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## Betrayal trauma theory of dissociative experiences: Stroop and directed forgetting findings

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According to betrayal trauma theory, many survivors of childhood sexual abuse learn to compartmentalize (i.e., dissociate) their traumatic experiences from conscious awareness by dividing attention. This theory predicts that those who dissociate extensively should be at an advantage during dual tasks. Using a modified Stroop task in Experiment 1 and a direct forgetting task in Experiment 2, we tried to replicate Freyd and colleagues' finding that high-dissociative people perform better under dual task conditions. However, in Experiment 1 we found that, relative to low-dissociative people, high-dissociative people exhibit a slowing of their Stroop reaction times that is independent of valence and attentional context. In Experiment 2, performance on a directed forgetting task was found to be unrelated to dissociation. Our 2 studies provide no evidence for the betrayal trauma theory, nor do they support other theories assuming that dissociation is the manifestation of an automatic defense mechanism.

Dissociation is defined as “a disruption in the usually integrated function of consciousness, memory, identity, or perception of the environment” (American Psychiatric Association, 2000, p. 519). In their mild form, dissociative experiences are common in the general population (Ross, Joshi, & Currie, 1991). Yet they are especially common and severe in certain diagnostic groups, including borderline personality disorder, posttraumatic stress disorder, and schizophrenia (Holmes et al., 2005; Merckelbach, à Campo, Hardy, & Giesbrecht, 2005), and are hallmark features of the dissociative disorders, including dissociative identity disorder (DID) and depersonalization disorder.

The definition of dissociation in the *Diagnostic*

*and Statistical Manual of Mental Disorders* (American Psychiatric Association, 2000), along with widely held clinical assumptions (van der Hart, Nijenhuis, Steele, & Brown, 2004), implies that people who experience high levels of dissociation exhibit attention and memory dysfunctions, engendered by the purported defensive function of dissociation (Gershuny & Thayer, 1999; van der Hart et al., 2004). For example, when writing about dissociation, Ladwig et al. (2002, p. 242) argued that “victims of a psychotraumatic event may protect themselves against the overwhelming exposure of threatening stimuli by inhibiting information processing.”

In her work on dissociation, Freyd and cowork-

1 ers (DePrince & Freyd, 2004; Freyd, Klest, & Al-  
2 lard, 2005) emphasized the importance of betrayal as  
3 a core antecedent in the evolvement of dissociative  
4 symptoms (for a critical review, see McNally, 2007).  
5 According to her betrayal trauma theory (BTT;  
6 Freyd, 1996), dissociation functions as a last resort  
7 when escape is not a viable option, as in the case  
8 of childhood sexual abuse by a trusted caregiver. In  
9 such a situation, according to the theory, it would be  
10 adaptive to learn to compartmentalize (i.e., dissociate)  
11 traumatic experiences from conscious awareness.  
12 Allowing them into consciousness would result in  
13 even more severe consequences, jeopardizing the  
14 person's well-being. Thus, BTT predicts that people  
15 who have been exposed to repeated traumatic  
16 experiences carrying an element of betrayal in them  
17 "may learn to dual-task as a way of managing and  
18 controlling the flow of information" (DePrince &  
19 Freyd, 1999, p. 452). Freyd and colleagues used two  
20 different paradigms in order to empirically evaluate  
21 the predictions flowing from BTT: the Stroop color  
22 naming task (Stroop, 1935) and directed forgetting  
23 (DF) (for a review, see MacLeod, 1998). Their studies  
24 (DePrince & Freyd, 1999, 2001, 2004) indicate that  
25 people high on dissociation tend to perform better  
26 under dual task conditions and are therefore better  
27 at dividing attention than low-dissociative people.

28 In the two studies reported here, we attempted to  
29 replicate Freyd and colleagues' findings (DePrince &  
30 Freyd, 1999, 2004; Freyd, Martorello, Alvarado, Hayes,  
31 & Christman, 1998) in two different samples of un-  
32 dergraduate students. This is important because one  
33 authoritative text on dissociation concluded about  
34 Freyd et al.'s findings that the "statistical reliability  
35 of their findings is rather weak" (Kihlstrom, 2005,  
36 p. 14). In line with this conclusion, McNally, Ris-  
37 tuccia, and Perlman (2005) and Devilly et al. (2007)  
38 questioned the replicability of DePrince and Freyd's  
39 (2001) itemwise DF finding. However, DePrince,  
40 Freyd, and Malle (2007) countered that Devilly et al.'s  
41 (2007) findings actually represent a replication, albeit  
42 nonsignificant. In their reply, Devilly and Ciorciari  
43 (2007, p. 220) disagreed, stating that their finding  
44 represented "a small effect in the direction opposite  
45 that theorized by DePrince and Freyd."

46 Thus, there remains disagreement about the ro-  
47 bustness of findings that support BTT. With this in  
48 mind, we made a systematic attempt to replicate two

different studies (DePrince & Freyd, 1999, 2004) that  
have been interpreted as lending support to BTT  
in order to establish the empirical robustness and,  
consequently, validity of betrayal trauma.

## EXPERIMENT 1

Janet's (1889) concept of dissociation was grounded  
in the hypothesis that dissociative people exhibit de-  
viant information processing of emotional material.  
In this view, people high on dissociation can inhibit  
information processing of emotional material (Lad-  
wig et al., 2002). Thus, people with heightened lev-  
els of dissociation should exhibit slower or impaired  
processing of threat-related information. Moreover,  
some investigators have proposed that extreme inhi-  
bition might be responsible for deficits in traumatic  
memory (Anderson & Green, 2001). Yet few studies  
have actually tested this assumption.

Two studies that Freyd and her colleagues (De-  
Prince & Freyd, 1999; Freyd et al., 1998) conducted  
are a noteworthy exception. In their first study, Freyd  
et al. (1998) found dissociation to be associated with  
color-naming latencies for incongruent color words  
(i.e., the standard Stroop effect) but not with color-  
naming latencies for control stimuli. In that study, dis-  
sociation was measured by means of the Dissociative  
Experiences Scale (DES; Bernstein & Putnam, 1986),  
which is a widely used self-report questionnaire that  
measures the frequency of dissociation. Thus, high-  
DES students displayed more Stroop interference  
than did low-DES students. In a follow-up study,  
DePrince and Freyd (1999) extended the standard  
Stroop task with emotional and neutral words, a sur-  
prise free recall task, and a dual task condition. The  
surprise free recall task allowed DePrince and Freyd  
to tap the automatic avoidant processing that is ar-  
gued to accompany dissociation (Cloitre, 1992), and  
the inclusion of the dual task condition was directed  
at specific predictions based on their BTT (i.e., supe-  
rior performance when in a state of divided attention).  
In line with their previous study, high-DES students  
exhibited more interference during the traditional  
(i.e., selective attention) Stroop task. However, during  
the dual task version (i.e., divided attention) of the  
Stroop task, this interference disappeared. Further-  
more, high-DES students consistently reproduced  
fewer aversive words during free recall than did low-

DES students. Thus, DePrince and Freyd's (1999) findings seem to be in line with the predictions flowing from their BTT (i.e., a performance advantage under dual task conditions and selective memory deficits for trauma-related stimulus words).

Given the assumed centrality of disturbances of information processing in dissociation, the aim of Experiment 1 was to replicate (i.e., empirically evaluate) the Stroop findings by Freyd and colleagues (DePrince & Freyd, 1999; Freyd et al., 1998).

## METHOD

### Participants

During mass testing sessions, undergraduate students enrolled at Maastricht University were selected on the basis of their score on the DES (Cronbach's  $\alpha = .90$ ). The DES (Bernstein & Putnam, 1986) is an instrument consisting of 28 items that ask the respondent to indicate the daily frequency of various dissociative experiences, such as derealization, depersonalization, and psychogenic amnesia, on 100-mm visual analogue scales (anchors: 0 = *never*, 100 = *always*). To obtain a total DES score, responses are averaged across items. Students with DES scores below 10 or above 20 were invited to participate in the current study. Several authors have recommended a score of 20 on the DES as the clinical cutoff for follow-up screening for dissociative disorders (Kersting et al., 2003). Sixty-four participants agreed to take part in the experiment. However, 15 of them had to be excluded because they failed to fulfill the inclusion criterion (DES score less than 10 or greater than 20) when the DES was readministered on the test occasion. The final sample involved 24 low-DES participants (mean DES = 5.67,  $SD = 2.66$ , range 0.73–9.50; 20 women, 4 men) and 22 high-DES participants (mean DES = 32.46,  $SD = 10.52$ , range 20.64–55.00; 17 women, 5 men). It is noteworthy that the mean DES score for the two groups closely corresponded to values reported by Freyd and coworkers for their samples, which were  $M = 29.55$  ( $SD = 8.07$ ) for the high group and  $M = 5.12$  ( $SD = 1.72$ ) for the low group. Mean ages of low- and high-DES groups were 20.5 years ( $SD = 1.86$ , range 18–24 years) and 20.3 ( $SD = 2.02$ , range 18–26 years), respectively. All participants had normal or corrected-to-normal vision and no self-reported color blindness and were compensated through either course credit or a small amount of money.

### Stimuli and materials

To measure high dissociators' ability to inhibit attention to traumatic stimuli, a Stroop color-naming task was used. The stimulus word categories were congruent color words (e.g., *blue* printed in blue ink), incongruent color words (e.g., *blue* printed in red ink), baseline stimuli (e.g., *xxx* printed in blue ink), 12 trauma-related words (e.g., *rape* printed in blue ink), and 12 non-trauma-related farm-related words (e.g., *pig* printed in blue ink). Non-trauma-related words served as control stimuli and were matched to the trauma-related stimuli with respect to word frequency (Baayen, Piepenbrock, & Gulikers, 1995) and word length. In the dual task condition, a different set of 12 farm-related and 12 trauma-related words, equivalent to the aforementioned ones, was used.

Stimuli were presented in lowercase letters at the center of a gray computer screen using the Experimental Run-Time System (ERTS; Beringer, 1996). The software also registered voice responses using an ERTS voice key, and stimuli remained on the screen until participants made a verbal response. Incorrect responses were registered online by the experimenter. The Stroop task was administered in standard (i.e., selective attention) and dual task (i.e., divided attention) conditions. For both conditions, participants were instructed to ignore the meaning of the words and to name the colors of the stimuli (i.e., blue, yellow, or red) as quickly and accurately as possible. Participants were instructed not to correct themselves. During the dual task condition participants were instructed to remember all stimulus words presented during the Stroop task while naming the color of the stimulus as quickly and accurately as possible. The dual task condition was always preceded by the standard (i.e., selective attention) condition. Both conditions were preceded and followed by a set of 12 country names to attenuate primacy and recency effects on free recall performance.

### Procedure

Our procedure and material closely mirrored those used by DePrince and Freyd (1999). Participants were tested individually in a soundproof cabin. After giving informed consent, participants completed the DES. Next, all participants completed the selective attention condition of the Stroop task (Stroop, 1935), which was followed by a surprise free recall task during which participants were instructed to write down all stimulus words they could remember

1 except for the country names. The surprise free recall  
 2 was followed by the dual task Stroop condition.  
 3 Next, participants were requested to write down  
 4 all experimental stimuli that had been presented  
 5 during this condition. Thereafter, participants were  
 6 fully debriefed.

## 7 RESULTS

8  
 9 Reaction times for trials with incorrect responses  
 10 were excluded from the analyses. To normalize  
 11 the reaction time distribution, data were log trans-  
 12 formed. In addition, log-transformed reaction times  
 13 falling more than three standard deviations from the  
 14 mean reaction time of the participant were excluded.  
 15 Analyses were conducted using a 2 (dissociation:  
 16 high, low) × 2 (attention task: standard, dual) × 5  
 17 (word category: congruent color words, incongru-  
 18 ent color words, baseline stimuli, trauma-related  
 19 words, non-trauma-related words) mixed-design  
 20 analysis of variance (ANOVA) on errors and reaction  
 21 times, with dissociation being a between-partici-  
 22 pant factor and attention task and word category  
 23 being within-participant factors. Multiple pairwise  
 24 comparisons were Bonferroni corrected. Effects for  
 25  $p > .10$  are not reported unless they pertain to criti-  
 26 cal hypotheses.

27 Table 1 presents error rates for all attention and  
 28 stimulus conditions for both groups separately. The  
 29 analysis on incorrect responses revealed a main effect  
 30 of word category,  $F(4, 41) = 30.22, p < .01$ . Multiple  
 31 pairwise comparisons indicated that this effect was  
 32 due to a higher rate of errors for incongruent stimuli,  
 33 all  $t_s(44) > 7.98$ , all  $p_s < 0.01$ , as compared to all other  
 34 stimulus types and lower error rates for congruent  
 35 stimuli as compared to all other stimulus types except  
 36 the baseline stimuli, all  $t_s(44) > 3.63$ , all  $p_s < 0.01$ . All

other main effects and interaction failed to attain con-  
 ventional levels of significance.

The analysis on reaction times revealed a main  
 effect for attention condition,  $F(1, 44) = 71.65, p < .01$ ,  
 and word category,  $F(1, 44) = 118.74, p < .01$ . In addi-  
 tion, the interaction between attention condition and  
 word category was significant,  $F(4, 41) = 8.32, p < .01$ ,  
 and the overall difference between the low- and the  
 high-DES group attained borderline significance,  
 $F(1, 44) = 3.47, p = .07$ . This difference was due to  
 the fact that high dissociators exhibited longer Stroop  
 reaction times, irrespective of attention condition or  
 stimulus category (Figure 1). Contrary to DePrince  
 and Freyd's (1999) findings, in our study the critical  
 DES group × attention task × word category interac-  
 tion was nonsignificant,  $F(4, 41) < 1$ .

In line with DePrince and Freyd (1999), we calcu-  
 lated interference scores by subtracting the reaction  
 times for the baseline category from the incongru-  
 ent category. These scores were analyzed in a 2 (dis-  
 sociation: high, low) × 2 (attention task: standard,  
 dual) mixed-design ANOVA, with dissociation being  
 a between-participant factor and attention being a  
 within-participant factor. This approach yielded a  
 main effect of attention condition,  $F(1, 44) = 4.75$ ,  
 $p < .05$ , due to a decrease in interference during the  
 dual task condition. Because Stroop interference  
 tends to become smaller with repetition (MacLeod,  
 1991), this decrease in interference is probably at least  
 partly due to the dual task condition always follow-  
 ing the standard condition. Given the fixed order of  
 attention conditions, we were unable to specifically  
 test whether interference is also reduced by dual task  
 instructions. However, this issue is not relevant to the  
 primary aim of our experiment, namely testing group  
 differences in cognitive performance. Importantly, the

**TABLE 1.** Mean (SD) error rates during the Stroop task as a function of dissociation group, stimulus type, and atten-  
 tional condition, Experiment 1

Dissociation	Condition	xxx	Consistent	Inconsistent	Farm	Trauma
Low ( $n = 24$ )	Standard	1.63% (2.74%)	0.36% (1.20%)	9.24% (6.99%)	1.45% (2.39%)	2.36% (3.94%)
	Dual	3.44% (7.61%)	1.27% (1.96%)	8.88% (8.07%)	4.17% (3.55%)	2.54% (4.66%)
High ( $n = 22$ )	Standard	1.63% (3.01%)	0.72% (1.62%)	11.41% (9.50%)	1.27% (2.65%)	2.54% (3.71%)
	Dual	1.99% (2.47%)	1.09% (1.87%)	9.96% (6.74%)	2.36% (3.73%)	2.54% (3.26%)

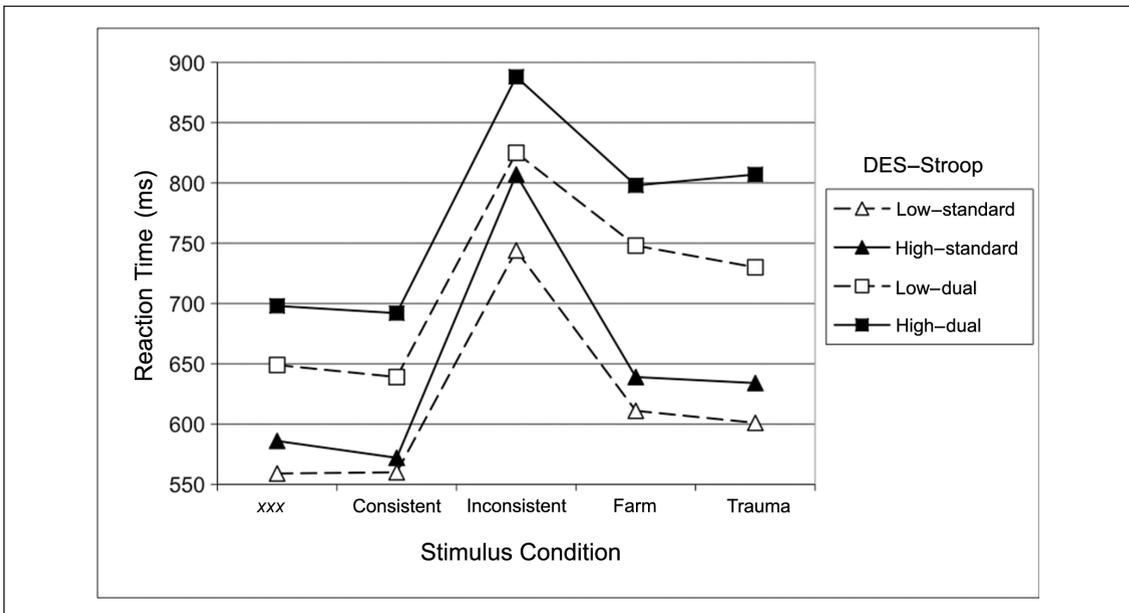


Figure 1. Mean Stroop reaction times for high-dissociative ( $n = 22$ ) and low-dissociative ( $n = 24$ ) participants as a function of attentional task (selective versus dual task) and stimulus type

critical crossover interaction of dissociation  $\times$  attention task was not significant,  $F(1, 44) < 1$ .

Free recall performance was analyzed using a 2 (dissociation: high, low)  $\times$  2 (attention task: standard, dual)  $\times$  2 (word category: trauma related, non-trauma related) mixed-design ANOVA, with dissociation being a between-participant factor and attention task and word category being within-participant factors. The two groups did not differ with regard to their overall free recall performance,  $F(1, 44) = 3.61$ ,  $p > .05$ , but the analysis revealed main effects of Stroop version,  $F(1, 44) = 145.63$ ,  $p = .001$ , and stimulus category,  $F(1, 44) = 13.70$ ,  $p < .001$ . The main effect of Stroop version reflects the overall higher levels of free recall after the dual task version of the Stroop. The main effect of stimulus category was due to a larger proportion of neutral words that both groups reproduced in comparison to their recall of trauma-related words. All other comparisons failed to reach conventional levels of significance.

## DISCUSSION

The findings of Experiment 1 are in sharp contrast to the findings reported by DePrince and Freyd (1999). Recall that these authors found that relative to low-DES participants, high-DES participants exhibit

more slowing for conflicting color words, a difference that disappears once high-DES participants perform under dual task conditions. These authors also reported that high-DES participants recall fewer trauma-related words than low-DES participants. Neither of these specific effects was reproduced in our study.

Although our subsamples were smaller than theirs, our failure to replicate the specific pattern reported by DePrince and Freyd (1999) is unlikely to be due to a lack of statistical power, given that we found all critical interaction effects to be virtually absent, with  $F$ s  $< 1$ . Admittedly, both the work of DePrince and Freyd and our study indicate that dissociative participants exhibit a lack of attentional control. However, whereas the findings of Freyd and coworkers suggest that this attentional dysfunction is context dependent (i.e., emerges only under standard conditions and for emotional stimulus material), the present study and previous work from our lab demonstrate that it is of a more generalized nature (i.e., independent of valence and context). For example, Giesbrecht, Merckelbach, Geraerts, and Smeets (2004) found that undergraduates scoring high on dissociation exhibit subtle deviations in executive functioning as measured by the Random Genera-

1 tion Task. More general deficits to neutral stimuli in  
2 early perceptual processing have also been reported  
3 in patients with depersonalization disorder (Gural-  
4 nik, Giesbrecht, Knutelska, Sirroff, & Simeon, 2007;  
5 Guralnik, Schmeidler, & Simeon, 2000).

6 Another relevant line of research that is difficult  
7 to reconcile with DePrince and Freyd's (1999) BTT  
8 has investigated cognitive inhibitory functioning in  
9 patients with DID (Dorahy, McCusker, Loewenstein,  
10 Colbert, & Mulholland, 2006; Dorahy, Middleton, &  
11 Irwin, 2005). These studies indicate that people with  
12 DID possess intact cognitive inhibitory capabilities  
13 under neutral conditions (Dorahy, Middleton, & Ir-  
14 win, 2004) but that these capabilities become strained  
15 or degraded in an anxiety-provoking context (Dorahy  
16 et al., 2005, 2006). This pattern of findings is fur-  
17 ther underpinned by Giesbrecht, Merckelbach, and  
18 Smeets (2006), who found that students with high  
19 scores on so-called taxon items of the DES experi-  
20 enced difficulties in suppressing emotional thoughts.  
21 Thus, these studies provide evidence for the view that  
22 dissociation is linked to a failure to inhibit emotional  
23 stimulus material rather than superior inhibition.

24 Our failure to replicate DePrince and Freyd's  
25 finding together with the breakdown of cognitive  
26 inhibition during emotional stress in DID is prob-  
27 lematic for mainstream theories on dissociation, in-  
28 cluding BTT, because they all assume that extreme  
29 inhibition, rather than lack of inhibition, is one of the  
30 few plausible scenarios accounting for psychogenic  
31 amnesia (Anderson et al., 2004).

## 33 **EXPERIMENT 2**

34 Proponents of the idea that dissociation serves a  
35 defensive purpose posit that a core characteristic  
36 of highly dissociative people is the ability to banish  
37 threatening information from consciousness (van der  
38 Hart et al., 2004). Along these lines, DePrince and  
39 Freyd used a DF task with itemwise (DePrince &  
40 Freyd, 2001) and listwise (DePrince & Freyd, 2004)  
41 instructions to study how dissociation affects pro-  
42 cessing of threatening information. During itemwise  
43 DF, participants are exposed to a series of words that  
44 are directly followed by a cue to either remember or  
45 forget. During listwise DF, participants are exposed  
46 to a list of words. Typically, after the presentation of  
47 the first half of the stimulus words, participants are

asked to forget all stimuli they have seen so far while  
remembering all subsequent stimuli. At the end of  
both versions of the DF task, participants are asked  
to recall all stimulus words irrespective of remember  
or forget instructions (Kihlstrom, 1983). In general,  
participants tend to recall fewer stimulus words that  
were coupled with a forget instruction in both vari-  
ants of the DF task. However, different mechanisms  
are thought to underlie the respective effects. DF ef-  
fects of the itemwise version are usually attributed  
to attentional disengagement (i.e., failure to encode)  
during presentation of stimuli coupled with a forget  
instruction. In contrast, DF effects during listwise  
DF are thought to represent retrieval inhibition of  
words that were encoded initially but are rendered  
temporarily less accessible (MacLeod, 1999).

DePrince and Freyd (2001, 2004) gave itemwise  
and listwise DF tasks using both neutral and trauma-  
related words to low- and high-dissociative partici-  
pants under standard and dual task conditions (i.e.,  
simultaneously pushing a button with color changes).  
Their results indicated that under dual task condi-  
tions, high dissociators tend to recall fewer trauma  
words (i.e., superior forgetting) and thus seem to be  
superior in dividing their attention compared with  
low dissociators. According to the authors, this fits  
well with the notion that high dissociators would be  
at a cognitive advantage in tasks that require divided  
attention due to their learned superior ability to dual  
task. Alternative hypotheses were rejected when they  
found that high dissociators recalled fewer trauma-  
related and more neutral words than low dissociators.  
However, following DePrince and Freyd's lead, Mc-  
Nally et al. (2005) failed to find any significant group  
differences in a sample of adults with continuous or  
recovered memories of a history of childhood sexual  
abuse and controls. Moreover, Devilly et al. (2007)  
failed to replicate DePrince and Freyd's (2001) find-  
ings in two samples of undergraduates using item-  
wise DF. However, one could argue that McNally et  
al. (2005) used a clinically relevant but very different  
sample than DePrince and Freyd (2004), and Devilly  
et al. (2007) failed to replicate DePrince and Freyd's  
(2001) itemwise DF findings, which leaves open  
the possibility that listwise DF effects would have  
been more convincing. Also, given that inhibition  
rather than an encoding deficit is thought to be the  
mechanism underlying dissociation, listwise DF as

used by DePrince and Freyd (2004) offers a stricter test for BTT but also for other theories assuming that dissociation is the manifestation of a defensive mechanism. With these considerations in mind, we designed Experiment 2.

## METHOD

### Participants

Seventy-six undergraduate students (54 women, 22 men) from Maastricht University with a mean age of 20.41 ( $SD = 2.12$ , range 18–27 years) participated in our study. All participants had normal or corrected-to-normal vision and no self-reported color blindness and were compensated through course credit.

### Stimuli and materials

High-dissociative participants' capacity to banish (i.e., inhibit) emotional material from memory was investigated using a listwise DF task. Stimulus words were drawn from two word categories: trauma-related and neutral words. Stimuli were presented in four blocks consisting of six trauma and six neutral words. Neutral words matched the trauma-related stimuli with respect to word frequency (Baayen et al., 1995). Stimulus words were presented for 6 s in the middle of the screen using ERTS (Beringer, 1996) and appeared on a gray background. Blocks were followed by a remember or forget instruction. Participants were instructed to exploit these instructions in order to remember stimulus words more efficiently.

Participants completed the DF task under two conditions: a standard attention condition and a dual task condition. In the standard attention condition, words appeared in black. During dual task conditions, words were presented in red initially but changed in color from red to blue at random intervals. Participants were instructed to press a key every time the color changed. Block order (standard vs. dual task and forget vs. remember instructions) was balanced across participants.

### Procedure

Our procedure and material closely matched DePrince and Freyd's (2004) DF study. Participants were tested individually with a female experimenter present. First, participants completed the DES (Cronbach's  $\alpha = .94$ ). This questionnaire was followed by the DF task under a standard and a dual task condi-

tion. At the end of the DF task the participants were asked to write down all words they could remember regardless of remember or forget instructions.

## RESULTS

Participants were divided into two groups: a low-dissociation group scoring below and a high-dissociation group scoring above the median of the DES, which was 14.91. This value comes close to the cutoff score of 15 that was found by Steinberg, Rounsaville, and Cicchetti (1991) to be sensitive enough to detect dissociative disorders (see also Devilly & Ciorciari, 2007, who used a similar approach). This approach yielded a low-DES group with a mean DES score of 7.97 ( $SD = 3.82$ ;  $n = 38$ ) and a high-DES group with a mean score of 26.34 ( $SD = 10.40$ ;  $n = 38$ ). Both groups included 27 women. The two groups did not differ in mean age,  $t(74) = .59$ ,  $p > .05$ .

To investigate whether one of the groups may have given priority to one of the subtasks during the dual task condition, we analyzed reaction times on the concurrent task (i.e., pushing a button in response to a change in color of the stimulus words). These reaction times are presented in Table 2. Analyses were conducted using a 2 (dissociation: high, low)  $\times$  2 (word category: emotional, neutral)  $\times$  2 (instruction: remember, forget) mixed-design ANOVA, with dissociation being a between-participant factor and word category and attention task being within-participant factors. All interactions and main effects failed to attain conventional levels of significance, indicating that high-dissociative participants did not differ in their performance on the concurrent task. However, our design allows only an approximation, given the limited number of trials in each condition.

The mean number of items correctly recalled is also presented in Table 2. Analyses were conducted using a 2 (dissociation: high, low)  $\times$  2 (attention task: selective, divided)  $\times$  2 (word category: emotional, neutral)  $\times$  2 (instruction: remember, forget) mixed-design ANOVA, with dissociation being a between-participant factor and attention task and word category being within-participant factors. Contrary to DePrince and Freyd (2004), we did not find a significant dissociation  $\times$  word category interaction,  $F < 1$ . However, in line with McNally et al. (2005), we found that all participants remembered more emotional words in-

dependent of dissociation status, as indicated by a significant effect of valence,  $F(1, 74) = 4.82, p < .05$ . Meanwhile, a significant main effect of attention task demonstrates that our attention manipulation was successful,  $F(1, 74) = 14.81, p < .05$ . Thus, participants remembered more words during the standard condition than during the dual task condition, but there were no differences between high- and low-dissociative participants.

Our subgroups were substantially larger than those used by DePrince and Freyd (2004) but similar in terms of mean DES scores. However, one might wonder whether splitting the group at the median, rather than using two extreme groups as DePrince and Freyd (2004) did, might have affected our findings. Therefore, we repeated our statistical analysis on two extreme groups by dividing our participants into high-dissociation (above 20) and low-dissociation (below 10) groups. The low-dissociation group consisted of 26 participants (19 women, 7 men), and the high-dissociation group consisted 23 participants (14 women, 9 men). The mean DES scores of the high- and low-dissociation group were 32.44 ( $SD = 9.11$ ) and 5.90 ( $SD = 2.55$ ), respectively. This is again comparable to DePrince and Freyd's sample, which consisted of a high-DES group with  $M = 28.9$  ( $SD = 13.4, n = 21$ ) and a low-DES group with  $M = 5.8$  ( $SD = 5.25, n = 24$ ). Groups did not differ with respect to gender,  $\chi^2 = 0.83, ns$ , or age,  $t(47) < 1$ . We specifically investigated the predicted dissociation group  $\times$  word category interaction for to-be-remembered stimuli in the dual task conditions. Contrary to DePrince and Freyd's (2004)

findings, in our study this interaction was nonsignificant,  $F < 1$ .

## DISCUSSION

According to BTT, high-dissociative people should be at a cognitive advantage because of their learned ability to divide their attention. Therefore, one would predict that when a DF test with neutral and trauma words is given in a dual task setup, high-dissociative participants should forget more trauma words than neutral words compared with control participants. However, in Experiment 2, both groups reported more trauma words, and high-dissociative participants displayed no advantage during dual task conditions. Thus, our findings are in stark contrast with those of DePrince and Freyd (2004), who demonstrated that high-dissociative participants remember more neutral and less emotional stimulus words under dual task conditions. Meanwhile, the pattern of results we found is perfectly in line with those of McNally et al. (2005) and Devilly et al. (2007), who both failed to replicate DePrince and Freyd's (2001, 2004) findings. Importantly, when Devilly et al. (2007) used a meta-analytic approach and combined the data from their own two studies with data from DePrince and Freyd's (2001, 2004) two studies, the integrated dataset did not yield the critical pattern of results. Specifically, high-dissociative participants did not remember fewer trauma words than neutral words under dual task conditions as compared with low-dissociative participants (for a comment, see DePrince et al., 2007; for a response by the authors, see Devilly & Ciorciari, 2007).

**TABLE 2.** Mean (*SD*) words recalled and reaction time (RT) as a function of dissociation group, stimulus valence, instruction, and attentional condition, Experiment 2

Dissociation	Condition		Forget–emotional	Remember–emotional	Forget–neutral	Remember–neutral
Low ( <i>n</i> = 38)	Standard	Recall	2.3 (1.6)	1.7 (1.4)	2.0 (2.0)	1.9 (1.4)
		RT (ms)	369 (87.39)	398 (100.64)	380 (75.96)	397 (103.53)
	Dual	Recall	1.1 (1.1)	1.8 (1.1)	0.6 (0.8)	1.9 (1.5)
High ( <i>n</i> = 38)	Standard	Recall	2.2 (1.4)	1.8 (1.4)	1.7 (1.5)	1.5 (1.4)
		RT (ms)	405 (101.28)	409 (88.21)	391 (100.79)	407 (87.50)
	Dual	Recall	0.9 (1.1)	1.8 (1.1)	0.7 (0.7)	2.0 (1.6)

Consistent with our findings is a study by Elzinga, de Beurs, Sergeant, Van Dyck, and Phaf (2000, Experiment 2) demonstrating that participants with DID and undergraduates with heightened dissociative tendencies display an inability to forget emotional stimulus material when instructed to do so. This inability was most pronounced for sexual words. Whatever its interpretation, this effect is difficult to reconcile with the results of DePrince and Freyd (2004).

## GENERAL DISCUSSION

Both studies tried to replicate findings of Freyd and colleagues (DePrince & Freyd, 1999, 2001, 2004; Freyd et al., 1998) that pertain to the possible mechanisms underlying dissociative experiences. According to these authors, victims of betrayal trauma learn to compartmentalize these experiences (i.e., divide attention) and would therefore experience an advantage during dual task conditions, as compared to low-dissociative participants. They argue that their studies substantiate this interpretation. However, our studies failed to replicate their basic findings. More specifically, in Experiment 1, high-dissociative participants tended to react more slowly under all conditions, irrespective of attention condition and stimulus valence. In Experiment 2, both high- and low-dissociative participants were found to report more trauma words, whereas high-dissociative participants displayed no advantage during dual task conditions.

The present studies contribute to the growing literature investigating cognitive and memory aberrations in relation to dissociation (Giesbrecht, Lynn, Lilienfeld, & Merckelbach, 2008) and are important to that end. A point reiterated in many of these studies is that dissociative tendencies occur not along with domain-specific cognitive aberrations (e.g., lack of memory for traumatic material, superior inhibition under dual task conditions) but with a general lack of cognitive efficiency. A case in point are studies finding substantial positive correlations between Broadbent, Cooper, Fitzgerald, and Parkes's (1982) Cognitive Failures Questionnaire, which measures everyday lapses and blunders (e.g., forgetting an appointment), and the DES (Merckelbach, Muris, & Rassin, 1999; Wright & Osborne, 2005). Of course, our finding that dissociative participants tend to show

more Stroop interference than control participants is in line with this, as are studies finding less efficient performance of the former group on executive tasks (Cima, Merckelbach, Klein, Schellbach-Matties, & Kremer, 2001; Giesbrecht et al., 2004).

McNally (2007) rightly argued that studies like ours do not provide a final test of BTT, nor does the work by DePrince and Freyd (1999, 2001, 2004). The point here is that in all these studies, participants were selected on the basis of their dissociation scores, not on the basis of their traumatic background. BTT hinges on the notion that trauma and dissociation are intimately linked and that one can use high DES scores as a proxy for traumatic background. This is why DePrince and Freyd (1999, 2004) recruited their participants on the basis of their dissociation scores rather than the presence or absence of their traumatic background. In an attempt to replicate their findings, we followed the same strategy of recruitment, but it should be acknowledged that the correlation between trauma and dissociation is weak, and the causal direction evidently does not flow from trauma to dissociation (Giesbrecht et al., 2008; Kihlstrom, 2005; Merckelbach & Muris, 2001). Consequently, high levels of dissociation must not be taken as indicators of trauma exposure. Moreover, not a single study on BTT selected participants on having forgotten being abused by a caretaker, the very phenomenon BTT aims to explain. This shortcoming in the selection procedure may have to do with the fact that dissociative amnesia for child sexual abuse is very rare (Goodman et al., 2003), if it exists at all (McNally, 2003; Pope, Barry, Bodkin, & Hudson, 2006). Thus, even if we had found that our high-dissociative participants were better at dividing their attention and leaving aside the fact that our design was cross-sectional, this would not have necessarily been the consequence of betrayal trauma.

In contrast, the very specific patterns of findings from our own studies and those of Devilly et al. (2007) and McNally et al. (2005) are problematic for BTT because they contradict BTT insofar as this theory assumes that dissociation is the mechanism underlying compartmentalization and selective forgetting of emotionally provocative (i.e., threatening) information. Yet neither Experiment 1 nor Experiment 2 found a hint in that direction: High-dissociative participants did not forget more threat-

1 ening words than did control participants. This  
2 conclusion reiterates that of many previous studies  
3 using undergraduate participants (Candel, Merckel-  
4 bach, & Kuijpers, 2003; Giesbrecht, Geraerts, &  
5 Merckelbach, 2007; Merckelbach, Zeles, van Ber-  
6 gen, & Giesbrecht, 2007) and dissociative patients  
7 (Montagne et al., 2007). Like Devilly et al.'s (2007)  
8 Experiment 1, many of these previous studies show  
9 that if dissociation is related to memory accuracy, it  
10 occurs as commission errors (i.e., adding incorrect  
11 elements to ones memory reports) rather than omis-  
12 sion errors (i.e., forgetting elements). Together these  
13 studies form such a large empirical database that it is  
14 time to discard the notion that high levels of dissocia-  
15 tion go along with increased memory omissions.

16 In sum, our two studies and Devilly et al.'s (2007)  
17 and McNally et al.'s (2005) findings cast doubt on the  
18 robustness of high-dissociative participants' capabil-  
19 ity to selectively forget emotional information under  
20 dual task conditions, as assumed by proponents of  
21 BTT. Therefore, one has to conclude that despite its  
22 popularity, BTT is built on a weak empirical funda-  
23 ment and that a more stringent examination of this  
24 theory is needed (McNally, 2007). Moreover, our find-  
25 ings add to a large body of findings from cognitive  
26 studies that show that, contrary to core assumptions  
27 in the clinical literature, dissociation is not related to  
28 inhibition of emotional information processing or to  
29 errors of omission in memory.

#### 30 NOTES

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