Emotional Memory in Aging: Effect of Delay on Recognition

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INTRODUCTION

• Emotional memory research indicates that young adults (YA) and older adults (OA) show memory enhancement for emotional compared to neutral stimuli on tests of immediate recognition (Ochsner, 2000; Kensinger et al., 2002).

• Evidence suggests that this enhancement may be qualitatively different, YA displaying a greater emotional enhancement for negative compared to positive stimuli, and OA showing the opposite pattern (Charles et al., 2003).

• In YA, emotional enhancement seems to be strengthened with longer delay intervals (LaBar & Phelps, 1998). It remains unclear, however, how the emotional enhancement evolves over time (e.g., Mather, 2004).

AIMS

• To compare the strength of emotional memory enhancement between negative and positive stimuli in YA and OA.

• To investigate differences between YA and OA in the evolution of the emotional memory enhancement over time.

METHODS

Participants

• YA: 26 (17 women) with a mean age of 21.4 ± 4.01 years (range: 18 - 34) and 14.5 ± 1.53 years of education (range: 13 - 19).

• OA: 24 (14 women) with a mean age of 71.0 ± 5.6 years (range: 62 - 82) and 17.3 ± 2.51 years of education (range: 13 - 22).

Stimuli

• 256 words (85 negative, 86 neutral, 86 positive) selected from the Affective Norms for English Words (Bradley & Lang, 1999). We created two lists of 120 words, equivalent with respect to imageryability, word length, and word frequency. The remaining 16 words served as fillers. Within each list, the emotional valence for each word type differed significantly from the other two (p < .001).

Procedure

• Study: Intentional encoding of 120 words (40 negative, 40 neutral, 40 positive) and 8 filler words. “Abstract”/“Concrete” judgment to promote deep encoding. Presentation time: 2 s for YA and 3 s for OA.

• Test (15-min and 24-hr delays): 120 words (60 old, 60 new) and 8 filler words. Remember-Know procedure (Gardiner & Java, 1993). Presentation time: 3 s for YA and 4 s for OA.

• Following the 24-hr test, participants rated the words for valence and arousal on a 5-point Likert scale.

• All statistical analyses were conducted on the words grouped according to each participant’s ratings.

Recognition: Remember-Know Paradigm

Word ratings

On average, YA rated 34% of the words as negative, 32% as neutral, and 34% as positive, compared to 34%, 34%, and 32% for OA. There was no difference in ratings between the two lists.

RESULTS

“Remember” responses

At 15 min, YA and OA show larger proportions of false alarms than correct “Know” responses (as reflected by the negative values).

At 24 hr, this bias is present in YA only, and only for emotional stimuli. Significant change between 2 sessions is only present for neutral words in YA and OA (p < .001 and p < .01, respectively).

“Know” responses

At 15 min: YA and OA show no emotional memory enhancement at 15 min.

At 24 hr: YA showed an emotional memory enhancement that was significant for negative words, and approached significance for positive words. We found no difference between the “Remember” responses to negative and positive stimuli. OA, however, did not show any enhancement at 24 hr.

SUMMARY

“Remember” Responses

• YA and OA showed no emotional memory enhancement at 15 min.

• At 24 hr, YA showed an emotional memory enhancement that was significant for negative words, and approached significance for positive words. However, their effects were not present in OA at either delay.

• Evidence suggests that this enhancement may be qualitatively different, YA displaying a greater emotional enhancement for negative compared to positive stimuli, and OA showing the opposite pattern (Charles et al., 2003).

• The presence of twice as many emotional as neutral words may have increased the contrast between the two lists.

• At 24 hr, YA continued to show a false alarm bias, but only for emotional stimuli; OA, however, showed no such contrast, regardless of the stimulus valence.

CONCLUSIONS

• These findings suggest that the effect of time on recognition of emotional stimuli is different in YA and OA.

• An emotional memory enhancement, of equal magnitude for negative and positive stimuli, occurred only in YA at the longer delay. Unlike previous studies (Charles et al., 2003, Leigland et al., 2004), we found no positive or negative bias in OA at either delay.

• The presence of numerous inaccurate “Know” responses (i.e., false alarms) to emotional stimuli suggests that emotional valence interferences with the ability to accurately discriminate between previously presented words and new items, when recognition can rely on more vivid, recollective processes.

• In OA, emotional memory enhancement was transient, possibly because of inadequate cognitive control processes mediated by prefrontal circuits during encoding.

• The presence of twice as many emotional as neutral words may have decreased their distinctiveness. Further, the use of longer word lists, compared to other studies (e.g., Leigland et al., 2004), may have resulted in overall lower performance in OA, thereby weakening the emotional enhancement.

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