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Dissociative States in Multiple Personality Disorder: A Quantitative Study

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Abstract. Multiple personality disorder (MPD) patients may experience themselves as several discrete alter personalities who do not share consciousness or memories with one another. In this study, we asked whether MPD patients are different from controls in their ability to learn and remember, and their ability to compartmentalize information. MPD patients were not found to differ from controls in overall memory level. Learning of information by MPD patients in disparate personality states did not result in greater compartmentalization than that of which control subjects were capable. However, there were qualitative differences between the cognitive performance of patients and that of controls attempting to role-play alter personalities. Our results suggest that simple confabulation is not an adequate model for the MPD syndrome, and we consider a possible role for state-dependent learning in the phenomenology of MPD.

Key Words. Multiple personality disorder, learning, memory, interference, compartmentalization, state dependency.

Multiple personality disorder (MPD) has been considered extremely rare, and, until recently, has received little systematic study or sustained attention in the psychiatric literature. Possibly because mental health professionals have, in general, had little clinical experience with MPD, a current focus of research has been systematic documentation of the phenomenology of the disorder. A growing body of research has centered variously on epidemiology, family history, and symptom patterns of MPD patients or their performance in cognitive, personality, or psychophysiological tests (Osgood et al., 1976; Coons, 1980; Greaves, 1980). Such data potentially serve to validate MPD as a diagnostic entity, refine procedures for its identification and treatment, and generate new research questions. In this report we have attempted a quantitative assessment of the subjective experience of separateness of the various dissociated states (alter personalities) of MPD patients by examining state-dependent

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processing and retrieval of verbal information.

Memory processes are of central interest in MPD. Apart from marked behavioral changes, the various personality states of MPD patients are most prominently distinguished by apparent amnesia for events that have taken place in disparate states (i.e., events that involved other alter personalities). A further clinical feature of MPD is that while the various alternates may behave as though they do not share one another's memories, they may also appear to have virtually photographic recall of events that happened *to them,* even in the distant past.

Although these phenomena may appear extremely convincing clinically, very little is known about the extent to which events experienced by an MPD patient in one personality state are accessible to and influence the patient in an alternate state. Do the various alternates truly respond to stimuli as though they were separate and distinct individuals, in accord with their own reports, or does the apparent separateness stem from selective inattention, reporting biases, or even conscious confabulation?

Our study design is based on the familiar concept of interference in learning and memory theory, which is the tendency for recall of a given body of material stored in memory to be influenced by prior and subsequent learning. Interference will be greatest when the competing material is most highly similar to the target information. If, as in the present study, a subject has two lists of words to learn, called list A and list B, and the words of the two lists are very similar (e.g., both lists contain names of body parts), then there will be a strong tendency for words from list A to intrude into the recall of list B and vice versa. That is, the subject will not very accurately be able to discriminate whether a word occurred in one or the other list. On the other hand, for an MPD patient hearing one of the lists in one personality state and one in a disparate state, if the two states are truly cognitively dissociated, there would not be the usual interference, and the material could be very accurately discriminated as to list. Thus, in our paradigm, the number of words accurately recalled reflects level of memory performance, while accuracy of list discrimination reflects the degree of dissociation between the two alternate personality states.

We use the above paradigm to ask the following questions about cognitive processes in MPD: Do MPD patients differ from normals in their level of learning and memory performance? Do MPD patients have super-normal ability to compartmentalize information? Does learning in two disparate personality states change the degree to which MPD patients can compartmentalize information? Can the cognitive performance of MPD patients be reproduced by normal subjects attempting to mimic dissociation? The use of an interference paradigm has the advantage that greater degrees of cognitive separateness (dissociation, amnesia) between personality states would result in *better* discrimination by MPD patients than normals, rather than merely *poorer* recall performance. While poorer performance may be attributable to many nonspecific factors, including conscious faking, super-normal performance would be more likely to arise from factors specific to MPD.

Methods

Subjects. Nine subjects with MPD (three men, six women) diagnosed according to *DSM-III* criteria (American Psychiatric Association, 1980) participated in the study. All were involved

in long-term psychotherapy for the disorder and were well known to their therapists, who were certain of the diagnoses. Mean age of the patients was 37.1 ± 7.7 (SD) years, and mean level of education was 14.7 ± 2.2 (SD) years. Ten control subjects (five men, five women) were drawn from a group of college students who had no known serious medical or psychiatric illness. Their mean age was 20.1 ± 1.1 (SD) years, and mean level of education was 14.2 ± 1.2 (SD) years.

MPD patients were asked to provide at least two alter personalities to participate in the study. Selection of alternates was left to the patient, with stipulation that the two chosen had no conscious awareness of each other's experiences. Patients who were able to provide more than two alternates were retested (using equivalent materials) in the new personality states, and the results were averaged across test administrations. In practice, only two alternates were available for testing in five patients; three presented three alternates for testing; and one presented four alternates.

Materials and Procedures. Subjects' cognitive performance was tested using sets of two lists made up of related words. The related lists were made up of words from the same categories (e.g., animals, body parts) selected to be equivalent across both lists in associative frequency. Four such sets of lists were constructed—one set to be used per trial under each experimental condition (see below). Each list contained 24 words drawn from two categories (12 words from each), with the other list in the set being drawn from the same categories. Thus, list A and list B each contained 12 animal names and 12 names of body parts. For testing recognition (see below), sheets were prepared containing all 48 words from the two lists, randomly mixed with 48 distractor words matched to the target items for category and associative frequency.

For patients, the experimental procedure was as follows: One of the two chosen alter personalities was read one of the two matched lists, which was given the arbitrary designation, list A. Words were read at the rate of one every 3 seconds, and subjects were told that they would later be asked for recall of the material. After learning of the list, the second alter personality was called forth, and the other of the two lists, designated list B, was read in an analogous manner. Subjects were then given 2 hours of ad lib activity, after which each alternate in turn was asked for free recall of the learned material, including from which list they thought the words came. When both alternates had completed free recall trials, they were given the distractor sheets and asked in turn to indicate which words they had previously heard (including list identification). This procedure is called the *dissociative* condition, because of the dissociative state change intervening between learning of the two lists.

The performance of each MPD patient learning material in the dissociative condition was compared to his own performance learning equivalent material entirely *within* a given state or personality (designated the *nondissociative* condition). For the nondissociative conditon, MPD patients were read a second set of matched lists (lists C and D), with no state (personality) change intervening between the lists. Patients were told to try to remember the words and from which list each had come. Free recall and recognition were tested after 2 hours, as in the dissociative condition. To avoid an arbitrary asymmetry between dissociative and non-dissociative conditions, both participating alternates were read both of the two paired lists, and performance was averaged across the two alternates. While this results in MPD subjects hearing the words twice in the nondissociative condition, it biases the results *against* our hypothesis of better discrimination in the dissociative condition.

MPD patients' performance was also compared as a group with the performance of normals. Control subjects performed the nondissociative task in exactly the same manner as patients. That is, they were read two matched lists, and told to remember both the words and their list memberships. Testing was performed under free recall and recognition conditions.

Controls were also asked to attempt to mimic dissociation by creating a "sham alternate" who would function like an MPD alter personality. In preparation for this procedure, subjects had, on the previous day, been instructed to make up an imaginary alternate personality who would participate in the testing. They were given a data sheet for these sham alternates on which they were asked to assign them names, ages, sexes, physical descriptions, personal histories, and personality styles. They were told to portray their sham alternate in any way they saw fit, but to

try to behave as though the subject and his "alternate" were unaware of each other's experiences. Completed data sheets confirmed that all subjects had devoted enough attention to the task to have created a sham alternate on paper. Testing of controls and sham alternates proceeded in exactly the same manner as testing of alter personalities in the dissociative condition. That is, each of the two matched lists was read to a different alternate.

Data Analysis. Level of memory performance was assessed on the basis of the total number of words correctly identified from both lists of the set, without regard to correctness of list identification. Data were analyzed by mixed analysis of variance, with patients vs. controls as the grouping factor, and condition (dissociative vs. nondissociative) and task (free recall vs. recognition) as within-groups factors.

The χ^2 statistic was used as a measure of list discrimination. The distribution of target words correctly identified by list vs. target words mistakenly identified with the opposite list of the pair was compared to the 50% correct list identification expected under chance conditions. The χ^2 statistic was chosen because it is a monotonic function of list discriminability and takes into account the total level of recall. Higher χ^2 values would therefore indicate greater discrimination. The χ^2 value was used as the dependent variable in tests of differences between groups and conditions. Because the χ^2 distributions were not consistently normal under the various experimental conditions, nonparametric analyses were used.

Results

Level of Memory in MPD Patients and Controls. Level of recall for patients and controls is shown in Table 1. Results are presented by list and also by total words remembered in each condition. Note that in the dissociative condition, lists A and B are read to different alternates (or sham alternates in controls), while in the nondissociative condition, lists C and D are both read to both alternates (see **Methods**).

Table 1. Level of memory performance in patients with multiple personality disorder (MPD) and controls (total words remembered)

Dissociative condition	MPD patients			Controls		
	List A	List B	Total	List A	List B	Total
Free recall	7.7 ± 3.4	7.1 ± 3.8	14.8 ± 5.8	7.8 ± 3.3	7.8 ± 4.0	15.6 ± 6.5
Recognition	11.6 ± 4.7	11.3 ± 4.4	22.9 ± 7.4	13.3 ± 5.4	12.7 ± 3.0	26.0 ± 5.6
Nondissociative condition	**MPD patients**			**Controls**		
	List C	List D	Total	List C	List D	Total
Free recall	11.2 ± 7.2	9.3 ± 5.1	20.5 ± 12.6	8.7 ± 3.0	6.9 ± 3.0	15.6 ± 5.2
Recognition	18.1 ± 4.1	17.0 ± 4.9	35.1 ± 8.4	15.3 ± 3.1	14.5 ± 4.0	29.8 ± 6.3

There was no difference between MPD patients and controls in their overall ability to remember target words ($F = 0.50$; $df = 1, 17$). Both groups remembered significantly fewer words under dissociative than nondissociative conditions ($F = 13.8$; $df = 1, 17$; $p < 0.002$), and the decrement was significantly greater for patients than controls (groups × conditions interaction: $F = 5.9$; $df = 1, 17$; $p < 0.03$). This interaction must be interpreted with caution, however, since MPD patients heard stimuli twice under

nondissociative conditions, but only once under dissociative conditions (see **Methods**). As expected, both patients and controls recognized more words than they could freely recall ($F = 54.1$; $df = 1, 17$; $p < 0.00001$), and there was no interaction of group with recall type. There was an interaction between type of recall and condition ($F = 8.5$; $df = 1, 17$; $p < 0.01$), indicating that for both groups the performance decrement with dissociation was greater on recognition than free recall.

The analysis of level of recall also provides a test of the degree of actual compartmentalization of information among the alternates of MPD patients. Under the hypothesis of complete compartmentalization (such as the patients subjectively report), there would be no proactive interference of list A on recall of list B, and no retroactive interference of list B on recall of list A. The hypothesis would therefore predict that patients would remember more words under the dissociative than nondissociative conditions. Our finding, as stated above, was that the reverse occurred. While providing no evidence of true dissociation, this result must be considered inconclusive because of the extra hearing of the list by MPD patients in the dissociative condition (see above). Note also that, as seen in Table 1, numbers of words recalled were essentially the same from both lists of each pair, so that proactive and retroactive interference were operating to the same degree in both patients and controls.

Compartmentalization of Information in MPD Patients and Controls. A high degree of compartmentalization of information might be expected of MPD patients learning in two disparate states. Subjectively, all MPD patients reported that all the words they remembered had been heard in the same personality state. Our main objective test of cognitive separateness is the χ^2 statistic (see **Methods**). The mean χ^2 values for patients in the dissociative condition were: free recall, 5.02; recognition, 5.75. These were not significantly different (Mann-Whitney U test) from the corresponding values for controls attempting to learn and discriminate the same material under ordinary (nondissociative) conditions: free recall, 6.75; recognition 5.80. Thus, patients actually remembered material presented in a disparate state; there was no evidence that MPD patients had super-normal ability to compartmentalize information, even though they subjectively reported such compartmentalization. When all learning occurred within the same personality (nondissociative condition), the mean χ^2 values for patients were: free recall, 4.63; recognition, 3.61. These numbers do not differ significantly from performance of patients in the dissociative condition, although the means are in the expected direction (Wilcoxon test for matched samples). Thus, dissociation did not significantly alter the ability of the patient group as a whole to compartmentalize information.

Ability of Controls to Mimic Patients' Performance. While the performance of patients and controls was quantitatively similar, there might have been qualitative differences between the two groups. We examined the comparative effects of dissociation vs. sham dissociation by calculating the change in χ^2 between dissociative and nondissociative conditions for each subject, and comparing the two groups' mean change scores (Mann-Whitney U test). (Positive values indicate increased compartmentalization of information, while negative values indicate poorer compart-

mentalization.) For free recall, the mean change for MPD patients was +0.39, compared to -3.47 for controls ($p < 0.09$); for recognition, the mean changes were +2.12 for patients vs. -2.92 for controls ($p < 0.05$). Thus, the effect of dissociation in patients was, to a significant degree, opposite from that of sham dissociation among controls.

Although performance of patients was quite variable, most of them (six of nine) showed greater compartmentalization when learning was split between two alter personalities, while the attempt to mimic dissociation resulted in poorer compartmentalization in 8 of 10 controls.

A second qualitative difference appeared in the relationships between dissociative and nondissociative performance in the two groups. For patients, ability to compartmentalize information under the dissociative condition was highly related to such ability in the nondissociative condition (free recall $r = 0.82, p < 0.008$; recognition $r = 0.55$, $p < 0.13$) by Spearman rank-order correlation. For controls, however, dissociative and nondissociative performances were not related (free recall $r = 0.07$, NS; recognition $r = 0.25$, NS). Thus, dissociation appeared to enhance the underlying capacity of patients to compartmentalize, while sham dissociation randomly disrupted such ability in controls.

Discussion

We hypothesized that if MPD patients were truly dissociated in alter personality states (i.e., if alter personalities stored and processed their experiences separately), they would show super-normal ability to discriminate two highly confusable sets of stimuli. Our patients reported no awareness of hearing stimuli read to a disparate alter personality. Despite their subjective experience of separateness and amnesia, there was considerable "leakage" of information across states; patients showed no evidence of such super-normal discrimination ability and, thus, no evidence of highly dissociated memory operations. We also found no evidence of differences between patients and controls in level of memory ability, which might have accounted for the subjective experience of dissociation. However, qualitative differences between patients and controls suggest that dissociation in MPD is not necessarily a purely subjective or confabulated experience. Dissociation appeared to enhance the underlying compartmentalization capabilities of most of the MPD patients, while the attempt to mimic dissociation disrupted such abilities among controls.

It has been suggested that MPD results from chronic autohypnosis, and our findings are similar to those in many hypnotically induced phenomena. Attempts to demonstrate true dissociation between trance and nontrance states have had quite variable results and have, like the present study, shown no more than partial separateness (Messerschmidt, 1927-28; Hilgard, 1977). Both patient and task factors appear to have contributed to this variability. While MPD patients are generally found to be good hypnotic subjects (Bliss, 1980), they may still represent a range of hypnotic potential. Furthermore, certain hypnotic phenomena, such as the presence of a "hidden observer," may bear a curvilinear rather than direct relationship to hypnotic susceptibility (Hilgard, 1977). Such parameters may have contributed to the variable response to dissociation among our patients.

In our study, as in previous reports of dissociation and divided attention using hypnotic trance (Evans and Kihlstrom, 1973; Knox et al., 1975), there were qualitative differences between the performance of patients and normal controls, even though multiplicity did not convey super-normal *levels* of performance. Our finding that both patients and controls tended to remember fewer words under dissociative than nondissociative conditions needs to be interpreted cautiously because patients heard material twice under nondissociative conditions. However, previous studies have similarly found that a memory task is more disrupted by distracting material learned under hypnotic trance than by such material learned in the waking state (Messerschmidt, 1927-28; Knox et al., 1975). Hilgard (1977) hypothesizes that cognitive capacity may be needed to keep information learned under trance out of conscious awareness, leaving less capacity available for the waking task.

Our results are in general agreement with findings of Ludwig et al. (1972) based on one MPD patient. They found evidence that material learned in one state influenced its processing in other states, i.e., that there was a practice effect across personalities. They also found distinct differences between alternate personalities in the way emotionally laden words were processed in memory, although emotionally neutral material was processed similarly across alternates. In the present study, most of the stimuli were emotionally neutral, which may have contributed to the relative lack of compartmentalization which we found.

Our study was a first order attempt to examine cognitive processes in MPD, and many questions remain to be answered. It is unclear, for example, whether patients who were able to compartmentalize their experiences more completely in disparate alter personality states differ from those who showed little or no dissociation. Factors such as the particular relationships between alternates within the total personality structure may, for example, affect the degree of objective dissociation (Ludwig et al., 1972).

A possible model for the performance of MPD patients is that of state-dependent learning. Both drugs and mood states have been shown to induce state-specific encoding operations and retrieval strategies, and provide specific cues for accessing previous experience (Goodwin et al., 1969; Tulving and Thomson, 1973). Information acquired in a given state remains available in memory, but inaccessible when remembering takes place under different retrieval (state) conditions (Ley et al., 1972; Eich et al., 1975; Weingartner et al., 1977). The present findings suggest that the alter personality states of MPD patients may provide more powerful markers and contexts for encoding and retrieving previous experience than does the conscious role playing of personality states by controls. In contrast to classical state-dependent learning phenomena, however, which are generally more robust under free recall conditions, the partial dissociation of MPD patients tended to be more pronounced under recognition (Eich, 1980). A possibly fruitful strategy for further research might be to attempt to model the behavior of MPD patients with hyponotically or pharmacologically induced state changes in normal subjects.

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