Age Differences in Efficiency of Information Uptake while Foraging in Multi-Text Environments

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RATIONAL

Little is known about how readers regulate learning in multi-text environments, especially among older adults who have been found to benefit from self-pacing in text memory (Johnson, 2003). Older readers are able to adapt to different reading ecologies just as younger adults do (Liu et al., 2016), but it is unclear whether their strategies are optimal. We used the Information Foraging framework (Pirolli & Card, 1999) to examine age differences in learning from text in an ecology with multiple sources (i.e., information patches), which requires search, selection, and time allocation decisions.

Questions: 1. Are learners more efficient in foraging compared to controlled presentation? 2. Does the use of optimal strategies in learning vary with age in the foraging condition?

METHOD

- Characteristics of participants are presented in Table 1.
- Materials: Biographical information about six historical individuals (Curie, Newton, Dickinson, Shakespeare, Mother Teresa, Gandhi); 12 texts per person (Table 2).

Table 1. Sample characteristics.

<table>
<thead>
<tr>
<th></th>
<th>Young</th>
<th>Old</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>20</td>
<td>22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>M (SE)</td>
<td>28.8 (1.6)</td>
<td>73.5 (1.3)</td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>20 - 40</td>
<td>61 - 81</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ED</td>
<td>M (SE)</td>
<td>14.8 (0.3)</td>
<td>13.7 (0.4)</td>
<td>2.29</td>
</tr>
<tr>
<td>Range</td>
<td>12 - 16</td>
<td>12 - 16</td>
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</tbody>
</table>

WM*: M (SE) 0.6 (0.2) - 0.5 (0.1) 4.7 < .001
WM = a composite score of reading span and listening span scores (Cronbach’s α = .75). ED = Years of Education.

- Procedure
  - Participants’ goal was to learn as much information as possible to prepare for a later quiz (Figure 1).
  - Foraging condition: Given topic cues, readers selected texts for reading at their pace; overall time was matched with the Control condition.
  - Control condition: Texts were presented in a random order, with presentation time systematically controlled (RT = 500 + x (# propositions)), where x increased or decreased across trials.

RESULTS

- There were no age differences in the information update rate in the Control condition; however, the asymptote was higher in the younger group relative to older group (Figure 3).
- The rate of information uptake was faster in the Foraging condition, relative to the Control, F(1, 40) = 4.54, p = .04 (Figure 4, left). The interaction of age and condition did not reach significance, F < 1. However, this result needs to be interpreted cautiously, because younger adults were significantly faster in Foraging relative to the Control, t(19) = 2.12, p = .05, whereas this difference was not significant in the older group, t < 1.
- Immediate recall performance was reduced in the Foraging condition compared to the asymptotic recall estimated in the Control condition F(1, 40) = 8.13, p = .007, and this did not vary with age, F < 1 (Figure 4, right).
- Delayed recall, measured as the number of texts from which the information was recalled, showed an age by condition interaction, F(1, 40) = 5.87, p = .02 (Figure 5), such that Foraging enhanced performance among younger adults, but hurt performance among older adults.

CONCLUSION

- Foraging increased the rate of information uptake among younger adults, but not among older adults.
- However, when readers had the opportunity to forage, memory for the material was reduced, relative to controlled presentation for both young and old.
- While younger adults learned more in a foraging ecology (under time constraints), older adults learned less relative to a controlled-presentation condition.
- These findings suggest that in foraging among multiple texts, both younger and older readers use a satisfying strategy. The regulatory demands of foraging may be especially costly for memory performance among older adults.

REFERENCES


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