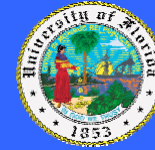# Memory for Emotional Words in Mild Cognitive Impairment

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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
(Affective Norms for English Words; Bradley & Lang, 1999)
30 low, 30 medium, 30 high arousal

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Participant rates word
Arousal (1-9)
Valence (1-9)

↓

10 minute memory test

↓

1 hour memory test

↓

3 month memory test

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.
-DV: percentage of correctly discriminated words for the low, medium, and high arousal categories.

Neuropsychological Measures
-Wechsler Abbreviated Scale of Intelligence (WASI):
 Vocabulary and Matrix Reasoning Subtests
-Mini-Mental State Examination (MMSE)
-15-item Geriatric Depression Scale (GDS-15)
-Hopkins Verbal Learning Test-Revised (HVLT-R)

RESULTS

	Control group	MCI group	t	p
Age	77.50 (7.23)	78.11 (12.45)	-0.133	0.896
Male/Female	6/3	7/3		
Education	16.90 (2.88)	16.44 (2.74)	0.352	0.729
WASI 2-scale estimated IQ	120.20 (12.20)	110.22 (9.90)	1.943	0.069
MMSE	*29.00 (1.25)*	*27.22 (2.11)*	*2.266*	*0.037**
GDS-15 Total Score	*1.80 (2.20)*	*4.89 (3.02)*	*-2.568*	*0.020**
HVLT-R total recall z-score	*-0.85 (0.92)*	*-1.97 (0.61)*	*3.112*	*0.006**
HVLT-R delayed recall z-score	*-0.32 (0.96)*	*-2.31 (0.76)*	*4.965*	*>0.001**
HVLT-R % Retention z-score	*-0.09 (0.88)*	*-1.94 (1.84)*	*2.750*	*0.019**

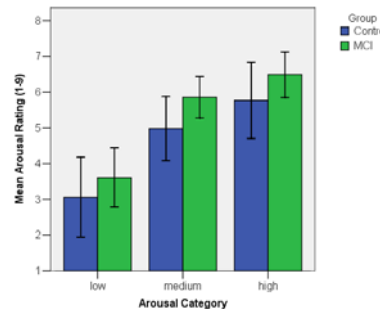Table 1. Mean (SD) demographic variables and testing scores. *indicates significant at the p< 0.05 level.

Figure 1. Mean Arousal Ratings by Group. Error bars display 95% confidence intervals.

- 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 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, $F(1.282, 21.789) = 4.489$, $p = 0.037$)
  - At 10 minutes, controls performed significantly better than MCI patients ($p = 0.001$).
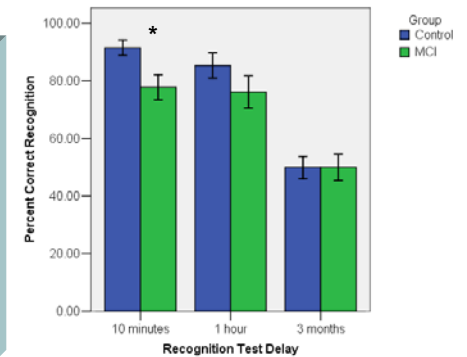

Figure 2. Mean % Correct Recognition Performance by Group and Time. Error bars display 95% confidence intervals. *Indicates significant at the p< 0.05 level.

- **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.