4.17 (.09)

<sup>†</sup> means are provided with standard errors in parentheses

\* significant group difference

<sup>a</sup> Wechsler Adult Intelligence Scale-Revised (WAIS-R; Wechsler, 1987)

<sup>b</sup> average listening and reading span (Stine & Hindman, 1994)

### Design & Procedure

Subjects participated in two sessions a week apart in which they read a series of short passages using a moving window method (word-by-word presentation).

#### Instruction Manipulation

	Control Group	Instruction Group
Day 1	"...read each passage in a natural way...try to remember as much of the information from the passage as you can...you'll be given cues and asked to recall as much as you can about each topic."	
Day 2	"... we have found that people who perform this type of task more than once, usually show higher levels of memory performance, even for new information, than those who do not...try to remember as much of the information as you can."	"...sentences express a set of ideas... describe relationships among concepts... take the time as you read to think about these ideas and to actively relate each new concept to ideas...pause momentarily in the middle of sentences...important to do this at the end of each sentence before going on to the next sentence... think about how the concepts are related."

Participants made sensibility judgments (SJ) after the second sentence continuation and estimates of how much they would remember [judgment of learning (JOL)] after reading each passage.

Participants repeated the read-SJ-JOL sequence for the same set of passages.

At the end of each session, participants recalled everything they remembered about that topic with given cues (a cue from the first sentence for each passage) (e.g., *housewives in Bali*).

#### Stimulus Material

Materials were two sets of 24 passages (two sentences in each) about topics in nature, science, and history adapted from Stine-Morrow et al. (2001).

The sets of target sentences were equated in terms of word length, mean number of propositions, and syntactic complexity.

Nonsensical passages were created by mismatching sentence pairs for half of the passages in each set by using random assignment.

#### Sample Stimulus Passages

**Sensible**  
 Every morning housewives in Bali put some rice on small pieces of banana leaves to ward off sprits. The rice is considered to have magical properties.

**Nonsensible**  
 The atmosphere of Venus has temperatures similar to those of a self-cleaning oven and incinerates any foreign objects. During the day their speed is their best defense.

## RESULTS

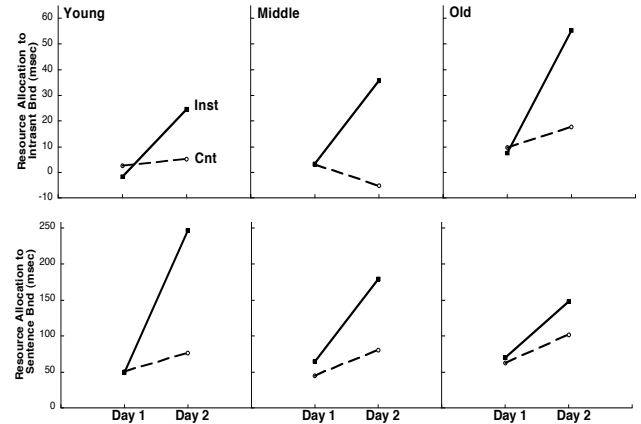
### Reading Times

Regression analysis of word-by-word reading times was used to isolate the resources allocated by individual readers to intrasentence (ISB) and sentence (SB) boundary wrap-up while controlling for other demands (e.g., word length, familiarity).

Resources allocated to conceptual wrap-up were analyzed in a 3 (Age) X 2 (Condition) X 2 (Day) X 2 (Process: ISB, SB wrap-up) repeated measures ANOVA, which showed that age differences in the effects of instruction on resource allocation depended on the type of conceptual processes,  $F(2,146) = 4.32, p < .02$ , for the four-way interaction.

Older adults exaggerated allocation to smaller intrasentence components with instruction.

Younger adults, in contrast, showed relatively greater allocation to conceptual integration at the sentence boundary.

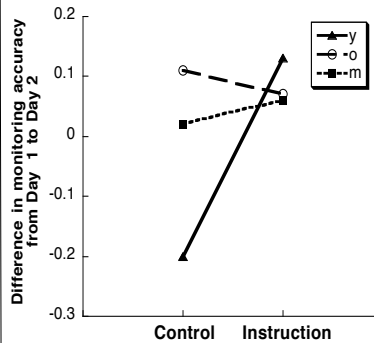


### Memory Monitoring

Participants were sensitive in monitoring their current state of learning across days, as indicated by gamma correlations between JOLs on Trial 2 and recall performance ( $M_1 = .12, M_2 = .14$ ) that were significantly greater than zero (all  $p < .001$ ).

The change in gamma from Day 1 to Day 2 was compared in an Age X Condition ANOVA:

Younger readers differentially improved their monitoring accuracy when given instruction, but those of middle-aged and older adults were not affected by instruction,  $F(2,127) = 3.34, p < .05$ .



### Recall

The Age X Condition X Day repeated measures ANOVA suggested that readers recalled a higher proportion of propositions on Day 2 than on Day 1,  $F(1, 142) = 34.42, p < .001$ , but none of the Age, Condition and Age X Condition effects reached significance.

Proportion of propositions recalled after instruction was predicted by ISB and SB wrap-up on Day 2. Younger and middle-aged adults showed a stronger relationship between their attention to wrap-up processing and recall.

	Young	Middle	Old
ISB	.31**	.31**	.19
SB	.40***	.31**	.28*

\*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$

## CONCLUSIONS

Instruction for conceptual integration at syntactic boundaries enhanced conceptual processing differently for younger and older readers.

While younger adults differentially allocated time to larger constituents, older adults showed this accommodation at smaller intrasentence constituents, possibly as a way to compensate for age differences in capacity (Miller & Stine-Morrow, 1998).

Conceptual wrap-up was associated with recall performance, but more so for younger and middle-aged readers than for older readers, suggesting that older readers may be relatively less reliant on the textbase processing for effective text memory.

Older adults were less accurate in memory monitoring in text memory (Miles & Stine-Morrow, 2004).

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