Memory for Emotional Words in Mild Cognitive Impairment

Department of Clinical & Health Psychology, University of Florida; Gainesville, FL

OBJECTIVE

Many studies have suggested that memory is enhanced for emotionally arousing compared to neutral material. Emotional memory has not been evaluated in mild cognitive impairment (MCI), a disorder involving reduced memory in the context of intact general cognitive abilities and activities of daily living. We used a rate of forgetting paradigm, sensitive to mesial temporal lobe dysfunction in humans, to evaluate the rate of information loss for emotional versus neutral words in individuals with MCI compared to controls.

We hypothesized that:
(1) MCI patients would perform more poorly on the word recognition tasks than controls, regardless of arousal category or of recognition test delay.
(2) Controls would have better recognition memory performance for high arousal words compared to medium and low arousal words, and MCI patients would also benefit from emotional arousal although to a lesser extent than controls.

METHODS

Participants
9 adults with amnestic MCI
10 age and education-matched controls

Study Design: Emotional Memory Task
Presentation of 90 target words matched for content, word length, valence, and arousal
- DV: percentage of correctly discriminated words for the low, medium, and high arousal categories.

Example words
Low: Table, Statue, Poster
Medium: Idea, Bouquet, Allergy
High: Success, Blackmail, Ecstasy

Recognition Memory tests:
- Each included a unique set of 30 of the original target words interspersed with 30 distracter words matched for content, word length, valence, and arousal.

**RESULTS**

Table 1. Mean (SD) demographic variables and testing scores. *indicates significant at the p<0.05 level.

<table>
<thead>
<tr>
<th></th>
<th>Control group</th>
<th>MCI group</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>77.50 (7.23)</td>
<td>78.11 (12.45)</td>
<td>-0.133</td>
<td>0.896</td>
</tr>
<tr>
<td>Male/Female</td>
<td>6/3</td>
<td>7/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>16.90 (2.88)</td>
<td>16.44 (2.74)</td>
<td>0.352</td>
<td>0.729</td>
</tr>
<tr>
<td>WASI 2-scale estimated IQ</td>
<td>120.20 (12.20)</td>
<td>110.22 (9.90)</td>
<td>0.352</td>
<td>0.729</td>
</tr>
<tr>
<td>MMSE</td>
<td>29.00 (1.25)</td>
<td>27.22 (2.11)</td>
<td>2.266</td>
<td>0.037*</td>
</tr>
<tr>
<td>GDS-15 Total Score</td>
<td>1.80 (2.20)</td>
<td>4.89 (3.92)</td>
<td>-2.568</td>
<td>0.020*</td>
</tr>
<tr>
<td>HVLT-R total recall z-score</td>
<td>-0.85 (0.92)</td>
<td>-1.97 (0.61)</td>
<td>3.112</td>
<td>0.006*</td>
</tr>
<tr>
<td>HVLT-R delayed recall z-score</td>
<td>-0.32 (0.96)</td>
<td>-2.31 (0.76)</td>
<td>4.965</td>
<td>&gt;0.001*</td>
</tr>
<tr>
<td>HVLT-R % Retention z-score</td>
<td>-0.09 (0.88)</td>
<td>-1.94 (1.84)</td>
<td>2.750</td>
<td>0.019*</td>
</tr>
</tbody>
</table>

**Hypothesis 1:** MCI patients will perform more poorly on the word recognition tasks than controls, regardless of arousal category or of recognition test delay.

**Results 1:**
- Significant main effect of time, F(1,282,21.789) = 131.961, p < 0.001
- Significant main effect of group, F(1,17)=5.754, p=0.028
- Significant time X group interaction, F(1.282,21.789) = 4.489, p = 0.037

- The MCI and control groups did not differ in their arousal ratings of low, medium, and high arousal words.

In order to evaluate the two hypotheses, we conducted a Group (MCI v. control) X Arousal (low, medium, high) X Time (10 minutes, 1 hour, and 3 months) mixed factorial ANOVA with Bonferroni-adjusted post hoc tests.

**Hypothesis 2:** Controls will have better recognition memory performance for high arousal words compared to medium and low arousal words, and MCI patients will benefit from emotional arousal although to a lesser extent than controls.

**Results 2:** There was no significant main effect of arousal, and no significant arousal X time or arousal X group interactions.

CONCLUSIONS

MCI subjects performed more poorly than controls on a recognition memory test for words at 10 minutes, but the performance of the two groups did not differ at 1 hour and 3 months. It appears that performance for both groups was at floor level at 3 months, perhaps masking group differences. Neither group benefited from emotional arousal. Given the well-documented emotional enhancement effect for memory in normal individuals it is surprising that controls did not benefit from emotional arousal. It will therefore be important to test these individuals with different stimuli (e.g., pictures), and at different time intervals.

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