

## Apparent Amnesia on Experimental Memory Tests in Dissociative Identity Disorder: An Exploratory Study

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Dissociative identity disorder (DID; called multiple personality disorder in DSMIII-R) is a psychiatric condition in which two or more identity states recurrently take control of the person's behavior. A characteristic feature of DID is the occurrence of apparently severe amnesic symptoms. This paper is concerned with experimental research of memory function in DID and focuses on between-identity transfer of newly learned neutral material. Previous studies on this subject are reviewed and a pilot study with four subjects is described. This study is specifically concerned with the question whether self-reported asymmetries in between-identity transfer can be replicated on experimental memory tests. A secondary aim was to examine whether, in the absence of explicit transfer, implicit transfer of information would occur. The results showed that the apparent amnesic asymmetry for explicit information was substantiated in the laboratory, although at least some leakage was present between the apparently amnesic identities. No evidence was found for better performance on implicit than on explicit memory tests in the apparently amnesic identities. In the discussion, parallels between apparent amnesia in DID and state-dependent memory are drawn, and the question of simulated amnesia is addressed. © 1998 Academic Press

### INTRODUCTION

This century's psychology has long been based on the paradigm that people have one identity and that autobiographical memory is connected to this one identity (Crabtree, 1993; Ross, 1989). The study of hypnosis and of hysterical patients during the last century led to the suggestion that for some individuals at least a radically different paradigm was needed, i.e., the so-called alternate-consciousness paradigm (Crabtree, 1993; Ellenberger, 1970). At the time prominent French psychiatrists and psychologists thought that in certain individuals several concurrent states of consciousness or ego centers exist, each having its own identity, memory, and other functions. More recently, in his neodissociation theory, Ernest Hilgard has extended this alternate-consciousness paradigm to general psychology (Hilgard, 1977, 1992). However, as his findings have been derived from subjects who were highly responsive to hypnosis, he warned that his generalizations should be used with caution.

These concurrent states of consciousness constitute the core of the current DSM-IV diagnosis of dissociative disorders, which share the essential feature of "a disruption in the usually integrated functions of consciousness, memory, identity or perception of the environment" (APA, 1995, p. 477). In this paper we focus on the

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disruptions in memory in the most complex dissociative disorder, i.e., dissociative identity disorder (DID; formerly called multiple personality disorder), in which at least two identities or personality states recurrently take control of the person's behavior. Disruption of at least some memory functions is an important aspect of DID, and in fact one of the DSM-IV criteria is the inability to recall important personal information that is too extensive to be explained by ordinary forgetfulness (APA, 1995).

As already observed by Janet (1889) and Ellenberger (1970), in DID different degrees of amnesia may exist between various identities, ranging from complete awareness of all experiences of another identity, through some awareness of the existence of other identities, and finally to complete unawareness of other identities. According to Ellenberger (1970), amnesia between identities can be classified as follows: (1) identities which are mutually cognizant of each other (no between-identity amnesia), (2) identities which are mutually amnesic, and (3) identities which are one-way amnesic. The latter means that identity A has awareness of the experiences of identity B, while identity B has no knowledge of the experiences of identity A. In his analysis of classical DID cases, Ellenberger concluded that the most frequently found form was one-way amnesia, whereas mutually cognizant identities were rare. However, modern clinical observations show that all these variations can exist in one DID patient. A recent classification based on 100 cases of DID was made by Putnam, Guroff, Silberman, Barban & Post (1986). The majority of cases (72%) had at least one identity who denied the existence of other identities. Even more cases (86%) had an identity who claimed to be aware of all other identities. According to Spiegel, Frischholz and Spira (1993), usually the more hostile and controlling identities have the widest access to memories across other identities.

In this paper we will examine to what degree between-identity amnesia is present in DID. Clinical observations suggest that the various types of memory which can be distinguished are not involved to the same extent in DID. The focus of the review will however be on laboratory studies in which experimental memory tests have been used. Between-identity amnesia for personal events does not necessarily imply that newly learned material in the laboratory will not transfer from one identity to the next. Evidence that amnesia in DID can extend to experimental tests of memory will be presented. Another important issue, and the topic of our own study to be described later, is whether experimental tests of memory can also reflect the asymmetrical amnesia which is seen clinically.

#### *Classification of Memory Dysfunction in DID*

Clinical observations and descriptions of DID patients indicate that amnesia is normally restricted to episodic memory, i.e., memory for autobiographical events and personal experiences (cf. Herzog, 1984; Kihlstrom, 1994). Episodic memory can be divided into explicit and implicit memory. Explicit memory is the person's conscious, intentional recollection of previous events. Implicit memory refers to the fact that prior experience can influence behavior and perception without the conscious awareness of that experience. It has been suggested that explicit and implicit memory in DID patients can be differentially affected. Kihlstrom, Tataryn, and Hoyt (1993) give several examples of patients with a dissociative disorder who did not have a conscious

recollection of an event but yet showed signs of implicit transfer as evidenced by their behavior. For instance, a woman who had no recollection of her identity was given a telephone and instructed to just randomly dial a number, after which she dialed her own telephone number.

In comparison to episodic memory, other types may be less affected in DID. Identities who are unaware of each other's biographical memories may share procedural knowledge, i.e., the skills and strategies that are used in judgment, decision-making, and problem-solving. Semantic memory, described by Kihlstrom et al. (1993) as a mental lexicon of abstract, categorical information, may also be intact. In some cases of DID, procedural and semantic memory does seem to be involved in the amnesia. In Doris Fischer, one of the classic DID cases, Prince (1917) found among her five identities one which could not read, write, nor speak. Prince observed that this illiterate identity learned the linguistic skills with remarkable speed after one of the other identities taught her. Other instances of amnesia for procedural memory are the frequently encountered child identities who cannot write and use certain skills in an age-appropriate manner (e.g., use of childish language, drawing in a childish way; cf. Taylor & Martin, 1944; Cutler & Reed, 1975; Dick-Barnes, Nelson & Aine, 1987).

#### *Experimental Research in DID Patients*

Given the prominent role of amnesia in both the diagnosis of DID and in clinical reports, it is surprising how little controlled experimental research of memory function in DID has been done. Up to now, three single case studies (Ludwig, Brandsma, Wilbur, Bendfeldt, Jameson, & Lexington, 1972; Dick-Barnes et al., 1987; Nissen, Ross, Willingham, Mackenzie, & Schacter, 1988) and one study involving nine patients (Silberman, Putnam, Weingartner, Braun, & Post, 1985) have been published on the subject of between-identity transfer of new information. These studies examined whether the clinically found between-identity amnesia for autobiographical experiences could be confirmed when experimental tests of memory were used.

The memory tests used in these studies can be classified as either explicit or implicit (Spiegel et al., 1993). In explicit memory tests the individual is asked to intentionally remember the target material. The two most widely used explicit measures of memory are recall and recognition. In a recall task the individual intentionally tries to generate the material which has been learned. This may be unaided, as in free recall, or aided as in cued recall. Recognition tests require the subject to correctly discriminate previously presented targets from distracting items. Generally speaking, recognition requires less mental effort than recall, and cued recall requires less effort than free recall. In implicit memory tests, no conscious recollection of the previously learned material is required, but the material still influences the performance in the test. For example, visibly degraded images are more easily identified when the image has been presented before and word fragments have a good chance of being completed to words previously seen.

Ludwig et al. (1972) were the first to perform an experimental study of memory transfer in DID. They presented three tests of explicit memory to the four identities of one patient suffering from DID: (1) a paired-words test in which 10 word pairs were read out repeatedly to one identity until the associated word could be given to

all 10 stem words. Then, the stems words were read out once to the each of the other identities, and the number of correct associations were counted; (2) an associate learning test, in which 10 stem words and their 10 paired associates were read out only once to each identity, after which this identity had to give the correct associate for each stem. Mistakes were corrected and repeated attempts were allowed until all associates were learned. The number of attempts until complete learning was scored; (3) a logical memory task, in which the same story was read successively to each of the four identities, and details of the story had to be recalled.

Ludwig et al. found that on the associate learning test and the logical memory task, information transferred among all identities. That is, performance improved with repeated presentation to successive identities: on the associate learning task, fewer presentations were necessary for complete learning to occur and on the logical memory task, the number of details reported increased for successive identities. On the paired-word test, material learned by one identity did not transfer to other identities, with one exception: all identities had access to the material learned by the main identity. According to the authors, this resembles their clinical data regarding the amount of awareness among the identities. The main finding of this study was, however, that there was an apparent discrepancy between the relative lack of transfer with the paired-words task and the presence of transfer with the associate learning and logical memory tasks. Ludwig et al. attributed this to whether the material was emotional or not. They state that the paired-words task in which no corrective feedback is given after each association may be influenced by emotion, unlike the associate learning task in which feedback is given. In our view, it is questionable whether the paired-words task really involves emotional material. Therefore, Ludwig et al.'s conclusion that the differences in amount of transfer between identities is based on the emotional nature of the material used, should be regarded as tentative.

The only study using more than one subject was performed by Silberman et al. (1985). They studied nine DID patients and compared them to normal controls. The patients selected two identities that had no conscious awareness of each other's experiences. These identities were tested with two explicit memory tasks: a free-recall task and a recognition task. The authors based their design on the concept of interference, which implies that recall of material stored in memory can be influenced by prior and subsequent learning. They hypothesized that if a DID patient would hear a word list in one identity state and a second word list in another identity state, the usual interference effects would not be found. That is, if the two identities do not have awareness of each other, the material should be correctly attributed to the correct list. However, it was found that DID patients had no superior ability to learn and discriminate the two lists in comparison to the control subjects. Nevertheless, some qualitative differences were found between DID subjects and controls. Within the patient group, in the dissociated state performance improved compared to the non-dissociated state. Most patients were better able to attribute a word to the correct list when the two list had been learned in two different identity states, then when the same identity had learned the two lists. On the other hand, controls who tried to mimic dissociation showed a performance decrement in comparison to the normal non-dissociated state. In the sham dissociated state they were less able to attribute a word to the correct list.

Following Ludwig et al. (1972), these authors also point to the fact that transfer might have taken place because they used emotionally neutral material.

Dick-Barnes et al. (1987) have studied memory function in one patient suffering from DID, by means of a paired-associate test and a perceptual-motor task. On both tasks, practice effects between the three selected identities were found, that is, performance improved from one identity to the next on successive learning trials. Again, this result is attributed to the non-emotional status of the tasks. Unfortunately, all three selected identities had awareness of each other's experiences, and this could be an alternative explanation for the results.

The most elaborate study of memory function in DID was performed by Nissen et al. (1988). They examined pairs of eight different identities in a single patient with DID and used a variety of explicit and implicit memory tests with emotionally neutral material. Between-personality amnesia was found on two out of five explicit memory tests and on some implicit memory tests, but not on others. The tests which showed that information acquired by one identity was inaccessible to another employed, for the most part, semantically rich material. In contrast, the tests in which the experience of one identity did influence the performance of another employed relatively simpler material like single words. The authors' own interpretation of their findings is that "material which allows for a variety of different interpretations, whose encoding is significantly guided by strategic processing, or whose interpretation might be expected to depend on one's mood and beliefs and biases is relatively inaccessible across personalities" (Nissen et al., 1988, p. 131). Unfortunately, again no information is provided about the degree of awareness one identity had of the other(s). As different pairs of identities have been used in the various tests, we do not know how much transfer of material could be expected between these specific identities.

At first sight the studies suggest that whether or not transfer of learned material to another personality will take place depends on the nature of the material. Ludwig et al. (1972), Silberman et al. (1985), and Dick-Barnes et al. (1987) have attributed the absence of amnesic effects between identities to the emotionally neutral character of the material used. However, this interpretation seems rather post hoc as none of the experimental memory tests have actually used emotionally laden material, and the inference is solely made on the basis of the absence of an effect for neutral material.

In short, it seems difficult to draw general conclusions regarding amnesia on experimental memory tests in DID patients, because a wide variety of memory tests have been used. Furthermore, the identities that participated in these studies had different degrees of awareness. Therefore, more controlled research is indicated.

#### *A Controlled Study of Asymmetrical Amnesia in DID*

The current study focussed on asymmetries in between-identity transfer of newly learned, neutral material in DID patients. Four DID subjects participated in this study, and for each of them two identities were selected in such a way that one identity (Identity A) had access to experiences of the other (Identity B), but that the reverse was not true. The selection was based on self-report. Two tests of explicit memory were used, a free recall and a recognition test. A word completion test was included



to test whether, in the absence of explicit access to the newly learned material of identity A, the performance of identity B would nevertheless be influenced by implicit processes. It has been suggested that the absence of transfer might be more apparent on tests of explicit memory than implicit memory (Spiegel et al., 1993; Kihlstrom et al., 1993). The hypotheses tested are:

1. Material learned by Identity A will not transfer to Identity B; transfer will take place when Identity B is the learning identity and Identity A is tested.
2. There will be at least some transfer to identity B of the material learned by Identity A on the word completion test, even in the absence of transfer on the free recall and recognition test.

## METHODS

Four female DID subjects and 18 female control subjects participated in the study. DID subjects were approached through a Dutch DID Patients Association and through clinicians. They were all currently in treatment for DID and could switch identity on request. All four DID subjects had more than two identities, and the selection of the two identities to participate in the experiment was discussed with them beforehand. Moreover, they were instructed not to let any other identity interfere in the tests. The subjects ages were 43, 29, 49, and 44, respectively. The control group consisted of university employees and students and their relatives. They ranged in age between 19 and 67, with an average age of 28.6.

DID subjects and control subjects were tested in two sessions. Sessions were separated by 1 week for the DID subjects. For the control group this varied between 5 and 10 days. In order to investigate both explicit and implicit transfer between identities three memory tests were used. Explicit transfer was tested by means of a free recall task and a recognition task. Implicit transfer was tested by means of a word completion task. All tests made use of the same learned material: a list of 15 one-syllable, concrete and emotionally neutral words. In the first session Identity A, the identity which had awareness of B, functioned as the learning identity and Identity B, the amnesic one, was tested on the material. In the second session this was reversed: Identity B learned the material and Identity A was tested. Control subjects simply went twice through the same procedure.

For DID-subjects the procedure was as follows. At the start of the first session, the 15-word list was presented repeatedly to Identity A. Words were shown one at a time on a computer screen, for a duration of 2500 ms, with an interval of 820 ms. Identity A was asked to memorize the 15-word list and was tested after the second presentation. The list was presented until total recall was achieved, or to a maximum of eight times. Next, subjects were requested to switch to Identity B. The switching process was supervised by one of the authors (OvdH), an experienced clinician in the dissociative disorders field, and was always accomplished in less than 3 minutes. After the presence of Identity B was confirmed, she was informed that Identity A had learned a number of words that she should try to recall. If identity B could not recall the words, she was encouraged to give the first word that came to mind, as long as other identities would not interfere in retrieval.

The recognition task was presented next. Seven words of the 15-word list (targets)

were mixed with 7 distractors and displayed one at a time on a computer screen. Identity B had to mark whether or not she recognized the word on an answering form. The last test was the word completion task, which used the remaining 8 words from the 15-word list. Identity B was given a list of wordstems (including the first vowel) and dots to indicate the number of missing letters. The instruction was to complete the wordstems to words that were learned by Identity A. If identity B could not remember the words from the list, she was instructed to fill in the first word that came to mind. In the absence of explicit recollection of the words, some transfer may still take place as implicit processes come into play. This would lead to above-chance completion of the wordstems to the target words.

Prior to the experiment, we tested the wordstems from the word completion task to lessen the possibility that they were coincidentally completed to an alternative from the 15-word list. In this test 60 people who did not know this list were asked to complete the wordstems and give as many alternatives as possible. Wordstems that were very likely to be completed to the words in the 15-word list were eliminated and replaced by less likely alternatives. The wordstems used in the test had at least seven possible alternatives. Thus, in the absence of both explicit and implicit memory transfer, on the basis of chance not more than one correct word completion would be expected.

In the second session the order of the learning and tested identity was reversed: Identity B, having no awareness of the memory and actions of Identity A, was the learning identity, and Identity A, aware of B's memory and actions, was tested. Control subjects went through a similar procedure. At the point where DID-subjects switched to the other identity, controls had a relaxation period of 3 min in which they read a magazine. After the interval, testing took place. A new but equivalent version of the 15-word list was presented both to the DID subjects and the controls to avoid interference of the first session.

## RESULTS

The results indicate that most controls had no difficulty in learning the 15 words within eight presentations: on average, 4.2 presentations (*SD* 1.5) were needed until total recall was achieved, both in the first and in the second session. Results from both sessions showed that delayed recall, recognition and word completion was excellent for the control group. There was no deterioration of performance due to interference nor improvement in performance due to practice from Session 1 to Session 2. Results from the control group are shown in Table 1. It should be noted that for control subjects, who did remember the previously learned words, the word completion task was not a test of implicit memory, but relied on explicit processes (cued-recall).

The results for the four DID subjects are shown in Table 2. Individual performance scores are given, as averaging of results would mask the potentially interesting differences between subjects.

Our first hypothesis predicted poor performance on all tests in the first session, and better performance in the second session. The second hypothesis predicted better performance in the first session on the word completion task than on the recall and recognition test. The results of the four DID subject are discussed separately.

TABLE 1  
Mean Scores Control Subjects (n = 18)

	Session 1 mean (SD)	Session 2 mean (SD)
Learning phase		
No. presentations	4.2 (1.5)	4.2 (1.5)
Free recall		
No. recalled	14.1 (1.1)	13.7 (1.4)
Recognition		
No. recognized targets	7 (0)	6.9 (0.2)
No. recognized distractors	0 (0)	0 (0)
Word completion		
No. completed to target	7.3 (1.2)	7.3 (0.7)

*Subject 1*

Results from Subject 1 were consistent with our first hypothesis that no transfer would be found on the free recall and recognition task in the first session, but that transfer would be present in the second session. Identity B could not recall any of the words learned by A. On the recognition task, two of the seven targets were recognized and one distractor was (incorrectly) recognized. In the second session, Identity A could recall 11 of the 15 words learned by Identity B. She indicated that she did not know them herself but that she could probe the mind of her Identity B. In the

TABLE 2  
Individual Scores of DID Subjects

	Subject	Session 1	Session 2
Learning phase			
No. of presentations	1	3	3
	2	8	8
	3	3	5
	4	7	7
Free recall			
No. recalled	1	0	11
	2	2	14
	3	14	14
	4	0	10
Recognition			
No. recognized targets	1	2	7
	2	5	7
	3	2	7
	4	0	7
No. recognized distractors	1	1	0
	2	3	0
	3	2	0
	4	2	0
Word completion			
No. completed to target	1	1	6
	2	2	5
	3	0	6
	4	1	7



recognition test, perfect performance was achieved as all targets and none of the distractors were recognized. The results for this subject were not consistent with our second hypothesis: transfer was absent on the word completion test as well during the first session. One wordstem was completed to a target word, which is not above chance level. In the second session, six of the seven wordstems were completed to target words, again demonstrating excellent (explicit) transfer from Identity B to Identity A.

#### *Subject 2*

Subject 2 had difficulties in learning the 15-word list: both in the first and in the second session she still had one word missing after the eighth presentation, although she had always reproduced the missing words in one of the previous recalls. In this subject Hypothesis 1 was again largely confirmed. Nevertheless, at least some transfer to Identity B of the material learned by Identity A seems to have taken place. After an initial denial and with much effort, Identity B could at last recall two of the 15 words. On the recognition test, five out of seven targets were recognized, but also three distractors were recognized incorrectly. As expected, in the second session transfer was much larger, 14 of the 15 words were recalled and all seven targets were recognized. Again, no support was found for our second hypothesis. Two wordstems were correctly completed in the first session, too little to infer implicit transfer. Moreover, there was some degree of explicit transfer in this subject, so that above-chance completion of wordstems could have been attributed to explicit processes anyway.

#### *Subject 3*

The results from Subject 3 are confusing and hard to understand. Not in line with our first hypothesis, the identical performance on the free recall test in the two sessions indicated that there was transfer of material from Identity A to Identity B. However, the recognition and word completion test did suggest absence of transfer to Identity B. In the first session performance on the recognition test seemed to be at chance level: two targets but also two distractors were recognized. Moreover, none of the wordstems in the word completion task were completed to the target word, demonstrating that implicit transfer was absent as well.

#### *Subject 4*

The results of Subject 4 confirmed the first hypothesis. In Session 1, complete absence of transfer was found, both on the recall and on the recognition test. In Session 2, transfer was found. The results of the word completion test showed that also for this subject, there was no indication of implicit transfer to identity B.

#### *Discussion of the Results*

From the number of presentations that were needed to achieve total recall (or recall of 14 words in the case of DID Subject 2), we can conclude that there were no differences in general learning ability between the selected identities. This is consistent with the findings for control subjects, where in both sessions on the average the

same number of presentations was needed. Thus, our results are not due to differences in general learning ability between identities.

The results support our first hypothesis: performance on the free recall and recognition task was better in the second session than in the first session for all subjects, with the exception of Subject 3 on the free recall test. Results for this subject are confusing: even though 14 of the 15 words were recalled in the free recall test, a few minutes later most of them were not recognized anymore nor were they recalled during the word completion test. Confronted with this finding afterwards, the subject declared that other identities had interfered in the test, in spite of our explicit instruction not to do so. In the subsequent tests, she was able to stop these identities from interfering. Subject 2 demonstrated that there may be at least some leakage of information across identities claimed to be totally incognizant of each other.

Our second hypothesis that in the absence of explicit transfer of information, some implicit transfer might be apparent on the word completion test in the first session, was not supported. None of the subjects showed above-chance performance on word completion. The best score was obtained by Subject 2, completing two of the stems to their target, but for this subject some transfer was also found on the explicit tests.

Finally, verbal reports from both DID Subjects 1 and 3 suggested that there may be a difference between direct awareness (an identity is "present" at all times, and has direct awareness, even when other identities are in control) and indirect awareness (access to the memory of another identity by 'looking up' the needed information). When identity A of the first subject was asked to recall the words learned by identity B, she indicated that she had to retrieve them from the memory of the latter. Subject 3 had made corrections on the word completion task during the second session. With her initial replies only three stems were completed to the target, but after her corrections she scored 6 out of 8. The corrections could have been the result of probing of the memory contents of the learning identity afterwards.

## GENERAL DISCUSSION

Our study confirmed previous findings that there can be absence of transfer between two identities of a DID patient also for newly learned material presented in the laboratory. The use of emotionally neutral material did not prevent the occurrence of this apparent amnesia, as was suggested by other researchers (e.g., Ludwig et al., 1972; Dick-Barnes et al., 1987). Moreover, the study also showed that the clinically reported asymmetry in amnesia for episodic memories in DID patients is reproducible on experimental memory tests. However, even in identities who themselves claim to be totally amnesic for another identity, some transfer of material may occur, as was demonstrated by Subject 2. We were not able to confirm the suggestion put forward by Spiegel et al. (1993) and Kihlstrom et al. (1993) that in the absence of transfer on explicit tests, transfer may be present on implicit tests.

Our study has some advantages over previous studies. First, we have used a fairly simple design in which only two identities were tested on a limited set of memory tests. The three memory tests were chosen specifically to draw upon different retrieval processes. Recognition involves less mental effort than free recall, and has been shown to be less affected by amnesia in various organic memory dysfunctions. The

word completion test was used to assess whether there would be evidence of implicit transfer, in those identities which did not show explicit transfer. Thus, conclusions as to the nature and extent of the amnesic barriers between identities are allowed. Our results suggest that all forms of episodic memory may be involved. Second, our selection of one-way amnesic identities allows for specific predictions regarding the transfer of newly learned material from one identity to the other. It also enables two kind of control comparisons: the not amnesic identity serves as the control for the amnesic identity and both identities can be compared to the normal control group. Finally, our study does not, as most previous studies, rely on the data of a single case.

Our study also has several limitations. Even though we did not use a single subject design, four subjects are obviously not sufficient to allow generalization to DID in general. This is especially true because of the variability of the results. Was the high score of Subject 3 on the free recall test an incident, or do other subjects deviate from the expected pattern as well? Will more DID subjects show the partial leakage of information to an identity which they consider to be totally amnesic of the other identity, as was the case in Subject 2? If so, what determines whether this leakage will occur? These are questions we cannot answer based on this small sample. Another limitation is the absence of an objective standard to assess one-way amnesia beforehand, so that we had to rely on self-report to select the identities. This made it easy for subjects to guess our hypotheses, increasing the risk of malingering. Finally, the word completion task as used here can be criticized as not being a proper test of implicit memory. Indeed it was not an implicit test for subjects or identities with explicit recollection of the 15 words. Only for identities without conscious awareness, implicit transfer may have come into play. In retrospect, it would have been better if a true implicit test had been used, allowing direct comparison of the scores of the two identities.

#### *State-Dependent Memory*

Between-identity amnesia is often compared to the phenomenon of state-dependent memory (Szostak, Lister, Eckardt, & Weingartner, 1995; Bower, 1995). State-dependent memory means that it is more difficult to retrieve material in one state when learning took place in another state. States can be drug induced, but they can also be related to differences in mood. The most prominent amnesic effects have been found with "opposite" mood states (e.g., sad-joy, fear-anger), and it has been speculated that in DID the most severe amnesic barriers will occur between identities with different emotional styles (Bower, 1995). So far, this has not been explicitly tested.

As Szostak et al. (1995) have pointed out, state-dependent memory also shows asymmetry. In mood states this has been shown both for autobiographical memories and for experimental tests such as word-list memorization (Bower, 1995). An example of asymmetry in drug-induced state-dependent memory is that material learned under the influence of alcohol is more difficult to retrieve when sober, whereas in the alcohol-induced state there is no difficulty remembering material from the sober state.

Although there are several parallels between state dependent learning and amnesia in DID there are also major differences. Amnesia observed in DID is much more severe than what has been reported in state-dependent retrieval. In the latter case, a slight deterioration in recall is found but never complete amnesia (Szostak et al., 1995; Bower, 1995). Moreover, state-dependent amnesia is usually only found when free recall is used, while the effects disappear with cued recall and recognition. Our study demonstrated that in DID, recognition is affected by amnesia as well.

### *Simulated Amnesia*

The validity of the diagnosis of DID has been the subject of controversy (e.g., Merskey, 1992; Spanos, 1994), and skeptics may claim that the findings on the memory tests could easily be simulated. It should be noted that our study was not intended to detect simulated amnesia, but because of the ongoing discussion on malingering in DID we will address this issue here.

It is indeed true that in our study tests were used on which it is fairly easy to simulate amnesia if one wanted to do so; moreover, as was discussed above, the subjects probably knew what was expected of them. Although we cannot exclude the possibility that malingering took place, some observations argue against deception on the part of the subjects as the sole explanation. Because of the transparency of the purpose and expectations of the study, one would have expected more consistent results in the case of malingering. The incomplete amnesia in Subject 2 and the anomalous results on the free recall test of Subject 3 suggest that subjects did not simply comply to our expectations. Subject 3 was a university-trained professional, who would certainly have been aware of what was expected of her in the various conditions. It is nevertheless unfortunate that we did not include a test on which intentional deceit would be less easy. The classical conditioning procedure which we had included to test for transfer of conditioned responses between identities turned out to be unsuccessful in establishing a conditioned response in the first place, in controls as well as in DID subjects.

In future experiments tests on which malingering is difficult, or tests specifically designed to detect malingering should be used in addition to other memory tests. Examples are tests in which interference of prior learning on the acquisition of new material is examined. Here, better than normal performance of DID patients would be expected if amnesia exists between identities. Interference tests were used by Nissen et al. (1988) and by Silberman et al. (1985). Both have found that there was interference of previously learned material from one identity to new learning by another identity. However, in the study of Silberman et al. (1985), there were qualitative differences in performance between DID patients and control subjects who simulated dissociation. When dissociation was simulated by controls, they had more difficulty in discriminating between the two previously learned word-lists. DID subjects showed improved discrimination when learning was done by separate identities (dissociated condition), compared to when the same identity learned both lists (non-dissociated condition).

Very recently a procedure to identify simulated amnesia has been described, using event related potentials (ERP; Rosenfeld, Ellwanger, & Sweet, 1995). This procedure

makes use of the so-called oddball procedure, in which rare but relevant items are shown to elicit a specific deflection in the EEG-signal, namely a positive peak with a 300 ms latency (P300). Normally, such a deflection cannot be observed in the noise of all other EEG-waves, but averaging of several EEG-signals to the same item, filters out the noise, and leaves the so-called event-related potential. In the oddball procedure, relevant (e.g., the name of one's mother) and irrelevant (unfamiliar names) items are presented to a subject in succession, and the P300 is shown to occur only in response to the relevant items. Simulated amnesia can be detected by this procedure: when subjects pretended that relevant items were not recognized, these items nevertheless elicited the P300, whereas irrelevant items did not.

Simulated amnesia can also be detected by using memory tests which have been described in the neuropsychological literature on malingering. In these tests, below chance performance has been reported in subjects simulating memory impairments. Finally, by changing the instructional set, false expectation can be induced in subjects regarding their performance in the tests. For instance, it can be suggested that prior research found that performance is always better on test A in comparison to test B. This instruction can be reversed for other subjects. If subjects comply to the induced expectations, this will be a clear sign of malingering.

#### CONCLUSION AND RECOMMENDATIONS FOR FURTHER RESEARCH

Some recommendations for future studies concerning amnesia on experimental tests of memory in DID patients can be made. As only group studies permit scientifically based inferences, this should be the preferred research design. Moreover, attention should be paid to proper selection of identities. Only when identities without awareness of each other's experiences are selected, amnesia is expected in the first place. At least it should always be explicitly stated what kind of identities, with what degree and type of amnesia, are subjected to the tests. Still, problems may arise in the selection of identities. As there is no objective method to establish the degree of awareness between identities beforehand, one has to rely on self-report by the subjects. Furthermore, it may sometimes happen that other than the selected identities interfere with performance. Before the test, it should be explicitly requested that other identities do not interfere, and afterwards it should be checked if this has been the case. Another criterium for the selection of identities could be the differences in emotional responsiveness between them, because according to Bower (1995) the most severe amnesic barriers can be expected between such identities.

As a final point, preferably a combination of memory tests should be used that draw on different retrieval processes. Moreover, tests that exclude malingering have to be included. In addition, it would be interesting to vary the nature of the test material, from neutral to emotional. The much stated claim that amnesia is more apparent on emotionally laden material than on emotionally neutral material could then be actually tested.

In conclusion, the amnesic barriers between different identities apparently do show up in experimental research using explicit memory tests with neutral material, and they seem to parallel the clinically observed asymmetry. However, at least some explicit transfer of experimental material might take place between self-reported am-



nostic identities. The apparent absence of transfer was as large on the recognition test as on the free recall test, and neither were signs of implicit transfer found. This study proved the feasibility of experimental memory research in DID. We will continue this research, accounting for the limitations in the present study. A major improvement will be the inclusion of a true test of implicit memory, besides recognition and free recall tests, and a test to uncover malingering.

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