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Forgetting Trauma Stimuli

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Abstract

Previous work reported in this journal (DePrince & Freyd, 1999) suggested that the cognitive capacities of high dissociators are impaired under conditions of focused (selective) attention, but not under conditions of divided attention, compared to low dissociators. Using a directed forgetting paradigm, the current study demonstrates that under divided-attention demands high dissociators have impaired memory for words associated with trauma (e.g. "incest") but not neutral words, as compared with low dissociators. In addition, the high dissociators report significantly more trauma history and significantly more "betrayal trauma" (abuse by a caregiver). These results are consistent with the proposal that dissociation may aid individuals with a history of betrayal traumas to keep threatening information out of awareness.

## Forgetting Trauma Stimuli

Traumatic exposure – particularly exposure to chronic and repeated trauma – has been associated with many deleterious consequences, such as posttraumatic stress disorder (PTSD), alterations in neuroendocrine function, and depression. While there is little dispute that traumatic exposure is often associated with negative consequences, controversy has surrounded the extent to which traumatic exposure has an impact on basic cognitive processes of attention and memory. The controversy has been most intense regarding memory for trauma: are some types of trauma associated with impaired memory for the event and avoidant encoding of trauma-related information?

At the same time that there has been controversy about memory for trauma, researchers have increasingly applied cognitive psychology to the study of various forms of posttraumatic distress, including acute stress disorder (e.g., Moulds & Bryant, 2002), posttraumatic stress disorder (PTSD; e.g., Brewin, Dalgleish, Joseph, 1996), and dissociation (e.g., DePrince & Freyd, 1999). Dissociation – the breakdown of normally connected processes of consciousness and memory – is of particular interest to both trauma researchers and cognitive scientists. Dissociation has been associated with trauma exposure (see Putnam, 1997) and involves the alteration of fundamental cognitive functions. Betrayal trauma theory predicts that dissociating information from awareness is mediated by the threat that the information poses to the individual's system of attachment (Freyd, 1994, 1996, 2001).

Theorists have proposed that memory impairment for trauma-related information involves avoidant processing (e.g., people may disengage attention from threatening information and thus fail to encode the material) and/or impaired retrieval processes (e.g., material is encoded, but cannot be retrieved; see McNally, Clancy and Schacter, 2001).

Directed forgetting paradigms have been used to investigate avoidant processing hypotheses for negative (e.g., Cloitre, Cancienne, Brodsky, Dulit, & Perry, 1996) and trauma-related (e.g., McNally, Metzger, Lasko, Clancy, & Pitman, 1998; Moulds & Bryant, 2002) stimuli.

In a directed forgetting task, participants are presented with items and instructed after each item (or list of items) to remember or forget the material (MacLeod, 1999). Memory is tested for both to-be-forgotten and to-be-remembered items. The directed forgetting task has been employed in two forms. In the “item” method, words appear one at a time with a memory instruction following each word. In the “list” method, participants receive the memory instruction at the end of a list of words. Participants in the item method likely selectively rehearse to-be-remembered words, whereas participants in the list method likely inhibit to-be-forgotten words (e.g., MacLeod, 1999; Basden, Basden, & Gargano, 1993).

Women diagnosed with PTSD who reported a history of childhood abuse did *not* demonstrate poorer recall for trauma-related stimuli compared to control groups, regardless of remember or forget instruction (McNally et al., 1998). Further, the women diagnosed with PTSD showed impaired recall for negative and positive words they were instructed to remember. The authors argue these findings are inconsistent with an avoidant encoding hypothesis.

McNally et al. (2001) tested women who reported repressed or recovered memories of childhood sexual abuse and women who denied any history of childhood sexual abuse. Using the same methodology as McNally et al. (1998), the authors did not find evidence that the repressed or recovered memory groups were engaging in avoidant processing of trauma-related information.

Directed forgetting, in its standard form, implicitly requires focused attention. However, recent research suggests that attentional context may play a critical role in the conditions under which recall of trauma-related information is impaired. Freyd, Martorella, Alvarado, Hayes, & Christman (1998) found that high dissociators showed more Stroop interference under selective attention demands than low dissociators, suggesting high dissociators have disruptions in consciously controlled attentional abilities. DePrince and Freyd (1999) found that while high dissociators performed worse (more Stroop interference) under selective conditions, they performed better (less Stroop interference) under divided-attention conditions relative to low dissociators. A free recall task revealed that high dissociators recalled more neutral and fewer trauma-related words compared to low dissociators, supporting the argument that dissociation may help to keep threatening information from awareness.<sup>1</sup>

These studies suggest that high dissociators might be at a cognitive advantage in tasks that require divided attention. We predicted, therefore, that divided-attention contexts would help high dissociators to keep threatening information from awareness. DePrince and Freyd (2001) tested high and low dissociators using an item-method directed-forgetting task under selective and divided attention conditions. Consistent with McNally et al. (1998), we found no difference in free recall of trauma-related items presented under selective-attention conditions; however, under divided attention conditions, high dissociators recalled fewer trauma-related and more neutral words than did low dissociators for to-be-remembered items (DePrince & Freyd, 2001).

The item method of the directed forgetting task likely drives participants to selectively rehearse words; this presumably enhances encoding and does not invoke inhibition. Recent research points to inhibition as a possible mechanism in memory

impairment for trauma-related information (e.g., Anderson, 2001; Anderson & Green, 2001). We were therefore interested in how high and low dissociators would perform in a directed forgetting task using the list method, which is believed to invoke inhibitory processes. Consistent with DePrince and Freyd (1999, 2001), we predicted that high dissociators would demonstrate impaired recall for trauma-related compared to neutral stimuli relative to low dissociators under divided-attention conditions. We also predicted that high dissociators would report significantly more trauma (including betrayal traumas for which the reported perpetrator was described as very close) than low dissociators.

### Method

*Participants.* Participants were 24 low (mean age 19.0; 16 female) and 21 high (mean age 19.0; 14 female) dissociators enrolled in an introductory psychology course at the University of Oregon; they received partial credit towards a research requirement for participating. Using the same methodology as previous studies (e.g., DePrince & Freyd, 1999, 2001), participants who scored above 20 and below 10 on the Dissociative Experiences Scale (DES) were recruited for the high and low dissociator groups respectively. Mean DES score (stand deviation) was 28.9 (13.4) for the high DES group and 5.8 (2.5) for the Low DES group. Recognition data for one high DES and one low DES participant were deleted due to computer error.

*Materials.* Stimuli presented during the directed forgetting task were replicated from McNally et al. (1998); word categories included neutral (e.g., stairs, curtain) and trauma-related (e.g., rape, assault, incest). Words matched for neutral (e.g., chair, light) and trauma-related (e.g., attack, violate) meaning were added to the lists replicated from McNally et al. (1998) for use in the recognition task.

The DES is a 28 item self-report measure of dissociation (Bernstein & Putnam, 1986). Participants indicate the percentage of time that they experience each of 28 items (e.g., “Some people have the experience of feeling that other people, objects, and the world around them are not real”). DES score was calculated by averaging responses across the 28 items.

The Brief Betrayal Trauma Survey (BBTS; Goldberg & Freyd, under review) is a 12-item, behaviorally defined, self-report measure. Items assess non-interpersonal (e.g., natural disasters) and interpersonal traumas (e.g., assault) before and after age 18. Interpersonal traumatic events distinguish between those perpetrated by someone relationally close and not close to the victim. Construct validity has been demonstrated based on agreement between traumatic events endorsed on the BBTS and an existing trauma inventory (DePrince, 2001).

*Procedure.* Participants were tested one at a time with an experimenter present. Participants saw words appear one at a time on the computer screen in four blocks (two selective and two divided-attention blocks); each word was presented for six seconds. In each attention condition, one block was followed by remember instructions and the other by forget instructions. Each block was comprised of six neutral and six trauma-related words. During the selective-attention blocks, words appeared in black with a white background. During divided-attention conditions, the stimuli changed in color from red to blue at random intervals. Participants were instructed to make a key press every time the color changed (consistent with DePrince & Freyd, 2001). Block order (divided versus selective and forget versus remember) was randomized for each participant. A block of country names was presented at the beginning and end of the experiment.

To assess recall, participants were given five minutes to write down all of the words they could remember from the lists presented, regardless of the remember/forget instruction. To assess recognition, participants saw items presented one at a time and made a key press to indicate whether they recognized the word from the lists viewed previously. Test items included words from the experimental lists previously presented and twenty-four words not previously viewed. Finally, participants completed the BBTS.

## Results

### Reported Trauma History

The total number of traumatic events reported on the BBTS was computed (possible scores ranged from zero to 24). Based on Goldberg & Freyd (under review), items were divided into high [(e.g., “made to have some form of sexual contact, such as touching or penetration, by someone with whom you were very close (such as a parent or lover)”], medium (e.g., “witnessed someone with whom you were very close deliberately attack another family member so severely as to result in marks, bruises, blood, broken bones, or broken teeth”) and low (e.g., “been in a major earthquake, fire, flood, hurricane, or tornado that resulted in significant loss of personal property, serious injury to yourself or a significant other, the death of a significant other, or the fear of your own death”) betrayal categories. High dissociators reported significantly more traumatic events overall and more high betrayal events than low dissociators (See Table 1).

### Memory Findings

The total number of items correctly recalled and recognized was tallied (see Table 2). Consistent with previous studies, a significant DES by word category interaction for to-be-remembered stimuli presented in the divided-attention condition ( $F(1,43)=15.313$ ,  $p<.001$ ; partial eta-squared [ $\eta_p^2$ ]=.26) indicated that high dissociators recalled more



neutral and fewer trauma words compared to low dissociators (See Figure 1). No other effects were significant. In a follow-up analysis, those participants who reported at least one betrayal trauma event were divided into high ( $n=13$ ) and low ( $n=10$ ) DES groups; the same significant interaction of DES by word category for to-be-remembered words presented under divided attention conditions was present, ( $F(1,21)=8.704$ ,  $p<.01$ ;  $\eta_p^2=.29$ ). There was no significant interaction of DES by word category nor main effect for dissociation for to-be-forgotten words presented under divided attention conditions, nor for to-be-remembered or to-be-forgotten words presented under selective attention conditions.

Analyses of the recognition data revealed a trend for the interaction of DES by word category for the to-be remembered items presented under divided-attention conditions ( $F(1,41)=2.939$ ,  $p=.09$ ;  $\eta_p^2=.07$ ). No other effects were significant. The DES by word category interaction was significant for the to-be-forgotten items under divided-attention conditions ( $F(1, 41)=4.447$ ,  $p<.05$ ;  $\eta_p^2=.10$ ) such that the high DES group recognized more neutral and fewer trauma-related items compared to the low DES group. The main effect for word category was significant ( $F(1,41)=14.521$ ,  $p<.001$ ;  $\eta_p^2=.26$ ); participants recognized more trauma than neutral words. There was no main effect of DES. The interaction for DES by word category was not significant under selective-attention demands.

### Discussion

Under divided-attention conditions, high dissociators recalled fewer trauma-related and more neutral words compared to low dissociators for to-be-remembered words. Among the to-be-forgotten words presented under divided attention conditions, high dissociators recognized more neutral and fewer trauma related words compared to

low dissociators. Taken together with previous findings (Freyd et al., 1998; DePrince & Freyd, 1999, 2001), these findings point to the importance of attentional context in identifying the conditions under which high dissociators forget trauma-related information.

The high dissociator group reported significantly more trauma, including high betrayal events, than low dissociators. Further, the dissociation by word category interaction was present when we looked only at those participants who reported a betrayal trauma history. This pattern is consistent with betrayal trauma theory's prediction that individuals who experience events high in betrayal will use dissociation to keep threatening information from awareness.

We did not find interactions between dissociation and remember/forget instruction, suggesting inhibitory mechanisms did not play a role in the high dissociators' memory impairment for trauma-related versus neutral information. Presumably the effect of the semantic content occurs at initial encoding, resulting in the interaction of dissociation by word category for to-be-remembered items; this is consistent with the prediction that high dissociators will engage in avoidant processing of threatening information under certain attention conditions. This does not mean that inhibitory mechanisms are not a viable route to memory impairment for trauma-related information (to the contrary, Anderson and colleagues have presented models of inhibitory mechanisms that might account for some memory impairment of trauma-related information); rather, the participants in this study appear to fail to encode the trauma-related information under divided-attention conditions.

Research with pre-school aged children suggests a similar effect. In a community sample, children saw neutral and emotionally charged pictures under selective and

divided-attention conditions (Becker, Freyd, & Pears, under review). Children who had trauma histories and who were highly dissociative recognized fewer charged pictures relative to non-traumatized children under divided attention conditions; no group differences were found under selective attention conditions.

The current study is an important addition to correlational research examining the relation between exposure to trauma and memory impairment. For example, Freyd, DePrince, and Zurbriggen (2001) found that reports of abuse perpetrated by caregivers were related to higher degrees of reported memory impairment. Such self-report research is inherently limited by its correlational nature and the potential confounds associated with self-report of memory persistence (e.g., Schooler, 2001). The current study demonstrates differences in experimental measures of memory for trauma-related stimuli based on dissociative level without relying solely on self-reports of memory persistence.

There are several limitations to the current work. This study used an undergraduate sample and likely does not reflect the more severe distress observed in clinical groups. The self-reported trauma histories are limited in that they were not corroborated, though there is evidence that retrospective reports of early childhood events are reasonably reliable (Brewin, Andrews & Gotlib, 1993). However, empirical reports indicate that abuse rates based on a single report are likely to significantly underestimate true prevalence (Femina, Yeager, & Lewis, 1990; Fergusson, Horwood, & Woodward, 2000; Martin et al., 1993; Sjoberg & Lindblad, 2002). Such false-negatives would likely decrease the strength of the observed correlation between dissociation and trauma.

The current study adds to our understanding of impaired memory for trauma stimuli by examining memory for trauma-related information under experimental

conditions. The research reported here specifically identifies attentional context as a critical aspect of the conditions under which individuals may experience memory impairment for trauma-related information. Future investigation is needed to evaluate the proposition that the divided-attention condition more closely reflects task demands in complex social situations than does the typical laboratory situation. If this is indeed the case, we may discover that keeping betrayal trauma stimuli out of awareness and memory is fairly common for individuals with dissociative tendencies.

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Footnote

<sup>1</sup> Alternatively, high dissociators may be more familiar with trauma words, making them less memorable. We addressed this issue in the current research. In a sample of 286 undergraduate participants, dissociation level was not related to familiarity ratings for the trauma and neutral words used in the current study, suggesting that differences in recall cannot be explained by simple differences in familiarity with trauma stimuli between groups.

Table 1

*Mean (SD) and two-tailed t-tests for reported trauma on the BBTS by DES group. Scores ranged from 0-6 for high, 0-12 for medium and 0-6 for low betrayal items.*

	Low DES (n=24)	High DES (n=21)	<i>t</i>	<i>p</i>
Total reported trauma	2.6 (2.5)	6.2 (3.9)	-3.7	=.001
High betrayal trauma	0.5 (0.7)	1.5 (1.6)	-2.7	<.01
Medium betrayal trauma	1.2 (1.5)	2.9 (1.9)	-3.2	<.01
Low Betrayal Trauma	0.9 (0.9)	1.9 (1.4)	-2.8	<.01

Table 2

*Mean (SD) for words correctly recalled and recognized.*

			Trauma-Remember	Trauma-Forget	Neutral-Remember	Neutral-Forget
Low DES	Recall	Selective	3.1 (1.1)	1.5 (1.1)	2.0 (1.6)	2.3 (1.6)
		Divided	1.7 (1.4)	1.5 (1.2)	1.1 (0.9)	0.7 (1.0)
	Recognition	Selective	5.1 (1.1)	5.0 (1.1)	4.7 (1.4)	4.9 (1.2)
		Divided	4.8 (1.3)	4.6 (1.4)	4.3 (1.1)	2.9 (1.5)
High DES	Recall	Selective	3.6 (1.1)	1.4 (1.2)	2.3 (1.2)	2.5 (1.1)
		Divided	1.0 (1.0)	1.5 (1.3)	2.0 (1.2)	0.8 (0.8)
	Recognition	Selective	5.3 (0.9)	5.1 (0.9)	5.1 (0.8)	5.3 (0.9)
		Divided	4.3 (1.2)	4.3 (1.4)	4.4 (1.2)	3.8 (1.7)

Figure Caption

*Figure 1.* Interaction of dissociation by word category for percentage of to-be-remembered items presented under divided attention conditions that were correctly recalled.

