Research Article

Cognitive Mechanisms Underlying Recovered-Memory Experiences of Childhood Sexual Abuse

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ABSTRACT—*People sometimes report recovering long-forgotten memories of childhood sexual abuse. The memory mechanisms that lead to such reports are not well understood, and the authenticity of recovered memories has often been challenged. We identified two subgroups of people reporting recovered memories of childhood sexual abuse. These subgroups differed dramatically in their cognitive profiles: People who recovered memories of abuse through suggestive therapy exhibited a heightened susceptibility to the construction of false memories, but showed no tendency to underestimate their prior remembering. Conversely, people who recovered memories of abuse spontaneously showed a heightened proneness to forget prior incidences of remembering, but exhibited no increased susceptibility to false memories. This double dissociation points to mechanisms that underlie recovered-memory experiences and indicates that recovered memories may at times be fictitious and may at other times be authentic.*

How people remember and forget trauma has been a controversial issue in psychiatry and psychology (Brewin, 2007; Geraerts & Jelicic, 2008; McNally, 2003). The debate has been particularly intense with regard to the authenticity of reports of recovered memories of childhood sexual abuse (CSA). Some scholars and clinicians maintain that the mind is able to protect itself by repressing traumatic events from awareness (Brown, Scheflin, & Whitfield, 1999). Others hold that abuse, combat, and other horrifying events are essentially imprinted in memory and are seldom, if ever, truly forgotten (McNally, 2003). Complicating matters further, human memory is susceptible to distortion (e.g., Geraerts, Bernstein, et al., 2008), and therapeutic interventions such as hypnosis, dream interpretation, and guided imagery—practices intended to recover memories of CSA—may unintentionally foster false memories of CSA (Loftus & Davis, 2006).

Strikingly, only recently has research focused on the cognitive functioning of the people at the heart of this recovered-memory debate: those who report recovered memories of CSA. Such work provides an opportunity to test hypotheses about how recovered-memory reports come about and may be valuable for diagnostics. Some research has shown that individuals reporting recovered CSA memories are significantly more likely than control participants to create false memories in the laboratory (Clancy, Schacter, McNally, & Pitman, 2000; Geraerts, Smeets, Jelicic, van Heerden, & Merckelbach, 2005). This finding suggests that people reporting recovered memories may be prone in general to remember events that they have not experienced, and is consistent with the hypothesis that some recovered-memory experiences are false recollections induced by suggestive therapy.

In contrast, Schooler and his coworkers (Schooler, 2001; Schooler, Ambadar, & Bendiksen, 1997) described several case studies of individuals who remembered apparently long-forgotten incidents of CSA that were corroborated. These case studies demonstrate that at least some recovered-memory experiences are not merely false recollections, but come about by some other means. Remarkably, in some of these cases, the partners of the women who reported recovered-memory expe-

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riences said that the women had talked about the abuse *before* the recovered-memory experience. Schooler et al. proposed that these cases illustrate a "forgot it all along" (FIA) phenomenon, in which remembering an event in a qualitatively new way (e.g., more vividly and emotionally) leads the individual to fail to recall prior occasions of recollecting that event. Hence, these case studies suggest that at least some recovered memories reflect genuine episodes of abuse that people simply forgot having thought about previously (Geraerts et al., 2006).

DIFFERENT RECOVERED-MEMORY EXPERIENCES

The evidence just summarized suggests two radically different hypotheses for how recovered-memory experiences come about. Rather than being contradictory, perhaps the hypotheses reflect two different types of recovered-memory experiences. In one type, memories arise following a prolonged and intensive effort to uncover suspected repressed memories. Such recovered memories are often induced by suggestive therapeutic techniques. In a recent study in which independent corroborative evidence for CSA was sought, none of the abuse events remembered through suggestive therapeutic techniques were corroborated (Geraerts et al., 2007). Although the lack of corroboration does not prove that these memories were not genuine, it raises the possibility that suggestive methods induced some of these reports and is consistent with a false-recollection hypothesis.

In the other type of recovered-memory experience, people are suddenly reminded of events that they feel they have not thought about in years. These recovered-memory experiences occur spontaneously—outside therapy—when individuals encounter reminders of the abuse episodes. Recent work found that memories recovered in this way are much more likely to be corroborated by independent evidence (37%) than are memories recovered in suggestive therapy, and can be corroborated about as often as abuse memories that have been continuously available to the victims (45%; Geraerts et al., 2007). Some such experiences may be exactly what they seem—essentially accurate recollections of events that the individual has not thought about in decades. But other cases of spontaneous memory recovery may arise when people fail to remember their prior recollections of authentic traumas; such memory recovery would be consistent with the FIA hypothesis. Remarkably, prior research examining the cognitive characteristics of people reporting recovered memories of CSA has not distinguished these two subgroups of people who have recovered memories of abuse spontaneously. Clearly, examining the cognitive characteristics of different populations reporting recovered memories of abuse may be informative for clinicians involved in diagnosing and treating such patients.

We hypothesized that laboratory measures of memory would show a double dissociation between individuals who recover memories of abuse in suggestive therapy and individuals who recover memories of abuse spontaneously. Specifically, we predicted that people reporting CSA memories recovered during suggestive therapy would score high on a measure of susceptibility to false memories, but would perform similarly to control subjects on a measure tapping the tendency to forget prior experiences of remembering (the FIA effect). Conversely, we predicted that people who report spontaneously recovered memories of abuse would be especially prone to forgetting their prior recollections, but would score similarly to control subjects on false-memory tasks. To test this double-dissociation hypothesis, we invited subjects to the laboratory to perform tasks tapping both the propensity to experience false memories and the tendency to forget prior remembering.

METHOD

Subjects

Subjects were recruited through advertisements in Dutch newspapers. One hundred twenty Caucasian subjects participated in this study. All gave informed consent for their participation. On the basis of a 30-min structured interview prior to the experiment, subjects were classified into four groups, each consisting of 30 subjects. Subjects in the *spontaneously-recovered-memory group* reported that they had previously forgotten memories of CSA and then spontaneously recalled them outside of therapy, without being prompted by anyone else or consciously seeking such memories. Subjects in the *recovered-in-therapy group* stated that they had gradually recovered memories of CSA during therapy, after prompting by suggestive therapeutic techniques, during an active effort to reconstruct their missing pasts. It should be emphasized that only people reporting having undergone suggestive therapeutic techniques (e.g., hypnosis, guided imagery, dream interpretation) were included in this group. The *continuous-memory group* comprised subjects who reported CSA and said that they had never forgotten their abuse. The *control group* consisted of subjects who reported no history of abuse in either childhood or adulthood.

These four groups were matched on age (mean age = 41.75 years, $SD = 10.7$), gender (79% female, 21% male), and level of education. The frequency of different types of alleged perpetrators (parent, family member, friend, stranger) did not vary significantly across the three groups reporting abuse. Also, the duration and severity of the abuse, as well as history of other trauma, as assessed in the structured interview, did not differ between these groups. There were no differences among the abuse groups with regard to anxiety (State-Trait Anxiety Inventory; Spielberger, Gorsuch, & Lushene, 1970), depression (Beck Depression Inventory; Beck, Ward, & Mendelson, 1961), or reported dissociative experiences (Dissociative Experiences Scale; Bernstein & Putnam, 1986).

Materials

To examine our hypothesis about the differing origins of recovered memories, we tested our four subject groups on both the

Deese-Roediger-McDermott (DRM) false-memory task (Deese, 1959; Roediger & McDermott, 1995) and the FIA paradigm (Arnold & Lindsay, 2002). The order of these tasks was counterbalanced across subjects.

In each of the 10 trials of the DRM task, subjects studied a different list of 15 words that are strong semantic associates of a word not presented in the list—the critical lure. For example, one DRM study list includes 15 words (e.g., *bed*, *rest*, *awake*, and *tired*) that are strongly related to *sleep* (i.e., the nonpresented critical lure). On a subsequent test, subjects often falsely recall and recognize *sleep* as having been presented. We expected that individuals who recovered their CSA memories in suggestive therapy would be especially prone to the false-memory effects elicited by the DRM manipulation.

To study the FIA phenomenon, the underestimation of prior remembering, we used a laboratory analogue that requires subjects to recall material in qualitatively different ways on two occasions (Arnold & Lindsay, 2002). Subjects studied a list of homographic target words, each accompanied by a context word that biased the interpretation of the target to one of its meanings (e.g., "hand-*palm*").[1] In Test 1, subjects were tested on a subset of the study list, with some of the target items being cued with the same context word presented during study (e.g., "hand-p**m") and the others being cued with a completely new context word that was intended to bias the interpretation of the target item to its other meaning (e.g., "tree-p**m"). The intention of introducing these other-context items was to mimic the situation in which a person recollects a past experience in a context that is qualitatively different from the context in which it was originally encoded. If they recall an experience under these conditions and subsequently recall the same experience in a different context, might they forget the first recollection? The second test made it possible to answer this question. In Test 2, subjects' memory for all the previously studied items was tested with the original studied-context cues. Thus, subjects' recall efforts were directed back to the original encoding experience at study, and not to the intervening test phase.

To measure subjects' susceptibility to forgetting prior acts of remembering in the FIA paradigm, we asked them to make a crucial judgment right after they recalled each target item on Test 2; that is, we asked subjects whether they had recalled that same item on the first test. Although people successfully recall most of the target items correctly in Test 2, they often fail to recollect that they had remembered the same items previously, especially if the retrieval took place in a different context. Essentially, if people remembered the experience in a different rather than the same context on the previous test, they are more likely to report that they had not previously recalled the target. This procedure was used to investigate whether people who believe they have suddenly recovered a memory of abuse for the first time (i.e., the spontaneously-recovered-memory group) are prone to forgetting their prior acts of remembering, as in the cases documented by Schooler et al. (1997).

[1]The words and themes in the DRM and FIA tests did not overlap. The words used were relatively neutral.

Procedure

DRM Test

For the DRM test, subjects were instructed that they would see several lists of words on a computer screen and that after viewing each list, they would be asked to write down the words. During the study phase, each word remained on the screen for 3 s. Subjects were given 2.5 min to recall each list. After the 10th list, the experimenter engaged subjects in a brief conversation lasting about 3 min. Subsequently, subjects were given a sheet with 30 old (studied) words and 30 new (nonstudied) words (10 of which were critical lures), and they were asked to indicate whether or not each word had appeared on any of the studied lists. Nonstudied words that were not critical lures were weak associates of the studied words. The test words were randomly intermixed.

FIA Test

For the FIA test, subjects were told that on each study trial, a context word and a target word would be displayed on a computer screen for 2 s, and that they were to repeat the words aloud in preparation for a memory test. Immediately after a word pair was removed from the screen, a sentence containing the context word and a row of asterisks in place of the target word was presented for 3.5 s, and subjects were instructed to read the sentence aloud. Finally, the target word appeared above the sentence for 1 s.

The study phase was followed immediately by the first cued-recall test (Test 1). Subjects were told that they would be tested on a subset of the targets (cues were presented for two thirds of the studied targets). On each trial, a context word was presented with the first and last letters of a target word, and the task was to fill in the missing letters and say the target word out loud. Subjects were told that on half of the trials, the context words would be those presented with the targets during the study phase, whereas on the other half of the trials, the context words would not be the same as those presented during the study phase (but would be related to the targets). Subjects were warned to respond only with targets that they remembered from the study phase.

The second cued-recall test (Test 2) occurred immediately after the first test. All of the target words were tested, and subjects were informed that all of the context words on Test 2 were the same as those presented with the targets during the study phase. On each trial, subjects were given a context word with the first and last letters of the target word and asked to recall the target word from the study phase. If a subject gave an incorrect answer or said "pass," the experimenter supplied the correct target. Finally, subjects were required to judge whether they remembered recalling the target word during Test 1. Subjects

were reminded that many of the items had not been cued on Test 1, and therefore could not have been recalled on that test.

RESULTS

DRM Test: False Recall and Recognition

Table 1 summarizes recall and recognition on the DRM false-memory test. Analysis showed that the four groups did not differ in the proportion of presented words recalled correctly, $F < 1$. This result suggests comparable overall memory ability across the groups. On average, subjects correctly recalled .61 (SD = .10) of the studied words. To examine whether the recovered-in-therapy group showed higher levels of false recall than the other groups, we computed the false-recall rate (i.e., the proportion of false recall of critical lures minus the proportion of false recall of nonstudied words other than critical lures). An analysis of variance (ANOVA) confirmed that our subject groups differed significantly in their rates of false recall, $F(3, 116) = 11.81, p < .001$, $\eta^2 = .23$. People with CSA memories recovered in the course of suggestive therapy had a significantly higher rate of false recall than people reporting spontaneously recovered memories, $t(58) = 5.02$, $p < .001$, $d = 1.31$; people reporting continuous memories of abuse, $t(58) = 3.43, p = .001, d = 0.61$; or control subjects, $t(58) = 4.76$, $p < .001$, $d = 1.23$. Rates of false recall in the latter three groups did not differ from one another, $p > .05$.

In our DRM task, we also measured recognition memory. As was the case for correct recall, correct recognition of the studied words did not differ significantly among the four groups, $F < 1$; the overall hit rate was .82 (SD = .09). In contrast, the groups differed significantly in their rate of false recognition (i.e., proportion of false recognition of critical lures minus proportion of false recognition of nonstudied words other than critical lures), $F(3, 116) = 3.96, p < .01, \eta^2 = .093$. Subjects reporting memories recovered during suggestive therapy were significantly more likely to falsely recognize nonstudied critical items as having been encountered before than were people with spontaneously recovered memories of abuse, $t(58) = 3.14$, $p = .003$, $d = 0.81$; people with continuously accessible memories of abuse, $t(58) = 3.99$, $p < .001$, $d = 1.03$; or control subjects, $t(58) = 2.95$, $p = .005$, $d = .76$. The latter three groups did not differ from one another, $p > .05$.

FIA Test: Judging Prior Remembering

On the FIA task, subjects uniformly were good at retrieving the original target words on Test 2, in which the cue was the same as the cue given at study ($M = .93$, $SD = .06$). This recall rate was high regardless of whether subjects had previously recalled the target from a same- or a different-context cue on Test 1, $F < 1$. Thus, subjects were equally likely to "recover" their initial experience regardless of whether their intervening recall had taken place in the same or a different retrieval context. Context did, however, affect whether or not subjects reported that they had recalled the item on Test 1: Specifically, subjects were significantly less likely to correctly judge that they had recalled the item before in the other-context condition than in the same context-condition, $F(1, 116) = 308.16$, $p < .001$, $\eta^2 = .73$. Thus, the overall pattern of data across all of our subject groups replicates prior work, demonstrating an increased tendency to forget prior incidents of remembering when retrieval contexts change between retrieval attempts (Arnold & Lindsay, 2002). Of key interest was whether this FIA phenomenon varied across our four populations of subjects (see Table 2 for a summary of memory judgments in the four subject groups).

TABLE 1

Mean Proportion of Words Recalled and Recognized on the Deese-Roediger-McDermott False-Memory Task

	Subject group			
Test and word type	Memory recovered in therapy (n = 30)	Memory recovered spontaneously (n = 30)	Continuous memory (n = 30)	Control (n = 30)
Recall test				
Studied words	.60 (.10)	.61 (.09)	.61 (.12)	.63 (.08)
Critical lures	.73 (.22)	.40 (.22)	.45 (.22)	.40 (.24)
Nonstudied nonlures	.19 (.24)	.21 (.17)	.16 (.17)	.21 (.14)
False-recall rate	.54 (.31)	.20 (.22)	.29 (.25)	.19 (.26)
Recognition test				
Studied words	.83 (.10)	.81 (.08)	.83 (.09)	.81 (.09)
Critical lures	.90 (.08)	.68 (.29)	.70 (.24)	.68 (.31)
Nonstudied nonlures	.12 (.11)	.09 (.10)	.11 (.09)	.09 (.09)
False-recognition rate	.79 (.12)	.59 (.33)	.59 (.24)	.60 (.33)

Note. Standard deviations are given in parentheses. The false-recall rate was calculated as the proportion of critical lures falsely recalled minus the proportion of nonstudied words other than critical lures falsely recalled; the false-recognition rate was calculated analogously.

TABLE 2

Results From the Forgot-It-All-Along Task: Mean Proportion of Items Judged as "Recalled" as a Function of Recall Status on Test 1 and Test 2

	Subject group			
Test 1/Test 2 recall status	Memory recovered in therapy (n = 30)	Memory recovered spontaneously (n = 30)	Continuous memory (n = 30)	Control (n = 30)
Studied-context cue in Test 1				
Not recalled/not recalled	.01 (.05)	.10 (.23)	.09 (.27)	.06 (.20)
Not recalled/recalled	.14 (.23)	.14 (.21)	.16 (.28)	.15 (.28)
Recalled/recalled	**.84 (.13)**	**.82 (.16)**	**.81 (.17)**	**.84 (.13)**
Recalled/not recalled	.26 (.41)	.35 (.41)	.34 (.42)	.31 (.43)
Other-context cue in Test 1				
Not recalled/not recalled	.04 (.14)	.09 (.20)	.09 (.23)	.12 (.22)
Not recalled/recalled	.22 (.26)	.25 (.23)	.10 (.23)	.30 (.34)
Recalled/recalled	**.55 (.25)**	**.24 (.17)**	**.52 (.27)**	**.56 (.25)**
Recalled/not recalled	.26 (.38)	.16 (.30)	.24 (.35)	.26 (.40)
Not tested in Test 1				
NA/not recalled	.04 (.10)	.04 (.11)	.09 (.20)	.05 (.15)
NA/recalled	.14 (.20)	.14 (.20)	.10 (.14)	.19 (.29)

Note. Standard deviations are given in parentheses. Boldface indicates the data for which statistical analyses are reported in the text. NA = not applicable.

To examine this question, we compared the magnitude of the FIA effect across our four groups in a 2 (context) × 4 (group) ANOVA, and found that the interaction between subject group and context was significant, $F(3, 116) = 12.71$, $p < .001$, $\eta^2 = .25$. Whether or not groups differed in memory for prior remembering depended on context. The four groups did not differ in memory for prior remembering of same-context items, $F < 1$. Thus, as long as retrieval had always taken place in the same retrieval context that was present during encoding, the groups did not differ significantly in how accurately they judged their past memory experiences. The groups did differ, however, in how well they remembered their past acts of remembering on Test 1 when the retrieval context had changed on Test 2, $F(3, 116) = 12.05$, $p < .001$, $\eta^2 = .24$. Critically, as hypothesized, subjects reporting spontaneously recovered memories of abuse were significantly more likely to forget that they had previously recalled an item on Test 1 than were people reporting abuse memories recovered in therapy, $t(58) = 5.54$, $p < .001$, $d = 1.43$; people reporting continuous CSA memories, $t(58) = 4.85$, $p < .001$, $d = 1.25$; or control subjects, $t(58) = 5.69$, $p < .001$, $d = 1.47$.

Thus, the only measurable difference among our subject groups on the FIA task was that subjects reporting spontaneously recovered memories showed a significantly increased tendency to falsely report that they had never recalled an experience before when the retrieval context had changed. This propensity to forget prior remembering occurred even though the spontaneously-recovered-memory group did not show a general increased bias to say that they had not recalled a target before; that is, the four groups did not differ in the proportion of not-tested items that they reported not having recalled before, Fs < 1.03, ps $> .87$. This forgetting of prior remembering is especially striking because these denials of retrieval occurred even though prior recall could be objectively demonstrated on Test 1, much as prior recall could be demonstrated in the case studies reported by Schooler et al. (1997).

DISCUSSION

The double dissociation observed in this study indicates that there are important differences between the cognitive profiles of people who recover memories of CSA through suggestive therapy and the cognitive profiles of people who recover memories of CSA more spontaneously, without extensive prompting or attempts to reconstruct their past. As a group, people who believed that they had recovered a memory of CSA through suggestive therapeutic techniques showed a pronounced tendency to incorrectly claim that they had experienced events that they had not really experienced, as measured by a simple cognitive test of false memory formation. To the extent that this pattern on the DRM task is indicative of a broader deficit in monitoring the source of one's memories, this finding suggests that such reports of recovered memories should be viewed with a cautious eye, as they may reflect the unwitting interaction of suggestive therapy with preexisting deficits in source memory (Johnson, Hashtroudi, & Lindsay, 1993; Lindsay, 2008), particularly given the difficulty in independently corroborating memories recovered in this way (Geraerts et al., 2007). It should be emphasized that our findings at the group level cannot speak to the validity of any individual's recovered-memory experience, and it is possible that some memories recovered

through suggestive therapy are accurate, even if they cannot be corroborated.

In contrast, people who believed that they had spontaneously recovered a memory of CSA showed no evidence of heightened susceptibility to false recall. This new finding significantly restricts the generality of past findings that people reporting recovered memories of CSA showed a propensity toward false recall; such effects appear to be associated with suggestive therapy, not recovery of CSA in general. Our findings also do not speak to the cognitive characteristics of people who recover memories spontaneously in therapy without suggestive techniques (Andrews et al., 1999). This population merits further study, to isolate whether some aspect of the therapeutic context itself or suggestive therapy in particular is associated with a propensity to falsely remember events that never happened.

Although subjects who reported recovering memories of CSA spontaneously were no more susceptible to false memories than were control subjects, they showed a striking tendency in the FIA task to forget prior episodes of remembering when those prior retrievals had been cued differently from their current recollections. Thus, even when prior accessibility of simple events studied in the laboratory could be demonstrated objectively, this group, as a whole, was significantly more likely than the other groups to deny having remembered those events on the first test. To the extent that performance on this simple laboratory test is indicative of a broader vulnerability to forgetting in the face of shifts in context, these findings suggest that many members of this group failed to remember their prior thoughts about genuine incidences of CSA (perhaps because their way of thinking about the abuse had changed).

Our data do not address why people who have spontaneously recovered memories of CSA show a stronger tendency than others to underestimate their prior remembering. One possibility is suggested, however, by recent findings establishing that, in laboratory measures of thought suppression, this population shows an enhanced ability to suppress unwanted thoughts, especially if those thoughts concern negative experiences (Geraerts & McNally, 2008; Geraerts, McNally, Jelicic, Merckelbach, & Raymaekers, 2008). Memory for prior thoughts concerning the target CSA event might have been more effectively suppressed by members of this group, relative to other subjects, because those thoughts were unpleasant, and such suppression would have impaired the long-term accessibility of those memories (Anderson & Green, 2001). If appropriate cues subsequently led such a person to remember his or her abuse more completely, that experience would likely feel novel, and the person might infer that he or she had not remembered the abuse previously (i.e., the FIA phenomenon).

This study is the first to establish qualitatively distinct cognitive profiles in different populations of individuals reporting recovered memories of CSA. The patterns of memory function we observed suggest differing mechanisms underlying recovered-memory experiences, with some such experiences reflecting forgotten recollections of what may often be authentic events and others being the product of suggestive therapeutic techniques. More research will be needed to identify factors that might discriminate genuine from false recovered memories. For example, is it possible that the cognitive profiles associated with the two types of recovered-memory experiences go hand in hand with individual differences? More research on cognitive measures like the DRM and FIA tests, in combination with personality tests, could ultimately yield a diagnostic procedure that clinicians might use in treating their patients. Our findings also suggest the existence of stable individual differences in susceptibility to false memories and to FIA effects. These may be traits (or trait dimensions). Further research is needed to explore the generality of, for example, an individual's susceptibility to illusory memories across conditions.

In conclusion, researchers investigating recovered memories and clinicians who treat patients reporting recovered memories of CSA should take care to examine the context of recovery and to consider its implications for the mechanisms underlying such reports. Characterizing the cognitive mechanisms underlying reports of recovered memories in different contexts may be a first step in resolving controversial and often contradictory claims concerning the origins of recovered memories.

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