Can We Make Memory for Highly Negative Pictures Inaccessible by Creating Retroactive Interference?

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Introduction

- Many studies have shown that emotionally arousing stimuli are remembered better than emotionally neutral stimuli (Talmi, 2013), even though there are exceptions (Deffenbacher, Bornstein, Penrod, & McGorty, 2004).

- The question is whether we can reduce these emotionally enhanced memories and, if so, how?

- We decided to use retroactive interference (RI) to accomplish this goal because there is well established evidence showing that RI is one of the major causes of forgetting.

- We used a standard RI paradigm. Participants learned a list of highly negative pictures (List 1) followed by a list of highly negative pictures, moderately negative pictures, or neutral pictures (List 2). There was also a control condition in which participants were not presented with List 2.

- This design was based on Weems et al. (2014) who showed that memories of a severe hurricane (Katrina) were reduced when children experienced a subsequent hurricane (Gustav) that was not as severe. It is possible that the interfering event does not have to be as negative as the original event

- Our previous research has shown that RI is possible with emotional stimuli. The question is now whether List 1 became inaccessible due to RI or participants simply did not report items when they erroneously thought that the items belonged to List 2.

- We therefore conducted Experiment 1 (see below) and asked participants to recall both List 1 and List 2 to eliminate source confusion errors.

- Experiment 2 was a replication of Experiment 1, except that List 2 was repeated three times for moderately negative and neutral pictures in an attempt to strengthen RI. The question was whether presenting moderately negative and neutral pictures multiple times in List 2 can be as effective as presenting highly negative pictures once in List 2 in erasing the memories for highly negative pictures from List 1.

General Method

List 1	List 2	Exp 1 List 2	Exp2 List 2	Recall
High Negative	High Negative	once	once	L1 and L2
High Negative	Low Negative	once	three times	L1 and L2
High Negative	Neutral	once	three times	L1 and L2
High Negative				L1 and L2

- Pictures were from the International Affective Picture System (IAPS). The ratings from Libkuman et al. (2007) were used to select the pictures.

- N = 40 per condition for both Experiment 1 and 2, for a total of 160 per study.

- During encoding, participants rated the emotionality of each picture (incidental learning).

- After encoding, participants performed a 2-min filler task.

- During free recall, participants recalled the pictures and wrote down a one-word or short-phrase description of each recalled picture.

- After free recall, participants completed a source memory task in which they indicated whether their responses were from List 1 or List 2, along with their confidence in that decision.

Results (Experiment 1)

- Responses were scored by one rater and confirmed by the second rater. The proportion of correct responses and proportion of source confusion errors were analyzed by a one-way between-subjects ANOVA.

- **List 1 recall** - The proportion of correctly recalled pictures from List 1 significantly differed between each condition ($p < .001$) except for high-low and high-neutral.

- **List 2 recall** - The proportion of correctly recalled pictures from List 2 showed no difference between the high-low and high-high conditions. The high-neutral condition recalled significantly fewer pictures than the other conditions ($p <.001$).

- **Source confusion errors** - The high-high and high-low conditions did not differ in source memory errors for List 1 or List 2. The high-neutral condition had significantly fewer source memory errors than the other conditions ($p < .001$).

- Question – If we increase encoding strength of List 2, what will happen to participants' memories?

Figure 1
Mean Proportion of Correct Recall
Across List and Condition in Experiment 1
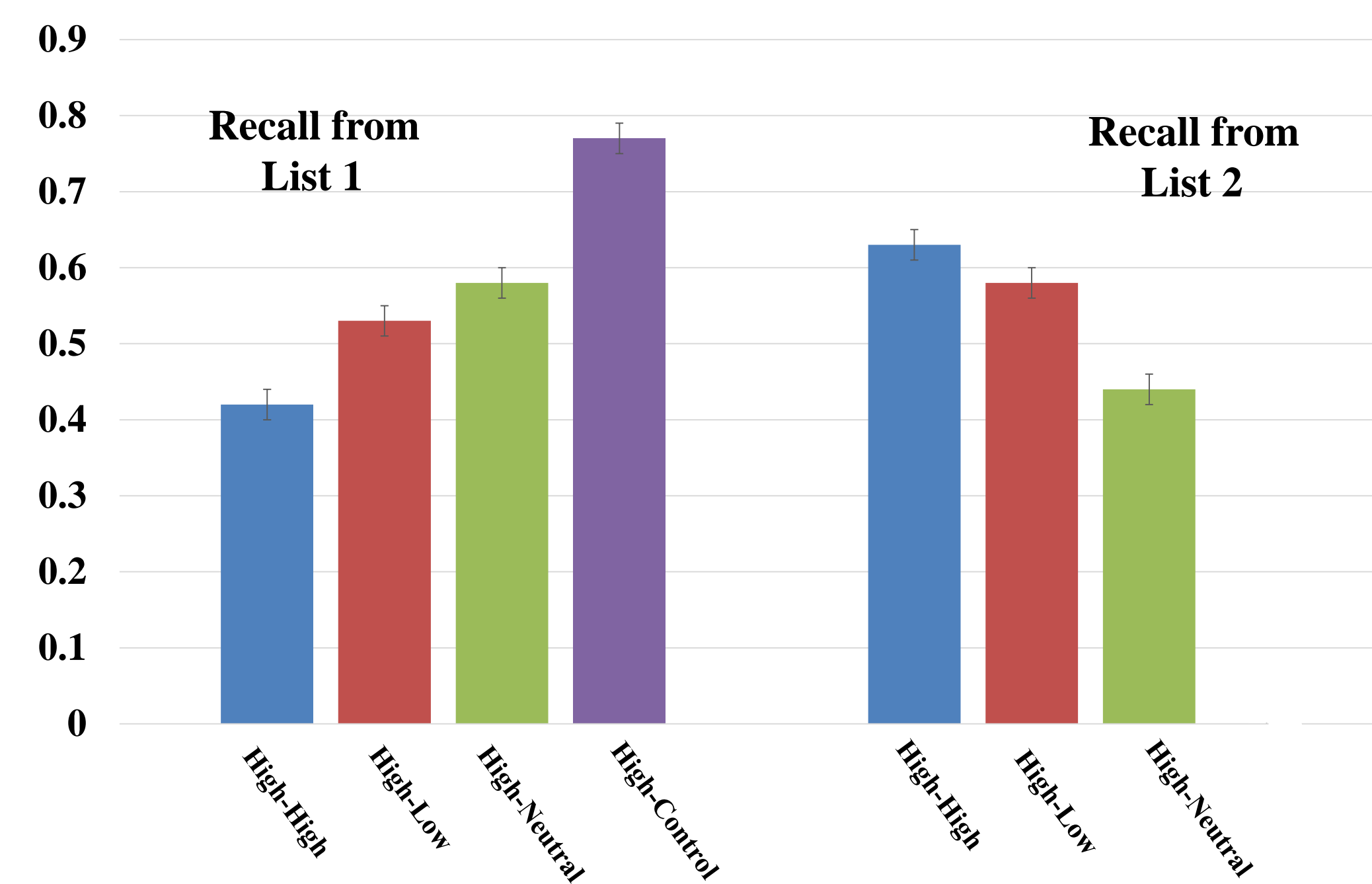
Results (Experiment 2)

- **List 1 recall** - The proportion of correctly recalled pictures from List 1 significantly differed between each condition ($p < .001$) except for high-neutral and high-high. High-low remembered significantly less than all other conditions.

- **List 2 recall** - The proportion of correctly recalled pictures from List 2 showed no difference between the high-neutral and high-high conditions. The high-low condition recalled significantly more pictures than the other conditions ($p <.001$).

- **Source confusion errors** - The high-neutral and high-low conditions did not differ in source memory errors for List 1 or List 2. The high-high condition had significantly more source memory errors than the other conditions ($p < .001$).

Figure 2
Mean Proportion of Correct Recall
Across List and Condition in Experiment 2
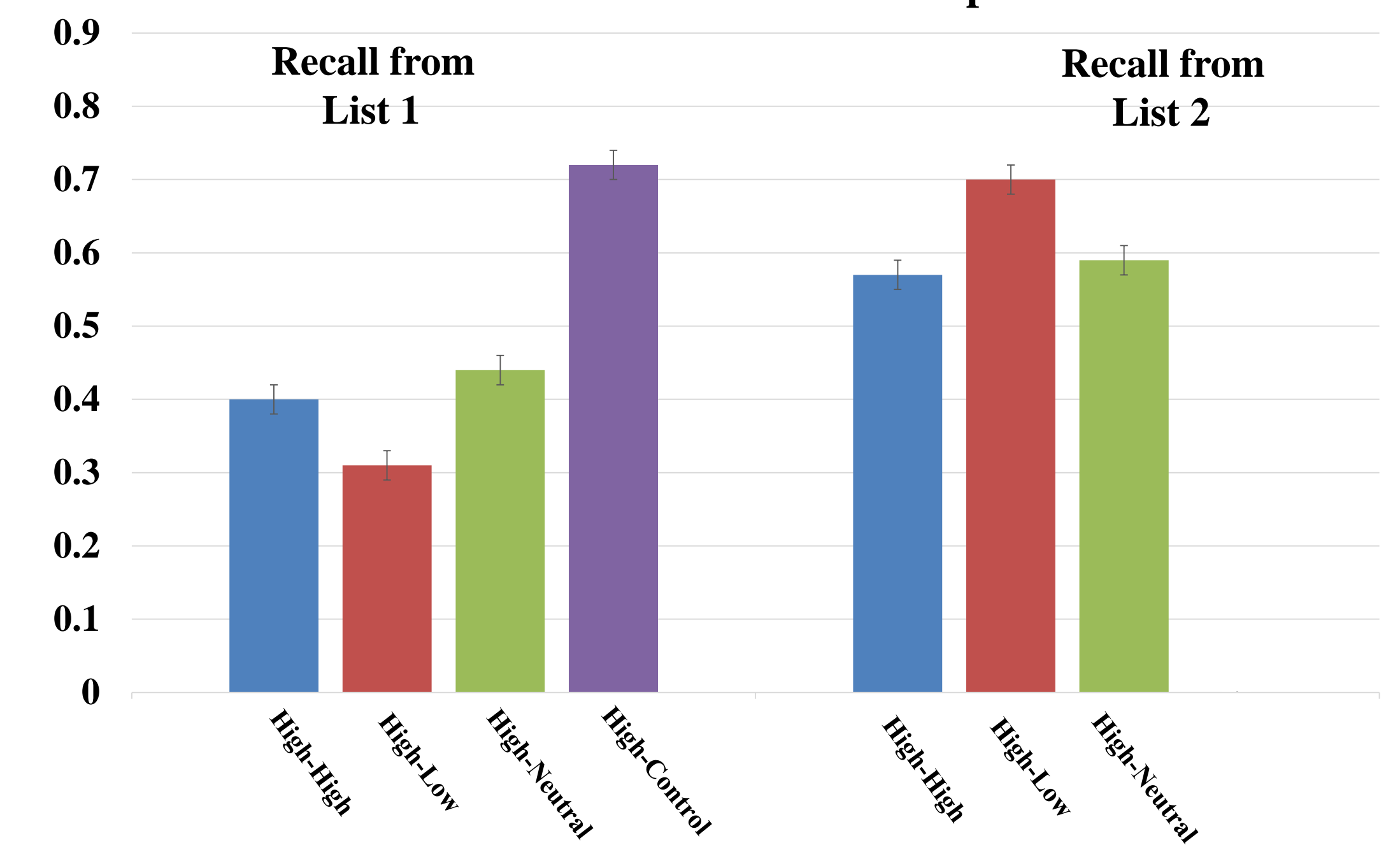
Discussion

- Can we reduce emotionally negative memories by creating RI? The answer is yes. For both experiments, RI was present. Experiment 1 showed that RI made memories of emotionally highly negative pictures inaccessible. These results go beyond what would be explained by simple source confusion.

- Can we use moderately negative pictures to create RI to reduce memories of highly negative pictures? The answer is yes. For both experiments, RI was present when List 2 consisted of moderately negative pictures.

- Both experiments showed that RI was present when List 2 was neutral. In fact, in Experiment 1, RI was similar between the high-low and high-neutral conditions. This means, neutral pictures can be used to reduce memories of highly negative pictures.

- Can we use moderately negative and neutral pictures to create RI that is as strong as that created by highly negative pictures? The answer is yes. Experiment 2 showed that manipulating encoding strength in Experiment 2 created more forgetting when List 2 was moderately negative.

References

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