Aging and the Effects of Metacognitive Judgments on Memory Performance
Matthew C. Shake, Soo Rim Noh, Adam D. Joncich, and Elizabeth A. L. Stine-Morrow
Department of Educational Psychology, University of Illinois at Urbana-Champaign

Rationale
In the “judgment of learning” (JOL) paradigm, learners estimate their current level of learning on each study trial. Some have suggested that this type of metacognitive control is itself resource-consuming so that monitoring may draw attention away from the cognitive processes that support performance (Dunlosky & Thiede, 2004; Thiede & Dunlosky, 1999). We examined age differences in the effects of making JOLs on learning efficiency as subjects read sentences (e.g., Miles & Stine-Morrow, 2004).

- If memory monitoring is resource-consuming, then participants who make JOLs should show reduced efficiency in learning relative to controls.
- Given that older adults show declines in fluid abilities, their learning may be more negatively impacted by memory monitoring relative to younger adults.
- Assuming that a goal of high recall accuracy (relative to low recall accuracy) is especially taxing for controlled processing, these effects of judgment type and age may be exaggerated when goal stringency is increased.

Methods
Participants
Young Old
N 59 53
Age Range 19-26 51-84
Age 20.7±1.49 65.3±8.19
Working Memory 4.56±1.12 4.16±1.00
Vocabulary 48.60±7.02 50.60±9.76
Education (yrs.) 14.25±1.47 15.90±2.78

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

Design
Judgment type was manipulated between-subjects; and Goal within-subject (see Figure 1). Materials were counterbalanced across goal condition and the order of goal condition was counterbalanced across subjects.

Materials
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 reading time could be measured. Answers varied in propositional density, including 12 “low density” sentences (5-7 propositions), 12 “medium density” sentences (8 propositions), and 12 “high density” sentences (9-10 propositions). Each sentence was followed by a second “filler” sentence, related to the first, which ensured accurate estimates of encoding time for the first sentence.

Procedure
Participants either made estimates of their memory performance (JOL; N=73) or estimates of their interest in the text (JOL; N=39) just prior to recall (see Figure 2).

Results
Recall
A three-way judgment x Age x Trial interaction, \( F(1,108) = 13.49, p < .01 \), showed that while younger adults’ performance improved more across trials when they were monitoring learning, older adults’ performance improved more when monitoring interest. This effect did not vary by reading goal.

Effective Reading Time
Effective Reading Time (ERT) was computed as the time needed to encode one proposition (i.e., ms/prop recalled). Older adults were disproportionately inefficient at encoding low- and high-density sentences when making JOLs, \( F(2,216) = 3.39, p < .05 \), for the Judgment x Age x Density interaction (Figure 4).

Conclusions
JOLs may to some extent draw resources away from encoding processes, thus depressing recall performance in some conditions, especially for older adults.

However, the type of judgment had no effect whatsoever on reading times, suggesting that JOLs affected performance primarily by depressing efficiency of encoding.

Accuracy goal did not exacerbate judgment effects on recall performance, but it did enhance discrepancy reduction for participants focused on learning (JOL). This may be a consequence of the compatibility between the memory goal and the focus induced by monitoring. Under a High Accuracy goal, participants must use considerably more controlled execution and consistently monitor the memory representation; this attention may be drawn away somewhat by a focus on more affective metacognitive cues (JOLs).

It is possible that JOLs are not entirely cognitively neutral, such that focusing the reader’s attention on affective responses to the material could potentially increase performance, which is a fruitful area for further research.

References

Contact Information: email: mshake@uiuc.edu

We are grateful for support from the National Institute on Aging (Grant B01 AG19393)