Encoding Support Can Eliminate Age-Related Differences in Recollection

Gail O’Kane and Suzanne Corkin

Department of Brain & Cognitive Sciences, Massachusetts Institute of Technology

INTRODUCTION

Long-term declarative memory deficits in older adults primarily reflect failures of recollection, the ability to recover detail information about a previously encountered scene. The sense of familiarity is intact because older adults are equally skilled at recognizing visual images, whether or not they have been previously encountered. However, declarative memory (both recollection and familiarity) declines with age, evidenced by a reduction in the ability to remember episodes that are limited to visual information (Poldrack & Wagner, 1999).

Age-related deficits in scene recognition can be elucidated by providing support to participants encoding images (Gleitman et al., 2001). Consistent with Daum (1992), older adults exhibit scene recognition deficits due to encoding failures (Feltch et al., 1999).

This study examines whether associations added with greater word requirements from scene recognition will improve retrieval in retrieval procedures in addition to encoding procedures. Specifically, we explore whether age differences in recollection and familiarity can be eliminated with encoding support.

PARTICIPANTS

<table>
<thead>
<tr>
<th></th>
<th>Young Adults</th>
<th>Older Adults</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>18-35 (M=21.7)</td>
<td>60-85 (M=71.9)</td>
</tr>
<tr>
<td>Years of Education</td>
<td>12-18 (M=15.0)</td>
<td>12-23 (M=17.4)</td>
</tr>
</tbody>
</table>

METHOD, EXPERIMENT 1

- HUNTER + DIAMOND
- WALNUT + TULIP
- SEAL + ROOF

- Supported Encoding Group
  - N=20 Y.A., 20 OA
  - Training & post-test
  - Paired-associate test
  - Old vs. young

- Unsupposed Encoding Group
  - N=20 Y.A., 20 OA
  - Received no training on encoding
  - Old vs. young

ASSOCIATIVE RECOGNITION TEST

<table>
<thead>
<tr>
<th>Hunter</th>
<th>Waln</th>
<th>FO</th>
<th>FOg</th>
<th>Celery</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Inact”</td>
<td>“Recom”</td>
<td>“New”</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PAIR-ASSOCIATE RECALL TEST

<table>
<thead>
<tr>
<th>Hunter</th>
<th>Waln</th>
<th>?</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Diamond”</td>
<td>“Tulip”</td>
<td></td>
</tr>
</tbody>
</table>

ENCODING METHOD, EXPERIMENTS 2 & 3

- HUNTER + DIAMOND
- WALNUT + TULIP
- SEAL + ROOF

- Experiment 2 (N=20 YA, 20 OA)
  - Young adults, self-paced
  - TULIP (M=15.0)
  - DIAMOND (M=15.0)
  - DIAMOND + TULIP (M=15.0)

- Experiment 3 (N=20 YA, 20 OA)
  - Unsupposed Encoding Group
  - Young adults, self-paced
  - Received no training on encoding
  - Time to Image (sec) 0 10 25 50 100
  - 200 300 0.5 3.0 10.0

SUMMARY AND CONCLUSIONS

Self-paced
Trained to create interactive images
Unaware of subsequent memory test

The long encoding times exhibited by older adults who performed incidental encoding in Experiment 1 suggested that creating interactive associations is more difficult for older adults than it is for young adults. After spending twice as long to encode pairs, older adults performed worse than young adults on the associative recognition test.

In Experiment 2, when participants were provided with summaries that associated the words in each study pair, older adults performed as well as did young adults. They did not differ from young adults in their ability to distinguish intact from recominated items, or in their ability to use recollection as a basis for these decisions.

Experiment 3 replicated the results of Experiment 2, once again finding no age difference in associative recognition performance. With encoding support, older adults also performed as well as young adults in a paired-associate recall task.

Older adults benefited from the incidental encoding manipulation in Experiment 1 and, with additional external support, were able to perform equally as well as young adults in Experiment 2.

These results suggest that older adults do have an impairment in binding information, as previously proposed (Chaffe & Johnson, 1996; Niedbalski, 2000), but that this deficit may be overcome by the addition of environmental support (Craik, 1986). Specifically, older adults appear to have difficulty generating the relation that links disparate information, but if that relation is provided to them, they are able to bind the component information into a stable associative trace.

Although the present encoding environment was artificial, the results show that older adults retain the cognitive (and neural) resources to bind information as well as young adults when they receive the same rich input.

REFERENCES


ACKNOWLEDGEMENTS

We thank Beth Kuo, Emily Brown, Elizabeth Kuo, Megan Leahy, Beth Regelin, Erica Reidenbach, Ashley Ripper, and Lucia Silver for assistance in data collection. Supported in part by a grant to S.W. from the Alzheimer’s Association for Adult Research.

CONTACT: Gail O’Kane, Ph.D.
okane@mit.edu