Research Report

DISSOCIATIVE TENDENCIES, ATTENTION, AND MEMORY

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Abstract—*Two groups of college students were selected on the basis of their scores on the Dissociative Experiences Scale (DES). The high-DES group (score > 20,* M *= 29.6;* n *= 54) and low-DES group (score < 10,* M *= 5.1;* n *= 54) both completed the standard and a new dual-task version of the Stroop ink-naming task with* xs *(baseline condition) and color, neutral, and emotionally charged words. Free recall results indicated that high-DES participants remembered fewer emotionally charged words than low-DES participants. We found a crossover interaction for Stroop interference: High-DES participants showed more interference (conflicting color – baseline latency for ink naming) in a selective-attention Stroop task and less interference in the dual-task Stroop task. The interaction between attentional context and dissociation for Stroop interference and the free recall results are consistent with a cognitive-environments view of dissociative tendencies. In this view, dissociative tendencies, which have been otherwise speculated to be largely deleterious, can be advantageous in certain contexts.*

Dissociation has been defined as the lack of integration of thoughts, feelings, and experiences into the stream of consciousness. Most people report some dissociative experiences, such as "highway hypnosis" (when one apparently loses conscious awareness of driving for some period of time). However, individual differences in dissociative tendencies have been consistently reported in the literature (see Freyd, 1996, for a review). A number of studies have indicated that dissociative tendencies appear to be high in populations of trauma survivors, and these studies include research in which there was external corroboration for the trauma (e.g., see Bremner et al., 1992; Carlson & Rosser-Hogan, 1993; Marmar et al., 1994; Putnam & Trickett, 1997). Dissociation appears to be an important clinical construct in various disorders, such as posttraumatic stress disorder (PTSD; e.g., Bremner et al., 1992; Carlson & Rosser-Hogan, 1993; Koopman, Classen, & Spiegel, 1994; Marmar et al., 1994) as well as the dissociative disorders. Despite its clinical importance, however, dissociation has not been well understood at the cognitive level, although a number of studies have provided some hints about the cognitive bases of dissociation and dissociative disorders (e.g., Eich, Macaulay, Lowenstein, & Dihley, 1997; Hilgard, 1986; Kihlstrom, 1992; Kihlstrom, Tataryn, & Hoyt, 1993; Litz et al., 1996; Nissen, Ross, Willingham, MacKenzie, & Schacter, 1988).

The need for more rigorous examination of the cognitive bases of dissociative tendencies coincides with a tradition of using information processing approaches to study the role of attention in the onset and maintenance of various disorders. The emotional Stroop task, for example, has been widely used to study information processing in a variety of mental disorders. In an emotional Stroop task, participants typically view words that are emotionally charged for the participants' particular fears (for a review, see Williams, Mathews, & MacLeod, 1996). Studies using this task have shown that individuals who meet criteria for PTSD take longer to name the color of words that are threatening than do control subjects without PTSD (e.g., Foa, Feske, Murdock, Kozak, & McCarthy, 1991; McKenna & Sharma, 1995; McNally, Kaspi, Riemann, & Zeitlin, 1990).

Freyd, Martorello, Alvarado, Hayes, and Christman (1998), working within the framework of betrayal trauma theory, examined the effects of dissociation on attention. Betrayal trauma theory posits a social utility in remaining unaware of abuse when the abuse is perpetrated by a caregiver (Freyd, 1996). Dissociating information from awareness is mediated by the threat that the information poses to the individual's system of attachment and most likely employs attentional mechanisms (Freyd, 1996). Freyd et al. (1998) used dissociation as a predictor of interference in a standard (as opposed to an emotional) Stroop task. The standard Stroop interference is the difference in reaction time to name an ink color that is incongruent with the word meaning (e.g., "green" appears in red ink) and to name an ink color in a baseline condition (e.g., the stimulus is a row of *x*s). Freyd et al. (1998) reported that participants who scored high on the Dissociative Experiences Scale (DES) showed greater Stroop interference than individuals with low DES scores. Individuals with high dissociative tendencies showed disruptions in consciously controlled attentional abilities. Dissociative tendencies were related to a basic cognitive operation and not dependent on the content of the material, as in emotional Stroop paradigms.

In the current study, we sought to replicate and extend these previous results (Freyd et al., 1998) by examining the influence of dissociation on both attention and memory in two different cognitive environments. The prior study showed that individuals with high dissociative tendencies were at a disadvantage in a task that required selective attention, but we suspected that high dissociative tendencies are actually advantageous under some conditions. In particular, we proposed that individuals with high dissociative tendencies are likely to engage in a generalized dual-tasking when attending to information in the world. Therefore, we believed that highly dissociative individuals would be more skilled at performing tasks that required divided attention. We predicted an interaction such that individuals with high DES scores would show greater Stroop interference than low-DES participants in a selective-attention task (replication of Freyd et al., 1998), but would exhibit less interference on a dual-task version of the Stroop (extension).

We were also interested in examining how dissociative tendencies relate to recall for words that are either emotionally charged or neutral. We were particularly interested in whether high-DES participants would be better able than low-DES participants to dissociate recall of the emotionally charged items, given the proposed role of dissociation in keeping threatening information from awareness. In view of the link between dissociation and traumatic histories (see Freyd, 1996), we included charged words associated with assault (e.g., "rape," "incest," "assault").

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METHOD

Participants

Undergraduate students at the University of Oregon were selected on the basis of their scores on the DES (Bernstein & Putnam, 1986), a measure of dissociative tendencies. Three hundred and eighty-eight students were screened in the laboratory (n = 220) or in group testing (n = 168); of these, 80 scored above 20. We were able to successfully test 54 of these 80 high-DES participants (mean score = 29.55, SD = 8.07). We also tested 54 low-DES participants (all scored below 10, with a mean score of 5.12, SD = 1.72) from the same sample.

Participants were compensated through fulfillment of a research requirement in an introductory psychology class. The mean ages for the low- and high-DES groups were 19.56 and 19.51, respectively; 79.6% of the low-DES and 61.1% of the high-DES participants were female.

Materials

Selective- and divided-attention versions of the Stroop color-naming task were employed. The experimental stimulus words came from five categories. Three stimulus categories were replicated from Freyd et al. (1998): baseline stimuli (strings of *x*s, in varying lengths to control for the length of the color words), neutral words (e.g., "cat," "star," "brother," "kitchen"), and incongruent colors (e.g., "red" in blue ink). The two additional stimulus categories were words charged for assault victims (e.g., "assault," "shame," "incest," "victim"; taken from McNally, Metzger, Lasko, Clancy, & Pitman, 1998) and congruent words (e.g., the word "red" in red ink). A practice session and final set of trials involved country names.

Each stimulus consisted of a single word or row of *x*s printed in lowercase at the center of a white computer screen. Each stimulus appeared in one of four colors (red, green, blue, or yellow). The stimulus remained on the screen until the participant made a voice response into a microphone, and there was a 100-ms intertrial interval. The emotionally charged and neutral words were divided to create two distinct lists. The words "red," "green," "yellow," and "blue" were used in each list to create the congruent (e.g., "red" in red) and incongruent (e.g., "blue" in green) categories. Finally, rows of *x*s appeared in both lists. One list was viewed during the selective-attention block, and the second list was viewed during the divided-attention block. The list order was randomized across participants. Word-color pairings and word order within each list were randomized for each participant. A free recall task was administered immediately following both the selective and dual-task Stroop blocks.

The DES was administered by computer. The DES is a 28-item self-report measure that assesses dissociative experiences such as dissociative amnesia, gaps in awareness, derealization, depersonalization, absorption, and imaginative involvement. The DES has been used in more than 250 published studies in a wide range of populations and has been shown to have good reliability (internal consistency and test-retest reliability), as well as good convergent validity (see Briere, 1997, for a review). Participants are instructed to indicate the percentage of time for which each item pertains to them. Items include "Some people have the experience of feeling that other people, objects, and the world around them are not real." Carlson and Putnam (1993) noted that scores above 20 are indicative of highly dissociative experiences about which a clinician would want to gather more information. Scores below 10 are considered to be in the range of normal dissociative experiences (Carlson & Rosser-Hogan, 1993).

Design

The design formed a 2 (dissociation: high or low) × 2 (attention task: selective or dual) × 5 (word category) × 2 (order of lists) factorial model with dissociation as the between-subjects factor. Word category and attention task were within-subjects factors.

Procedure

Participants were tested one at a time in a room with an experimenter present. They were instructed that they would be presented with single words in one of four colors in the center of the computer screen, and were told that their task was to name the color of each word as quickly and accurately as possible. They received instructions to ignore the word meanings and to name the color of each word by speaking into a microphone located directly in front of them. Participants were instructed not to correct themselves if they made errors. They engaged in a practice session that included two blocks of eight country names. Following the practice, participants viewed the first block of words, which concluded with the presentation of the eight country names. Country names appeared during practice and at the end of the list to help reduce primacy or recency effects for the experimental words in the memory tasks. Following completion of the first block, participants were given a surprise free recall memory task and were instructed to write down all of the words that they could remember from the list they had just seen.

Participants were given new instructions for the dual-task Stroop task, which constituted the second block of trials. They were instructed to name the ink color of each word as quickly and accurately as possible while also remembering the words for a memory test at the end of the block. Practice trials using the country names were administered. Participants then viewed a list that did not include any of the emotionally charged or neutral words from the selective-attention block. Country names were presented at the end of the list. Participants were then instructed to complete a free recall task. Finally, the DES was administered by computer.

RESULTS

Free Recall Task

The mean percentages of neutral and emotionally charged words correctly recalled are presented in Table 1. (Recall for the congruent, incongruent, and baseline categories did not allow for meaningful interpretation because the four color words were used in both tasks and spoken aloud and baseline items were not words.) A 2 (dissociation) × 2 (attention task) × 2 (word category) repeated measures mixed-design analysis of variance revealed a significant effect for attention task, $F(1, 106) = 120.77$, $p < .001$. Participants recalled more words in the divided-attention condition, suggesting that the instruction manipulation was effective. In addition, a significant main effect for word category ($F[1, 106] = 12.21$, $p = .001$) revealed that more charged words were recalled than neutral words. The only significant interaction, dissociation by word category, indicated that high-DES

Table 1. *Mean percentage of correctly recalled neutral and charged words by task and group*

	Selective-attention Stroop		Dual-task Stroop	
Group	Neutral	Charged	Neutral	Charged
Low DES	4.18	9.73	18.05	28.70
High DES	4.40	6.95	18.13	19.45

Note. DES = Dissociative Experiences Scale.

participants recalled fewer charged words and more neutral words than did low-DES participants, $F(1, 106) = 4.63$, $p = .034$.

Stroop Tasks

Reaction times for trials in which responses were incorrect and in which the microphone malfunctioned were deleted from the analysis. In addition, reaction times falling more than 2.5 standard deviations from the grand mean for each participant were deleted. With these data removed, the mean reaction time for each stimulus category was calculated separately for the standard and dual-task Stroop tasks for each participant. Table 2 reports the mean response times in milliseconds. Though our primary predictions related to Stroop interference, preliminary analyses revealed a main effect for attention, $F(1, 106) = 211.5$, $p < .001$: Participants showed slower reaction times in the divided-attention condition. There was also a main effect for word category, $F(4, 424) = 122.5$, $p < .001$. The main effect for dissociation was not significant, $F(1, 106) = 0.070$, $p = .792$. No significant effects within categories were revealed for high-DES versus low-DES groups.

To test our main prediction, we calculated interference scores by subtracting the mean reaction times for the baseline category from the mean reaction times for the incongruent category. Group means were then computed (see Fig. 1). A 2 (dissociation) × 2 (attention task) analysis revealed that main effects for dissociation level and attention task were not significant. The crossover interaction of dissociation by attention task was significant, $F(1, 106) = 4.05$, $p = .047$. Numerically, high-DES participants showed greater interference in the selective-attention condition and less interference in the divided-attention condition than the low-DES participants. Follow-up tests of simple

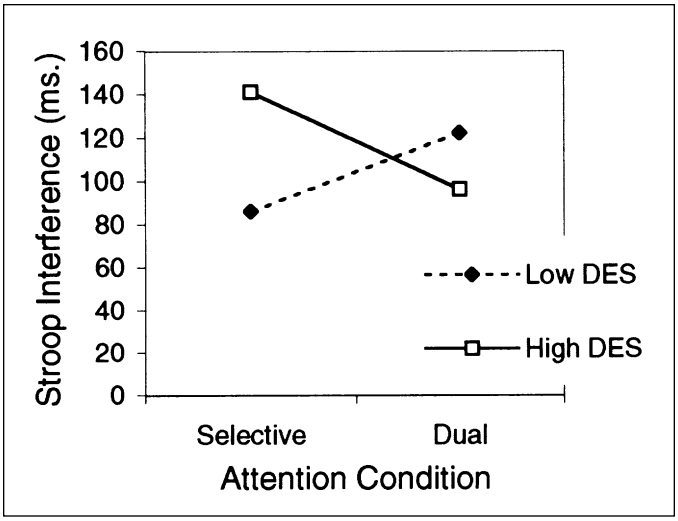

Fig. 1. Mean Stroop interference scores for high and low scorers on the Dissociative Experiences Scale (DES) as a function of attention task (selective and dual-task).

effects showed that within the selective-attention condition alone, the difference between high-DES and low-DES participants was significant, $t(106) = 1.94$, $p = .028$ (one-tailed). However, within the divided-attention condition alone, the difference was not significant, $t(106) = 0.996$, $p = .161$ (one-tailed). Further tests of simple effects showed that within the high-DES group, the difference in interference between the selective- and dual-attention conditions failed to meet conventional levels of significance, $t(53) = 1.62$, $p = .055$ (one-tailed); within the low-DES group, the difference was not statistically significant, $t(53) = 1.22$, $p = .114$ (one-tailed).

DISCUSSION

As we predicted, high-DES participants showed more interference on the selective-attention version of the Stroop color-naming task than low-DES participants. In contrast, the high-DES group exhibited numerically less interference when they were asked to divide their attention and accomplish two tasks at once. However, this significant crossover interaction must be qualified by the fact that three of the four simple effects failed to reach conventional levels of statistical

Table 2. *Mean reaction time (in milliseconds) by task and word category*

	Selective-attention Stroop		Dual-task Stroop	
Word category	Low DES	High DES	Low DES	High DES
Baseline (*xxx*)	669 (144)	649 (82)	784 (167)	785 (174)
Incongruent	759 (136)	778 (129)	900 (190)	878 (155)
Neutral	699 (121)	700 (101)	836 (156)	831 (151)
Charged	691 (151)	687 (103)	843 (163)	820 (178)
Congruent	605 (112)	609 (85)	735 (145)	724 (157)

Note. Standard deviations are given in parentheses. DES = Dissociative Experiences Scale.

significance. We also found that the high-DES group remembered fewer charged words and more neutral words than the low-DES group.

The current findings suggest that dissociative tendencies and basic cognitive processes of memory and attention are interconnected. The crossover interaction for Stroop interference suggests that, at least for some tasks requiring the selection of information, dissociative people may perform better when dual-tasking, as compared with nondissociative people, who may perform best when focusing their attention. As a corollary, this finding suggests that although highly dissociative individuals are generally considered impaired, in some contexts they may have a cognitive edge.

We currently understand these results as consistent with a cognitive-environments conceptualization of dissociation. This conceptualization assumes that individuals who are highly dissociative have developed ways to cope in life that allow for their dissociation. This lack of integration of experiences, memories, and thoughts creates an environment that requires constant divided attention, and encourages cognitive strategies for functioning efficiently in such environments. Habitual creation of a divided cognitive environment may lead to both adaptive and maladaptive consequences, depending on the context and functional demands of the situation. Based on the current study and our reading of the literature on dissociation, we propose that some individuals who experience traumatic events may learn to dual-task as a way of managing and controlling the flow of information. From a cognitive-environments viewpoint, traumatized individuals may use dissociation and dual-tasking in order to keep information that is potentially at odds with survival goals away from consciousness and other mental functions. However, additional research is needed to confirm the effects obtained here and to further explore the influence of dissociation on attention, especially under different types of dual-task demands. If the present results are confirmed, the current study should be replicated using trauma history as an additional predictor of Stroop performance, in order to test the assumptions of betrayal-trauma theory.

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REFERENCES

Bernstein, E.M., & Putnam, F.W. (1986). Development, reliability, and validity of a dissociation scale. *Journal of Nervous and Mental Disease, 174,* 727–735.

Bremner, J.D., Southwick, S., Brett, E., Fontana, A., Rosenheck, R., & Charney, D. (1992). Dissociation and posttraumatic stress disorder in Vietnam combat veterans. *American Journal of Psychiatry, 149,* 328–332.

Briere, J. (1997). *Psychological assessment of adult posttraumatic stress.* Washington, DC: American Psychological Association.

Carlson, E.B., & Putnam, F.W. (1993). An update on the Dissociative Experiences Scale. *Dissociation, VI,* 16–27.

Carlson, E.B., & Rosser-Hogan, R. (1993). Trauma experiences, posttraumatic stress, dissociation and depression in Cambodian refugees. *American Journal of Psychiatry, 148,* 1548–1551.

Eich, E., Macaulay, D., Lowenstein, R.J., & Dihley, P.H. (1997). Memory, amnesia, and dissociative identity disorder. *Psychological Science, 8,* 417–422.

Foa, E., Feske, U., Murdock, T., Kozak, M., & McCarthy, P. (1991). Processing of threat-related information in rape victims. *Journal of Abnormal Psychology, 100,* 156–162.

Freyd, J.J. (1996). *Betrayal trauma theory: The logic of forgetting childhood abuse.* Cambridge, MA: Harvard University Press.

Freyd, J.J., Martorello, S.R., Alvarado, J.S., Hayes, A.E., & Christman, J.C. (1998). Cognitive environments and dissociative tendencies: Performance on the Standard Stroop Task for high versus low dissociators. *Applied Cognitive Psychology, 12,* S91–S103.

Hilgard, E.R. (1986). *Divided consciousness: Multiple controls in human thought and action.* New York: John Wiley & Sons.

Kihlstrom, J.F. (1992). Dissociative and conversion disorders. In D.J. Stein & J. Young (Eds.), *Cognitive science and clinical disorders* (pp. 247–270). San Diego: Academic Press.

Kihlstrom, J.F., Tataryn, D.J., & Hoyt, I.P. (1993). Dissociative disorders. In P.B. Sutker & H.E. Adams (Eds.), *Comprehensive handbook of psychopathology* (pp. 203–234). New York: Plenum Press.

Koopman, C., Classen, C., & Spiegel, D. (1994). Predictors of posttraumatic stress symptoms among survivors of the Oakland/Berkeley, Calif., firestorm. *American Journal of Psychiatry, 151,* 888–894.

Litz, B.T., Weathers, F.W., Monaco, V., Herman, D.S., Wulfsohn, M., Marx, B., & Keane, T.M. (1996). Attention, arousal, and memory in posttraumatic stress disorder. *Journal of Traumatic Stress, 9,* 497–520.

Marmar, C.R., Weiss, D.S., Schlenger, W.E., Fairbank, J.A., Jordan, B.K., Kulka, R.A., & Hough, R.L. (1994). Peritraumatic dissociation and posttraumatic stress in male Vietnam theater veterans. *American Journal of Psychiatry, 151,* 902–907.

McKenna, F.P., & Sharma, D. (1995). Intrusive cognitions: An investigation of the emotional Stroop task. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 21,* 1595–1607.

McNally, R., Kaspi, S., Riemann, B., & Zeitlin, S. (1990). Selective processing of threat cues in post-traumatic stress disorder. *Journal of Abnormal Psychology, 99,* 398–402.

McNally, R.J., Metzger, L.J., Lasko, N.B., Clancy, S.A., & Pitman, R.K. (1998). Directed forgetting of trauma cues in adult survivors of childhood sexual abuse with and without posttraumatic stress disorder. *Journal of Abnormal Psychology, 107,* 596–601.

Nissen, M.J., Ross, J.L., Willingham, D.B., MacKenzie, T.B., & Schacter, D.L. (1988). Memory and awareness in a patient with multiple personality disorder. *Brain and Cognition, 8,* 117–134.

Putnam, F.W., & Trickett, P.K. (1997). The psychobiological effects of sexual abuse: A longitudinal study. *Annals of the New York Academy of Sciences, 821,* 150–159.

Williams, J.M.G., Mathews, A., & MacLeod, C. (1996). The emotional Stroop task and psychopathology. *Psychological Bulletin, 120,* 3–24.

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