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# Cognitive Processing of Trauma Cues in Adults Reporting Repressed, Recovered, or Continuous Memories of Childhood Sexual Abuse

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Psychologically traumatized people exhibit delayed color naming of trauma words in the emotional Stroop task. Four groups of participants were asked to color name positive words, neutral words, and trauma words; these groups included 15 women who believed that they harbored repressed memories of childhood sexual abuse (CSA), 13 women who reported recovered memories of CSA, 15 women who had never forgotten their CSA, and 12 women who had never been abused. Repressed-memory participants exhibited patterns of interference indistinguishable from those of the nonabused control group participants. Irrespective of group membership, the severity of self-reported posttraumatic stress disorder symptoms was the only significant predictor of trauma-related interference, $r(48) = .30$, $p < .05$.

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Some clinicians believe that people can be sufficiently traumatized by childhood sexual abuse (CSA) that memories of these events become repressed and inaccessible to awareness (e.g., Terr, 1991; van der Kolk, 1994). According to this perspective, dissociated memory fragments may intrude as sensory flashbacks and inexplicable physiologic reactions to trauma cues, adversely affecting adjustment. Clinical improvement is said to require recovery and integration of these dissociated memories into a healing narrative (Brown, Scheflin, & Hammond, 1998).

According to another perspective, some psychologically distressed people who have never been abused may come to believe that their troubles are rooted in CSA events that they cannot remember (e.g., Loftus, 1993; Ofshe & Watters, 1994). They may "recall" false memories of abuse after undergoing suggestive psychotherapies, reading self-help books, or watching television shows about repressed and recovered memories of CSA (e.g., Heaton & Wilson, 1998; Ofshe & Watters, 1994; Schacter, 1999).

Central to the first perspective is the thesis that CSA memories are repressed or dissociated because they are so psychologically traumatic. Indeed, sensory flashbacks, psychophysiologic reactions, and so forth are said to be triggered by cues linked to the repressed-memory trauma. This notion would lead to the prediction that people who have repressed their memories of CSA should exhibit marked interference for trauma-related words in the emotional Stroop task (Williams, Mathews, & MacLeod, 1996). This task requires participants to name the colors of words that vary in emotional significance while ignoring the meanings of the words. Delays in color naming, or Stroop interference, occur when the meaning of the word captures the participant's attention despite his or her attempt to focus on its color. Stroop interference for trauma-related words increases as a function of psychological traumatization (e.g., McNally, Kaspi, Riemann, & Zeitlin, 1990); psychologically disturbed survivors take longer to name the colors of words related to their trauma than to name the colors of positive or neutral words (for a review, see McNally, 1998). In an important replication of this effect, Dubner and Motta (1999) found that sexually abused children and adolescents exhibited greater interference for CSA words than for control words. This effect was especially pronounced in those who qualified for a diagnosis of posttraumatic stress disorder (PTSD).

In this study, we administered an emotional Stroop task to four groups of participants: (a) women who believe that they were sexually abused as children but who have no explicit autobiographical memory of this abuse (*repressed*[1] *-memory group*), (b) women who report having recovered memories of CSA (*recovered*[1]*-memory group*), (c) women who report never having forgotten their CSA (*continuous-memory group*), and (d) women who report never having been abused (*control group*). The task required participants to name the colors of neutral words (e.g., carpet), positive words (e.g., elation), and words related to CSA (e.g., incest). If individuals reporting repressed and recovered memories of CSA have been psychologically traumatized, then they ought to resemble psychologically disturbed sexual assault survivors who exhibit enhanced interference for words related to their trauma (Cassiday, McNally, & Zeitlin, 1992; Dubner & Motta, 1999; Foa, Feske, Murdock, Kozak, & McCarthy, 1991).

We tested several hypotheses. In people exposed to traumatic events, Stroop interference for trauma-related words is positively

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[1] We use the terms *repressed memories* and *recovered memories* to characterize the phenomenology of our participants. We were unable either to confirm (or disconfirm) whether participants in the repressed-memory and recovered-memory groups had, in fact, been abused.

correlated with severity of psychological traumatization (i.e., severity of PTSD symptoms; McNally et al., 1990). According to some theorists (e.g., Brown et al., 1998; van der Kolk, 1994), the more psychologically disturbing an event is, the more likely the trauma-exposed person will repress all memory for the event (for critiques of this traumatic amnesia perspective, see McNally, 1999; Pope, Hudson, Bodkin, & Oliva, 1998). This perspective implies that scores on a dimensional self-report measure of PTSD should predict trauma-related interference irrespective of group membership and that the magnitude of trauma-related interference should be greatest in the repressed-memory group and then the recovered-memory group, the continuous-memory group, and the control group. That is, if interference reflects the severity of psychological disturbance, then people who continue to repress their memories should exhibit more interference than those who have recovered their memories; the latter, in turn, should exhibit more interference than those who have never repressed them (i.e., continuous-memory group). Alternatively, if trauma-related interference reflects the accessibility of disturbing memories, then individuals who report explicit, autobiographical CSA memories (recovered-memory and continuous-memory groups) should exhibit more interference than those who do not (repressed-memory and control groups). Finally, if trauma-related interference reflects a belief that one has been abused, then the repressed-memory, recovered-memory, and continuous-memory groups all should exhibit more interference than the control group.

## Method

### Design

We used a 4 (group: continuous, recovered, repressed, control) × 3 (word type: trauma related, positive, neutral) design with repeated measurement on the second variable.

### Participants

The 15 women in the continuous-memory group had been recruited for a previous study via newspaper advertisements, CSA survivor support groups, and word of mouth (Orr et al., 1998). None of these individuals had ever forgotten that she had been sexually abused, and 12 had consented to have their reports of abuse corroborated by an informant (Orr et al., 1998).

Members of the other groups had responded to newspaper advertisements requesting "adult, female volunteers who either (a) feel they may have been sexually abused as children, but are not sure, or (b) have recovered memories of having been sexually abused as children, or (c) have no history of sexual abuse as children, to participate in a study on memory."[2] Interviewing these individuals, S. A. Clancy used the following criteria to assign them to the appropriate group. Women who believed that they had been sexually abused as children but who had no explicit autobiographical memory of the suspected abuse events were assigned to the repressed-memory group ($n$ = 15). Participants in this group cited a variety of symptoms that they believed indicated an abuse history (e.g., depressed mood, nightmares, substance abuse, becoming inexplicably tense in the presence of certain family members). Women who reported having recovered memories of CSA were assigned to the recovered-memory group ($n$ = 13), whereas women who reported no abuse history were assigned to the control group ($n$ = 12).

Our procedures followed guidelines of the American Psychological Association for studies involving human participants. Participants provided written informed consent and were paid $25 for their participation.

### Psychometric Measures

To characterize our participants further, we asked them to complete the following questionnaires: the civilian version (CMISS; Vreven, Gudanowski, King, & King, 1995) of the Mississippi Scale for Combat-Related Posttraumatic Stress Disorder (Keane, Caddell, & Taylor, 1988), the Beck Depression Inventory (BDI; Beck & Steer, 1987), and the Dissociative Experiences Scale (DES; Bernstein & Putnam, 1986), including the pathological taxon subset of items (DES-T; Waller, Putnam, & Carlson, 1996). Waller et al. (1996) found that items 3, 5, 7, 8, 12, 13, 22, and 27 of the DES were strongly linked to severe dissociative disorders. The BDI is the most extensively validated and psychometrically sound self-report measure of depression (Beck, Steer, & Garbin, 1988). Evidence supporting the reliability and validity of the DES as a measure of dissociative tendencies has been summarized by Carlson and Putnam (1993). The original (military) version of the Mississippi PTSD scale has long been established as a psychometrically sound measure of PTSD symptoms (McFall, Smith, Mackay, & Tarver, 1990), and studies on the civilian version (CMISS) have begun to appear (Vreven et al., 1995).

The means and standard deviations for these measures, plus age and years of education, are shown in Table 1. One-way analyses of variance were conducted on these data. The groups did not differ significantly either in age or in years of education, $ps > .05$, but they differed on every clinical variable (see Table 1). Follow-up Tukey's honestly significant difference tests indicated that the repressed-memory group reported significantly more PTSD symptoms, depressive symptoms, dissociative symptoms, and pathological dissociative symptoms than did either the continuous-memory group or the control group, $ps$ = .03 to .002. There were no further significant effects.

### Materials and Procedure

The Stroop stimuli consisted of 10 trauma words (worthless, rape, violated, incest, molested, abuse, penis, assault, victim, shame), 10 positive words (loyal, cheerful, laugh, merry, polite, sociable, tidiness, clever, elation, neat), and 10 neutral words belonging to the category of household items (mirror, curtain, carpet, bowl, paneling, cupboard, mailbox, microwave, fan, washer). The emotional relevance of the trauma words had been established by our group in previous research on information processing in CSA survivors with PTSD (McNally, Metzger, Lasko, Clancy, & Pitman, 1998). The word categories did not differ in terms of mean length or frequency of usage in American English (Francis & Kučera, 1982). Each participant saw each word four times, once each in the colors red, blue, white, and green. Therefore, each participant was exposed to 120 total trials, 40 of each word valence. There were four randomized sequences.

For the emotional Stroop task, participants were asked to name the colors of words as quickly as possible while ignoring the meanings of the words. A trial began with a 500-ms white fixation cross appearing at center screen against a black background. The fixation cross was replaced by the stimulus word, which appeared in lowercase letters at center screen. The participant's vocal color-naming response was detected by a lapel microphone connected to a voice-activated relay box that stopped the computer's clock and recorded the color-naming latency. The vocal response erased the word from the screen, and the fixation cross for the next trial automatically appeared 1,500 ms later. We used Micro Experimental Laboratory (Schneider, 1988) software to present stimuli and to record vocal-response latencies. Micro Experimental Laboratory was run on a Gateway 386 IBM-compatible PC. The Stroop task took about 15 min to complete.

[2] Participants were recruited from among those who had volunteered for our previous memory research (Clancy, Schacter, McNally, & Pitman, 2000).

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Table 1
*Demographic and Psychometric Data*

| | Memory group | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Continuous | | Recovered | | Repressed | | Control | |
| Variable | *M* | *SD* | *M* | *SD* | *M* | *SD* | *M* | *SD* |
| Age | 48.0 | 13.4 | 43.6 | 8.5 | 41.7 | 13.7 | 36.5 | 14.0 |
| Education | 13.7 | 2.1 | 15.3 | 2.0 | 14.9 | 2.0 | 15.7 | 2.1 |
| CMISS | 84.2 | 17.8 | 95.9 | 20.3 | 109.5 | 26.0 | 77.8 | 13.9 |
| BDI | 6.7 | 5.9 | 13.5 | 9.3 | 21.2 | 11.7 | 9.2 | 7.3 |
| DES | 8.7 | 11.2 | 12.5 | 6.6 | 19.8 | 13.9 | 6.1 | 3.9 |
| DES-T | 4.7 | 7.5 | 8.5 | 6.4 | 14.6 | 11.7 | 2.5 | 2.6 |

*Note.* Because of missing data, degrees of freedom vary. Age and education are given in years. CMISS = civilian version of the Mississippi Scale for Combat-Related Posttraumatic Stress Disorder (possible range: 35 to 175); BDI = Beck Depression Inventory (possible range: 0 to 64); DES = Dissociative Experiences Scale (possible range: 0 to 100); DES-T = Dissociative Experiences Scale—Pathological Tax on subscale.

## Results

Response latencies of less than 300 ms or of greater than 1,500 ms were deleted a priori as outliers. Mean response latencies as a function of group and word type are shown in Table 2. Following typical procedure (e.g., McNally et al., 1990), we calculated two Stroop interference indices by subtracting each participant's mean response latency for neutral words from her mean response latency for trauma words and from her mean response latency for positive words. By calculating these two indices, we controlled for differences among the participants in overall color-naming speed. Because we had specific hypotheses, we conducted focused contrasts that took the form of one-tailed *t* tests (Rosenthal & Rosnow, 1991) and computed effect size *r* for each contrast (Rosenthal & Rosnow, 1985). This method has more statistical power for detecting effects than do traditional unfocused omnibus analyses of variance and is therefore recommended for tests of specific hypotheses (Rosenthal & Rosnow, 1985).

To test whether self-reported PTSD symptoms predicted trauma-related interference, we correlated CMISS scores with the difference in the magnitude of interference for trauma words versus positive words (i.e., trauma interference index minus positive interference index; Table 2). Subtracting the positive interference index from the trauma interference index creates a new variable (a "second-order interference index") that economically represents the degree to which trauma words provoke more interference than positive words (Flynn & McNally, 1999). We computed similar correlations for the DES, DES-T, and BDI. Degrees of freedom varied because of missing data for some participants.

The strongest predictor of trauma-related Stroop interference was severity of PTSD symptoms, as indicated by the correlation between the second-order interference index and CMISS scores, $r(48) = .30$, $p < .05$. Severity of dissociation (DES), $r(48) = .15$, pathological dissociation (DES-T), $r(48) = .16$, and depression (BDI), $r(44) = .20$, did not significantly predict interference ($ps > .10$, two tailed).

According to the repression hypothesis, trauma-related interference should be a linear function of the degree of repression. Applying the contrast weights −2, −1, 1, and 2 to the data from the control, continuous-memory, recovered-memory, and repressed-memory groups (see last column in Table 2), respectively, we obtained no support for this hypothesis, $t(51) = 0.47$, *ns*, effect size $r = .07$.

A variant of the repression hypothesis holds that members of the recovered-memory group did, in fact, repress and recover genuine memories of CSA, whereas members of the repressed-memory group were incorrect in assuming that they had been abused. Indeed, inspection of Table 2 suggests a linear trend of increasing interference ranging from the control group (7 ms) to the continuous-memory group (23 ms) to the recovered-memory group (38 ms). A contrast test of this apparent linear trend fell short of significance (contrast weights: −1, 0, 1), $t(37) = 1.42$, $p < .10$, effect size $r = .23$.

If trauma-related interference reflects access to CSA memories, then the recovered- and continuous-memory groups combined should exhibit greater interference than the control and repressed-memory groups combined (contrast weights: 1, 1, −1, and −1). This hypothesis fell short of significance, although a trend was evident, $t(51) = 1.61$, $p < .10$, effect size $r = .22$.

If trauma-related interference reflects salience of trauma cues for those who believe that they have been abused, then the continuous-, repressed-, and recovered-memory groups combined should exhibit more interference than the control group (contrast weights: 1, 1, 1, and −3). There was no convincing support for this hypothesis, $t(51) = 1.04$, $p < .25$, effect size $r = .14$.

## Discussion

This experiment provided no support for the hypothesis that the repressed-memory group would exhibit the most trauma-related interference. As shown in Table 2, this group exhibited interference indistinguishable from that of the control group and strikingly different from that of people who were exposed to sexual assault and who remembered their trauma (Cassiday et al., 1992; Foa et al., 1991).

Participants in the continuous- and recovered-memory groups tended to exhibit more interference than those in the repressed-memory and control groups. However, not much weight should be placed on this effect; it failed to reach a conventional level of significance despite our high-power, focused contrast analysis. A similar trend indicated a linear increase in interference from the

Table 2
*Response Latency and Mean Interference Index as a Function of Group and Word Type*

| | Word type | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Trauma | | Positive | | Neutral | | Index | |
| Memory group | *M* | *SD* | *M* | *SD* | *M* | *SD* | *M* | *SD* |
| Continuous | 733 | 126 | 710 | 98 | 708 | 103 | 23 | 56 |
| Recovered | 781 | 147 | 743 | 133 | 732 | 108 | 38 | 60 |
| Repressed | 675 | 111 | 666 | 117 | 654 | 110 | 10 | 34 |
| Control | 640 | 128 | 633 | 118 | 641 | 108 | 7 | 48 |

*Note.* Data are given in milliseconds. Index = trauma interference index minus positive interference index (second-order interference index).

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control group to the continuous-memory group to the recovered-memory group.

Consistent with previous research (McNally, 1998), the severity of self-reported PTSD symptoms predicted the magnitude of trauma-related interference irrespective of group membership. These findings are similar to data from rape (Cassiday et al., 1992) and combat (McNally et al., 1990) survivors; the more severe a participant's trauma-related symptoms, the greater the magnitude of Stroop interference for trauma words, irrespective of whether the participant meets the full criteria for the PTSD syndrome.

The repressed-memory group scored significantly higher than did the control group on self-reported PTSD symptoms (CMISS score: 109.5 versus 77.8) but not on trauma-related interference (10 ms versus 7 ms). Given the fact that the CMISS was the best predictor of interference, one might have expected the repressed-memory group to have shown comparably higher interference than the control group. That they did not suggests that the repressed-memory group's symptoms originated, at least in part, from a diversity of non-trauma-related sources. Their attribution of their symptoms to repressed memories of CSA may represent an "effort after meaning"—an attempt to explain one's otherwise inexplicable unhappiness. Moreover, not only does the CMISS tap reexperiencing symptoms, it taps other PTSD symptoms that do not refer directly to remembered events (e.g., startle, numbing) and other, nonspecific problems (e.g., no longer having close friends, difficulty remaining employed). Therefore, a person who recollected no traumatic events could nevertheless score higher on the CMISS than a person who recollected traumatic events but who endorsed mainly intrusive symptoms. Taken together, these considerations explain why the CMISS would predict trauma-related Stroop interference despite the repressed-memory group scoring high on the CMISS but low on interference.

Our study has limitations. First, we were unable to determine the veracity of the recovered memories in the recovered-memory group, and we were unable to determine whether participants in the repressed-memory group harbored traumatic memories that they were unable to recall. Although it is impossible to prove the null hypothesis that someone was not, in fact, abused, it would be interesting to compare Stroop performance in people whose recovered (or repressed) memories have been corroborated and those whose memories have not. Second, our study was organized around memory phenomenology, not psychiatric disease. Hence, it would be interesting to compare participants reporting repressed, recovered, and continuous memories of abuse and who either do or do not qualify for PTSD. Testing of this hypothesis, however, would be complicated for participants reporting repressed memories because PTSD is typically expressed as intrusive recollections of autobiographical memories of traumatic events, and these would be inaccessible (by definition) for participants in the repressed-memory group.

The debate about the reality of repressed and recovered memories of sexual abuse has been an issue for psychology and psychiatry for several years. The present study represents an attempt to illuminate this issue by providing data on cognitive processing of trauma cues in the very people at the center of this controversy.

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