Now it’s Threatening? In That Case...
Changes in Memory for Neutral Stimuli After the Addition of Threatening Information

Jessica M. Senn, Cathryn H. A. Gordon Green, and Adam S. Radomsky
Department of Psychology, Concordia University, Montreal, Canada

Abstract
There are a number of aetiological pathways to the development of anxiety disorders, including those associated with stressful triggering situations. It has been suggested that life events can provide new meaning to past situations, leading to the delayed onset of a disorder. Whether or not a disorder will emerge is theoretically related to one’s appraisal and memory of prior events, and memory biases are proposed to exist for threat-related information in association with anxiety disorders. Given that a new event may change the meaning of past events, it is possible that threatening information can change one’s memory for once neutral events. The current study aimed to examine the effect of threatening information on memory for previously encoded (neutral) stimuli. Participants learned neutral objects (displayed in two boxes) and completed a recall memory test. They were then randomly assigned to either receive new threatening or new neutral information about half of the already-learned objects (one of the boxes); a second recall test was subsequently completed. Individuals in the Threat condition showed a greater proportion of memory for items that were manipulated to items that remained neutral than did individuals in the No-Threat condition. Results are discussed in terms of understanding memory bias and other cognitive features associated with anxiety disorders and of the onset and treatment of anxiety disorders.

Method
Participants
• Undergraduate students from Concordia University participated in order to receive course credit.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Threat (n=55)</th>
<th>No-Threat (n=60)</th>
<th>Total (n=115)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>82% female</td>
<td>90% female</td>
<td>86% female</td>
</tr>
<tr>
<td>Age</td>
<td>23.80 (7.17)</td>
<td>23.38 (5.88)</td>
<td>23.58 (6.50)</td>
</tr>
</tbody>
</table>

Measures
• Recall Memory Test (i.e., name as many objects as possible in a 3-minute period)
• Disgust Scale (Haardt, McCauley, & Rozin, 1994)
• Spider Phobia Beliefs Questionnaire (Arntz, Lavy, van den Berg, & van Rijsoort, 1993)
• Beck Depression Inventory-II (Beck, Steer, & Brown, 1996)

Procedure

- Free Association Task
- Distracter Task
- Threat Information (Spider)
- Recall Memory Test #1
- Neutral Information (Paper)
- Emotion State Questions
- Recall Memory Test #2
- Questionnaire Package

Covariates
• Proportion of items remembered from manipulated versus un-manipulated box at Time 1
• Disgust Scale scores (significant differences between conditions were evident)
• State disgust ratings

ANCOVA Results
• Individuals in the Threat condition showed higher proportionate memory for items in the manipulated box versus the un-manipulated box, F(1,114) = 4.92, p = .03, partial η² = .05, than those in the No-Threat condition
• There were no differences between conditions in proportionate memory at Time 1, f(113) = -0.14, p = n.s., d = -.02

Discussion
• Provides support for the theoretical notion that after information is encoded, subsequent events can lead to reappraisal of threat (Ehlers & Clark, 2000)
• Given that memory is important to the development of anxiety disorders, this suggests a hypothesis of how disorders of delayed onset (DO) may develop
• Disorder onset relates to interpreting life events as threatening (either immediately following the event or after some time has passed); reinterpreting once-neutral events as threatening could explain how a disorder can develop long after the occurrence of the event
• Mechanisms of DO are still unclear, but this study suggests that memory bias for threat may be involved
• First study to experimentally demonstrate possible mechanisms associated with DO, and to look at DO associated with anxiety (e.g., spider fear) other than anxiety in PTSD

References

Hypothesis
If neutral stimuli are encoded and then made threatening at a later time (through the provision of new information), there will be a subsequent proportional increase in memory (i.e., memory bias) for the originally-neutral stimuli.