AGING AND THE EFFECT OF SEMANTIC FIT DURING READING
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RATIONALE

Recent research examining older adults’ ability to take advantage of context to process individual words has typically measured contextual constraint as close probability (i.e., predictability of the upcoming word; cf. Federman et al., 2002; Rayner et al., 2006). Semantic fit or plausibility (i.e., the degree to which a word can be meaningfully integrated with the sentence context regardless of its predictability) can also affect reading processes, though the effects tend to be more downstream (e.g., after the initial fixation; Rayner et al., 2004). Age differences in the effects of semantic fit on reading processes have not been extensively examined. Using words that were age-equated on perceptions of semantic fit (Little et al., 2004), we used both eye-tracking and the moving window paradigm to test the hypothesis that older readers would be differentially facilitated by semantic fit.

METHODS

Participants

<table>
<thead>
<tr>
<th>Age Group</th>
<th>N</th>
<th>Young</th>
<th>Old</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>19</td>
<td>60-80</td>
<td></td>
</tr>
<tr>
<td>Age Range</td>
<td>18-32</td>
<td>60-80</td>
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<tr>
<td>Age</td>
<td>21.37 (0.70)</td>
<td>67.53 (1.39)</td>
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<tr>
<td>Verbal WM Span</td>
<td>5.56 (0.29)</td>
<td>4.54 (0.27)</td>
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<td>WAIS-R Vocabulary</td>
<td>47.84 (1.38)</td>
<td>51.11 (1.32)</td>
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<tr>
<td>Education (yrs)</td>
<td>14.37 (0.41)</td>
<td>15.89 (0.56)</td>
<td></td>
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</table>

Materials

- Each participant read a total of 48 experimental sentences containing a low, medium, or high semantic fit target word, drawn from the Little et al. (2004) materials (see table below). These 48 sentences included 24 containing either a low or high fit word, and 24 containing either a medium or high fit word (with each pair matched closely on word frequency and length). Only target words whose ratings of semantic fit were age-equivalent were used in the current study. These sentences were intermixed with 48 unrelated filler sentences (N = 90 total) and randomized for presentation.

Example 1: Low/High (L/H)

- The bride was happy to see her sister had arrived.

Example 2: Medium/High (M/H)

- Carrying only a backpack, the old man looked up at him in his way.

RESULTS

Moving Window (MW) Measures

Figure 1. MW Target Word RT for L/H Comparisons

There was no evidence that semantic fit facilitated target word processing time for the L/H or M/H sets, and semantic fit did not interact with age (see Figure 1 for L/H comparisons).

Older adults’ RTs on the target word were longer than those of the young for the L/H set and the M/H set.

Figure 2. MW Sentence RT for L/H Comparisons

Semantic fit tended to decrease total sentence RT in the more extreme L/H comparison (MW = 4385ms, SE = 135; MW = 4286ms, SE = 136), but not for the M/H comparison (see Figure 2 for L/H comparisons).

Semantic fit did not interact with age, though total sentence RT was longer for older adults in the L/H and M/H sets.

Eye-Tracking (ET) Measures

Figure 3. ET Total Fixation Duration for Old & Young

First Fixation Duration

Similar to the MW Target Word RT, the First Fixation Duration showed no semantic fit effects on the target words, for the L/H or M/H set, though it also showed no effects of age.

Total Fixation Duration

Total time spent on target words showed a main effect of semantic fit for the L/H set (MW = 501, SE = 23; M/H = 357, SE = 17), but was only marginal for the M/H set (MW = 434, SE = 21; M/H = 404, SE = 19).

The effect of fit on target words was moderated by Age for the L/H comparisons, (see Figure 3), which indicates that older adults were somewhat more disrupted than the young by low semantic fit, as evidenced by differentially greater time spent on low-fit target words. For the M/H set, there were no effects or interactions with age.

Figure 4. Proportion of Trials w/ Regression to Target Word for Old & Young

Further evidence for sensitivity to low semantic fit is found in the qualitative eye movement regression patterns. These data show a Fix & Age interaction: the increase in older adults’ total fixation durations on the low-fit words was due to an increased likelihood of regressions back in reading (see Figure 4). For M/H comparisons, there were no main effects of Fix or Age, nor any interactions.

REFERENCES


CONCLUSIONS

Using materials normed for both younger and older adults, we showed that readers slow down when encountering a relatively implausible concept, though this adjustment does not appear to occur on the initial processing of the word itself but rather downstream.

Older adults required differentially more time to resolve highly implausible concepts, while showing reading patterns more similar to the young when sentence content could be more easily integrated.

Results suggest the source of age-related differences in language processing of semantic fit as being likely due to older adults’ increased tendencies to re-read implausible words, and thus fixate on them for longer periods of total time; initial fixations on the word appear age-equivalent.

Eye tracking allowed a more sensitive assessment of such post-interpretive effects, relative to computer-based paradigms, detecting the age-interaction for semantic fit that the moving window paradigm did not.

We are grateful for support from the National Institute on Aging (Grant BOI AG13053) and the UIUC Bureau of Educational Research.

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