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SUGGESTED AMNESIA IN THE
CONTEXT OF DIRECTED FORGETTING

by

Stephen Rivers, M.A.

A Thesis Submitted to the Faculty of Graduate Studies in
Partial Fulfillment of the Requirements for the Degree of
Doctor of Philosophy

Carleton University

July, 1979

SUGGESTED AMNESIA IN THE

CONTEXT OF

DIRECTED FORGETTING

The undersigned recommend to the Faculty
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ABSTRACT

Empirical consistencies in the suggested amnesia literature are reviewed and summarized. Individual differences, the role of hypnotic induction procedures and the problem of faking are discussed. The experiment was designed to compare and contrast the suggested amnesia and directed forgetting paradigms by manipulating the nature of the instruction to forget. 72 high and 72 low susceptible subjects were tested under both hypnotic and nonhypnotic conditions. Subjects listened to 12 tape recorded 12-word lists and were instructed (after list input) to recall some, all or none of each list. Portions of lists not required for recall were to-be-forgotten either "permanently" or "temporarily." Some subjects were challenged to verbalize to-be-forgotten material. The notion that to-be-forgotten items are functionally segregated (and not accessed during retrieval) and an "inattention" hypothesis vied as alternative explanations of suggested amnesia. Both the only-effect (the advantage that accrues when portions of input material are to-be-forgotten) and final free recall data supported the inattention hypothesis. Suggested amnesia and directed forgetting appear to be divergent phenomena involving different processes.

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Historians generally agree that hypnotic phenomena can be traced to the work of the eighteenth century physician Franz Anton Mesmer (Darnton, 1970; Dingwall, 1968; Ellenberger, 1970; Tinterow, 1974).

Posthypnotic amnesia, a temporary inability to remember events occurring during a hypnotic session, has been associated with hypnosis since the early nineteenth century (Ellenberger, 1970). Interestingly, the discovery of an association between mesmeric procedures and amnesia was not made by Mesmer himself but by a disciple, the Marquis de Puysegur (1751-1825).

Since that time various classification schemes have been proposed to differentiate the major forms of hypnotic amnesia (Erickson & Rossi, 1974; Evans, Note 1; Hilgard, 1965a, 1965b, 1966; Thorne, 1967).

The broadest classification identifies "spontaneous" and "suggested" amnesias. Spontaneous amnesia purportedly occurred regularly in the nineteenth and early twentieth centuries but is reported much more rarely now (Hilgard & Cooper, 1965). In sessions where the amnesia suggestion is purposefully omitted, nonrecall of session events posthypnotically is taken as an index of spontaneous amnesia (Cooper, 1972). However, it now appears that spontaneous amnesia can be explained in terms of normal forgetting processes (Evans & Thorne, 1966). Because of the difficulty in separating "spontaneous" amnesia and normal forgetting, few investigations have been undertaken on this

topic. This thesis deals only with "suggested" forms of amnesia.

Table 1 lists articles that fall under the general rubric "suggested amnesia." The table also provides definitional and learning criteria and type of learning material used in each study. These design features will be elaborated as they become relevant to the discussion.

Definition and Measurement

Because of certain commonalities between the hypnotic amnesia and directed forgetting literatures (for reviews of the latter see Bjork, 1972 and Epstein, 1972), some of the terminology from the latter will be applied to the former. The suggestion that the subject forget will be called the forget cue (F-cue) and the specific instructions to once again remember what had been "forgotten" will be labelled the cancellation cue (C-cue). Material or events designated to-be-forgotten will be abbreviated (TBF). For further convenience three retention tests found in various paradigms will be labelled as follows: A test taken after input of TBF material but before an F-cue (T_b); a test taken during the period of forgetting prescribed by the F-cue (T_d); and a test taken after the C-cue is administered (T_a).

One third of the studies listed in Table 1 assessed amnesia using one of the standard hypnotic susceptibility scales¹ (Cooper,

Table 1

Summary of Suggested Amnesia Studies

Study	TBF Material	Level of Mastery	Reversibility tested/used	Subject Testimony tested/used	Amnesia Measure
Barber & Calverley, 1966	6 nouns	one perf. rep.	+/-	+/-	R_{Td}
Bitterman & Marcuse, 1945	8 nouns	N.A.	++	++	autonomic
Bodorik & Spanos	9 nouns	two perf. reps.	++	++	R_{Ta} , R_{Td}
Bowers, 1966	Taffel task	N.A.	+/-	++	R_{Td}
Clemes, 1964	10/18 words	5 study trials	++	+/-	R_{Td}
Coe, Basden et al., 1976	35 words	3 study trials	++	+/-	R_{Td}
Coe, Baugher et al., 1976	11 SHSS items	N.A.	+/-	+/-	R_{Td}
Coe, Taul et al., 1973	35 words	3 study trials	+/-	-/-	R_{Td}
Cooper, 1972	10 HGSHS items	N.A.	-/-	-/-	R_{Td}
Evans, Note 1	Source of learning	N.A.	-/-	++	New Knowledge
Evans & Kihlstrom, 1973	9 SHSS items	N.A.	+/-	-/-	$R_{Td} < 3$
Goldstein & Sippelle, 1970	colour pattern	3 perf. reps.	-/-	-/-	cf. chance
Graham & Patten, 1968	12 adjectives	1 perf. rep.	-/-	-/-	$R_{Td} < 3$
Hilgard & Cooper, 1965	9 SHSS items	N.A.	+/-	-/-	$R_{Td} < 5$
Kihlstrom, Note 2	9 HGSHS items	N.A.	++	-/-	$R_{Td} < 4/R_{Ta} = R_{Td} + 2$

Study	TBF Material	Level of Mastery	Reversibility tested/used	Subject Testimony tested/used	Amnesia Measure
Kihlstrom & Evans, 1976	9 HGSHS items	N.A.	+/+	-/-	R _T
Kihlstrom & Evans, Note 3	9 HGSHS items	N.A.	+/-	-/-	R _{Td}
Nace et al., 1974	9 SHSS items	N.A.	+/+	-/-	R _T - R _{Td} RT breakdown
Nagge, 1935	11 nonsense syll.	1 perf. rep.	-/-	-/-	No I.Q. change
Norris, 1973	I.Q. test	N.A.	-/-	+/-	R _{Td}
O'Connell, 1966	9 SHSS or HGSHS items	N.A.	+/+	-/-	R _{Td}
Pettinati & Evans, 1978	9 HGSHS items	N.A.	+/+	-/-	R _{Td}
Spanos & Bodorik, 1977	9 words	2 perf. reps.	+/+	+/-	R _T - R _{Td} R _{Ta}
Spanos et al., in press (Expts. 1-4v)	9 words	2 perf. reps.	+/+	+/-	R _T - R _{Td} R _{Ta}
Spanos & Ham, 1973	number "4"	overlearned	-/-	+/-	items not verbalized
Spanos & Ham, 1976	number "4"	overlearned	+/+	+/-	items not verbalized
Stern et al., 1963	auditory tones	OR adaptation	+/+	+/-	adaptation rate
Stewart & Dunlap, 1976	12 words	1 study trial	-/-	-/-	R _{Td}
Strickler, 1930	9 PA nonsense syll.	2 perf. reps.	-/-	-/-	Savings
Thorne, 1969	25 PA response words	1 study trial	-/-	-/-	R _{Td}
Thorne & Hall, 1974	25 PA response words	1 study trial	-/-	-/-	No carryover
Williamson et al., 1965	6 nouns	2 study trials	+/+	-/-	R _{Td}

1972; Evans & Kihlstrom, 1973; Hilgard, 1965b; Hilgard & Cooper, 1965; Hilgard & Hommel, 1961; Kihlstrom, Note 2; Kihlstrom & Evans, Note 3, 1976, 1977; O'Connell, 1966; Pettinati & Evans, 1978; Wagstaff, 1977).

Because this procedure for assessing amnesia is used frequently, it will be described in detail.

Most scales used to assess hypnotic susceptibility include, as a final item, a suggestion that the subject will be unable to remember any of the test suggestions administered during the session until he/she is given specific instructions to do so. Amnesia is suggested during hypnosis and tested posthypnotically, i.e., after the subject has been "awakened." The F- and C-cues are established simultaneously and take the following form:

You will probably have the impression that you have slept because you will have difficulty in remembering all the things I have told you and all the things you did and felt. In fact, you will find it to be so much of an effort to recall any of these things that you will have no wish to do so. It will be much easier simply to forget everything until after I tell you that you can remember. You will remember nothing of what has happened until I say to you: "Now you can remember everything!" You will not remember anything until then. (Shor & E.C. Orne, 1962).

The C-cue is the sentence "Now you can remember everything!" and is imbedded in the amnesia suggestion. Because the entire set of instructions contains both an F-cue and a C-cue, we can label the set F + C-cue. The procedure entails the establishment of both cues after TBF material input and before any retention tests are called for. After "awakening," subjects are asked to write down everything they can remember happening from the time the session began. If a minimum number of items are recalled (e.g., less than 4 on the HGSHS) "amnesia" is defined as present (regardless of subsequent reversibility) and the subject receives one point on the hypnotic susceptibility scale. Nevertheless, after the allotted time interval for completing T_d , the C-cue is given and subjects are asked to write any additional items that come to mind. Performance at T_a is not used for scoring purposes unless investigators are specifically interested in the extent to which subjects can recover "forgotten" material (e.g., Kihlstrom & Evans, 1976; Nace et al., 1974). In these cases, the difference between the number of items recalled at T_d and T_a has been used as the measure of reversibility.

The use of performance of T_d as the sole index of amnesia has a number of serious problems. Poor performance at T_d could reflect poor initial mastery of the TBF material or rapid forgetting just as it could index direct effects of the F-cue. The possibility also

exists that some subjects respond to the C-cue and not to the F-cue. Conceivably, a subject could score above four at T_d and still show substantial improvement at T_a . He would not be scored "amnesic" but would nonetheless have responded to a critical element of the original suggestion (namely, the C-cue). All of these possibilities point to an inadequate criterion of amnesia.

To use T_d as the amnesia criterion, the minimum control requirement is to include a no-F-cue condition. Equivalent retention in control and F-cue conditions indicates that nothing beyond normal forgetting occurred. However, a difference between conditions would suggest that some of the retention failure could not be explained by normal forgetting and could be directly attributed to the F-cue (assuming equivalent levels of initial "mastery" of the TBF material). Using this control procedure some evidence has been provided demonstrating F-cue efficacy in the hypnotic amnesia literature (Cooper, 1972; Hilgard, 1965b; Hilgard, Weitzenhoffer, Landes & Moore, 1961).

Another control for normal forgetting involves requiring subjects to demonstrate substantial recovery after C-cue presentation. If retention loss during suggested amnesia is primarily a function of normal forgetting, we would expect the instructions: "Now you can remember everything!" to have little effect on this process. On the other hand, substantial recovery at T_a would argue against normal

forgetting. Although most investigators acknowledge reversibility to be an essential characteristic of suggested amnesia, Table 1 shows that only 29% of the investigations included this criterion. A few studies which have incorporated it (e.g., Spanos & Bodorik, 1977; Spanos, Radtke-Bodorik & Stam, Expt. I & II, in press) have shown that with the particular paradigm used, recovery of material learned to criterion is almost always complete despite significant nonrecall during the suggestion period. Although non-cued controls were not used in these studies, complete recovery clearly demonstrated that normal forgetting did not operate. These two control procedures (i.e., a "remember" condition and reversibility) are used in the present investigation.

The next section deals with the following issues: 1) individual differences in response to amnesia suggestions, 2) the contribution of hypnotic induction procedures to elicitation of amnesic responding and 3) the problem of faking.

Variables Associated with Suggested Amnesia

Hypnotic susceptibility. With respect to the question of individual differences and response to amnesia suggestions, several empirical consistencies have emerged. One finding is that subjects who display amnesia also tend to respond "appropriately" to other suggested items on standardized scales. Group data also show a

consistent relationship between hypnotic susceptibility (defined as a person variable measured by these scales) and suggested amnesia (Barber & Calverley, 1966; Coe, Taul, Basden & Basden, 1973; Hilgard & Cooper, 1965; Kihlstrom, Note 2; Kihlstrom & Evans, 1976; Nace, Orne & Hammer, 1974; Spanos & Bodorik, 1977; Spanos et al., in press; Thorne & Hall, 1974; Williamson, Johnson & Eriksen, 1965).

Studies using the various criteria discussed above, have shown that the relationship between amnesia and hypnotic susceptibility is not definition-specific. Table 1 reveals that of the ten studies cited in the preceding paragraph, four employed a 2-component criterion of amnesia (Kihlstrom, Note 2; Nace et al., 1974; Spanos & Bodorik, 1977; Spanos et al., in press). In Spanos' series, subjects were classified "amnesic" only if they showed more recall at T_a than T_d , provided they subsequently testified that they did not remember the words during T_d . (The extent of amnesia was taken as retention (R) at T_a minus retention at T_d and is expressed in Table 1 as $R_{T_a} - R_{T_d}$).

For Kihlstrom (Note 2), passing the amnesia item on the HGSHS required a score of less than four at T_d and at least two additional items:

recalled at T_a (expressed in Table 1 as $R_{T_d} < 4 / R_{T_a} = R_{T_d} + 2$).

This study yielded a .45 point-biserial correlation between amnesia and the overall score for the remaining HGSHS: A items. In another 2-component study, Nace et al. (1974) used the three forms of the

SHSS to identify groups of "High", "Medium" and "Low" susceptible subjects. During the amnesia suggestion the High susceptible subjects consistently recalled less TB material than the Low susceptible subjects.

In addition to the above investigations, six others that used a single component criterion of "amnesia" (i.e., T_d) reported positive associations between hypnotic susceptibility and "amnesia." Four of these found group differences between high and low susceptible subjects (Barber & Calverley, 1966; Coe, et al., 1973; Thorne & Hall, 1974; Williamson et al., 1965) and two found significant correlations between these variables (Hilgard & Cooper, 1965, $r = .53$; and Kihlstrom & Evans, 1976, $r = .35$).

The relationship between hypnotic susceptibility and amnesia also appears to be independent of the particular scale used to assess hypnotic susceptibility. Positive associations have been observed using the HGSHS:A (Kihlstrom, Note 2; Kihlstrom & Evans, 1976, Spanos et al., in press), the three forms of the SHSS (Coe et al., 1973; Hilgard & Cooper, 1965; Nace et al., 1974; Williamson et al., 1965) and the BSS (Barber & Calverley, 1966; Spanos & Bodorik, 1977).

At the same time, a growing body of literature has provided evidence that hypnotic susceptibility reflects cognitive skills such as the ability to sustain "non-analytic" attending (Spanos, Rivers & Gottlieb, 1978). Supposedly, these skills enable some subjects to

successfully carry out suggestions. The association between hypnotic susceptibility and suggested amnesia implies that the latter may be partly determined by abilities brought to the experimental situation by particular individuals. Thus comparative studies of high- and low-susceptible subjects (hereafter referred to as "Highs" and "Lows" respectively) both optimize the probability of observing the phenomenon and provide a condition whereby the relative contribution of hypnotic susceptibility to suggested amnesia phenomena can be assessed. This factor is examined in the present investigation.

Hypnotic induction procedures. Another issue related to suggested amnesia is the contribution of hypnotic induction procedures to the elicitation of the phenomenon. Investigations employing somewhat different procedures have yielded anomalous findings in this regard.

One line of evidence has shown that equivalent levels of recall and recognition amnesia can be obtained with hypnotic induction procedures and task motivational (TM) instructions. The latter are intended to match the enhanced motivation implied in most hypnotic induction procedures. With no mention of hypnosis, drowsiness, relaxation or sleep, TM subjects are asked to try their best to accomplish the tasks the experimenter asks them to perform. They are told that the tasks are easy and interesting and that other subjects have successfully carried them out (Barber, 1969).

Barber & Calverley (1966) tested subjects under induction and TM conditions for amnesia of six words learned to criterion. Recall and recognition tests were administered at T_d and recall was retested at T_a . Subjective reports were also secured but were not included in the amnesia scoring criterion. (According to these reports the majority of subjects in both conditions were scored as "withholders" in this study.) In comparing induction versus TM conditions, equal levels of recall and recognition "amnesia" were demonstrated with authoritatively-worded instructions. Under no-suggestion control conditions amnesia was found in neither group (i.e., performance remained at the learning criterion). Moreover, induction and TM groups did not differ on T_a , demonstrating equivalent recovery in the two conditions. Overall, Barber & Calverley demonstrated that recall and recognition amnesia could be elicited to an equal extent in Induction and TM groups and could not be accounted for in either case by differential learning or normal forgetting. However, response withholding did seem to play a substantial role.

Spanos and Ham (1973) tested selective amnesia for the number "four" in groups of hypnotic and TM subjects. They found that subjects in these conditions did not differ in the extent to which they failed to verbalize the number 4 as they counted from 1 to 5. Forty percent of the hypnotic subjects and 55% of the TM subjects passed

this behavioral criterion. These groups also failed to differ in self-ratings of amnesia. However, 73% of the hypnotic and 75% of the TM subjects who passed the behavioral criterion indicated that they had been at least partially aware of the number 4 while counting. This finding corroborates other work (Barber & Calverley, 1966; Spanos & Bodorik, 1977; Spanos et al., Expt. 111, in press) which suggests that a good deal of ostensible amnesia in hypnotic subjects may result from voluntary inhibition of verbal responding. It also shows that this kind of withholding may occur to the same extent using "non-hypnotic" procedures as it does when standard hypnotic induction procedures are used.

Another line of evidence suggests that induction procedures may produce more amnesia than TM instructions. In each of six studies (Radtke-Bodorik, Spanos & Haddad, in press; Radtke-Bodorik, Planas & Spanos, Note 4; Spanos & Bodorik, 1977; Spanos et al., Expt. I-III; Spanos, Spillane & McPeake, 1976), subjects who had been administered a standard hypnotic induction showed more suggested amnesia than those administered TM instructions.

In the Spanos et al. (1976) study, both hypnotic and TM subjects were given suggestions to forget the number "four" and then asked to count from one to five as was done in the Spanos and Ham study. Objective scores and subjective ratings of the extent to which for-

getting occurred were significantly greater for subjects in the induction condition than the TM condition.

In the five other studies cited above the investigators were primarily interested in the extent of disorganized recall resulting from suggested recall amnesia (discussed below), but obtained data on the number of items reported as well. These studies had a number of common procedural characteristics that differentiate them from previous work. Any one or combination of these could account for the differences between these studies and those that found no differences in amnesia between hypnotic and control subjects. For instance, the procedure used in Spanos' laboratory had subjects tested at T_b , T_d , and T_a and all three tests were conducted while the hypnotic subjects were in "trance". The procedures used previously all employed two retention tests (T_d and T_a) and both of these were conducted after subjects were "brought out of trance" i.e., posthypnotically.

Spanos & Bodorik (1977) suggested differential arousal levels to account for the superior performance of the hypnotic subjects. They speculated that relaxation instructions which are contained in hypnotic inductions but not in TM instructions, lowered autonomic arousal levels for hypnotic relative to TM subjects. According to this formulation the arousal level of hypnotic subjects fell below

a threshold required to maintain a postulated automatic retrieval mechanism. This hypothesis was tested by Spanos et al. Expt. II, (in press) in a study that manipulated arousal levels for hypnotic subjects by including either relaxation or arousal directives in otherwise typical induction procedures. The hypothesis was not supported however, as the manipulation had no effect on extent of amnesia.

The present investigation includes TM control groups. This is not intended to clarify which the paradigm-specific differences outlined above account for hypnotic-TM differences, but to establish whether or not such differences obtain using a novel methodology.

Simulation instructions and honesty demands. The problem of faking (i.e., withholding TBF material) has been approached primarily through the use of simulation studies. Some of the problems in the use of such designs have been described elsewhere (Sheehan & Perry, 1976), and with these in mind, it can be stated that the findings in general indicate that suggested amnesia cannot be parsimoniously accounted for wholly by faking.

Williamson et al. (1965) and Barber and Calverley (1966) compared hypnotic, simulating and control subjects on recall and recognition of six words. The words had been presented for a fixed interval of time to all subjects. Attempting to test for the availability of nonrecalled items as associative responses, both sets

of investigators included a recognition test of partial words and a word association test (WAT). Comparable results were obtained in both studies. Findings indicated that both low susceptible and high susceptible simulators tended to overplay the role of the amnesic subjects. These subjects showed complete amnesia (reversibility was assessed), low degrees of recognition of the critical items and impaired performance on the partial word test and on the WAT. High susceptible hypnotic subjects (but not low susceptible hypnotic subjects) demonstrated partial impairment on the memory tasks but no impairment on the associative tests. Nonhypnotic control subjects showed no impairment on any of the tests.

Bowers (1966) found clear differences between hypnotic and simulating subjects. Subjects in each of these conditions were given amnesia suggestions for an experimental task (Taffel task) after its completion. Later, in another setting after the experiment was ostensibly completed, a different "experimenter" asked each subject whether or not he or she remembered the experimental task. Over half of the hypnotic subjects but none of the simulators reported that they could not remember. Contrary to the first two studies discussed in this section, Bowers demonstrated more amnesia for hypnotic subjects than for simulators. It could possibly be argued, however, that high susceptible subjects who made up the hypnotic

group simply "saw through" the "extra-experimental" interview. This possibility was not assessed in Bower's study.

Goldstein and Sippelle (1970) randomly assigned high susceptible subjects to one of three groups: (a) Induction, (b) Simulation and (c) Hypnotic Model (i.e., subjects watched a previous subject - really a confederate demonstrate hypnotic amnesia and were then treated as subjects in the Induction group). After subjects learned a seven-item colour pattern to criterion, amnesia was suggested for the pattern. Simulators responded as if they had never seen the pattern, demonstrating random guessing behavior for the elements of the pattern. On the other hand, both hypnotic groups made significantly fewer errors than the simulators, indicating "overacting" on the simulators' part. These data are consistent with the findings of both Barber & Calverley (1966) and Williamson et al. (1965).

Although the simulation paradigm is open to criticism, it is currently the best method of tackling the problem of faking. Because simulation experiments show that hypnotic subjects and simulators do not perform identically (regardless of susceptibility level) faking constitutes an incomplete account of suggested amnesia. The next section evaluates some alternative explanations.

Underlying Processes

Three major theories have been promulgated to explain the tempo-

rary, reversible loss of recall memory resulting from verbal suggestion. These are the repression hypothesis, the disrupted retrieval hypothesis and the functional ablation hypothesis.

Repression hypothesis. The repression hypothesis states that memories associated with negative affect (i.e., "ego-threatening") are spontaneously kept out of awareness through selective forgetting (Gill & Brenman, 1959). By comparison, enhancement is the process whereby positive affect-laden memories are selectively remembered. Most tests of the repression hypothesis have focussed on partial amnesics (subjects who forget some but not all suggested test items). An early finding (Hilgard & Hommel, 1961) indicated that failed items (suggestions on standard susceptibility scales) were forgotten more often than passed items, supposedly due to the negative affect associated with perceiving oneself as an unsuccessful hypnotic subject.

Pettinati and Evans (1978) considered some of the methodological problems in measuring recall of passed versus failed suggestions. The main problem addressed was the difference in recall pool size between Highs and Lows which tends to inflate the apparent number of forgotten failed suggestions for low susceptible subjects. This situation normally results because Highs tend to pass more suggestions than Lows and therefore have a smaller pool of failed items to remember. Pettinati and Evans developed a measure of selective re-

call of passed versus failed suggestions which served to remove this artifact. They found that an equal number of Highs and Lows recalled more passed than failed items. Because the repression hypothesis did not predict this finding, the data were considered to be more parsimoniously explained in terms of normal memory processes. The authors cited several studies (reviewed by Butterfield, 1964) which demonstrated that passing skill-oriented tasks positively effected recall of the task.

Several subsequent studies (Clemes, 1964; Coe, Baugher, Krimm & Smith, 1976; O'Connell, 1966) yielded contradictory findings although most failed to support the repression hypothesis. Moreover, the concept of repression has been criticized on grounds unrelated to hypnosis. Holmes (1974) reviewed an extensive literature of over 60 articles which tested predictions derived from the repression hypothesis. These studies attempted to manipulate "ego-threat" by inducing various kinds of failure experience, test anxiety and cognitive dissonance or by presenting pleasant and unpleasant stimuli and testing for differential recall. For all of these studies, Holmes concluded that no strong supporting evidence for the notion of repression has been provided: "The conclusion ... should not be interpreted as suggesting that there is no selectivity in what persons are able to report of their previous experiences. ... However ... the

patterning of selectivity is often inconsistent with the predictions derived from the theory of repression, and/or the findings can be better accounted for by processes other than repression" (p. 649).

One alternative process suggested by Holmes was nondefensive selective attention acting at the time of an experience and/or at recall.

Disrupted Retrieval and the Inattention Hypothesis. Recently

Kausler (1974) suggested that in a free recall paradigm (outside of the hypnosis context), subjects frequently employ some organizational strategy or combination of strategies to aid in retrieval. One organizational strategy is the use of temporal information to access item information (Murdock, 1974). That is, recall can be enhanced by cuing subjects to recall items in the same order in which they were learned (Tulving, 1972). A second organizational strategy is the categorization or clustering of items by semantic commonalities (Collins & Quillian, 1970; Katz & Fodor, 1963). Subjects who learn nouns taken from various semantic categories recall the nouns by category, even though the items were originally presented in a random sequence (Bousfield, 1953). Subjects also tend to increase subjective organization of responses with continued practice for word lists which were not pre-categorized (Tulving, 1962).

In hypnosis research, one line of investigation has provided evidence that at least some successful amnesic subjects fail to employ these retrieval strategies during free recall. In one study, Evans and Kihlström (1973) examined the organization of recalled material in partially amnesic subjects. After administering three separate susceptibility scales to their subjects, they compared the actual order of occurrence of the suggested tasks on these scales with the order of recall of these tasks during the amnesia suggestion (for subjects remembering at least three items). They found that Highs tended to recall the scale items randomly, whereas the Lows recalled the items sequentially. This relationship disappeared after the G-cue was given, demonstrating a relationship between hypnotic susceptibility and a "breakdown" of temporal sequencing during an amnesia suggestion. Unfortunately, data pertaining to whether or not this disruption was related directly to extent of amnesia were not presented.

Spanos and Bodorik (1977) demonstrated the effects of an amnesia suggestion on organization of recall. Subjects were randomly assigned to either an Induction or a TM treatment condition. They then learned to a criterion of two perfect repetitions, a list of 9 words taken from three Taxonomic categories. In a split-plot design, clustering and recall were measured before, during and after an amnesia suggestion.

permitting assessment of pre-amnesia levels of clustering. Of 52 subjects tested, only 5 hypnotic and 2 TM subjects evidenced partial nonrecall (i.e., recalling some words at T_d but more at T_a). Analysis of variance showed that hypnotic and TM subjects did not differ on degree of clustering at T_b and T_a ; while hypnotic subjects did show less clustering than TM subjects at T_d . Moreover, it was the hypnotic partial nonrecallers who accounted for this difference as hypnotic full recall (i.e., remembering the same words at T_d and T_a) subjects' performance remained unchanged over recall trials. Full recall and partial nonrecall TM subjects did not appear to differ across recall trials although the small number of subjects in the partial nonrecall group obviated statistical testing. A replication study (Spanos, Radtke-Bodorik & Stam, Expt. 1, in press), incorporated moderate to high susceptible subjects and obtained sufficient numbers of partial nonrecallers to do these tests (i.e., 21 hypnotic and 12 TM). Again, the number of words recalled and the extent to which they were clustered were compared at T_b , T_d and T_a . In terms of a breakdown in clustering, both hypnotic and TM nonrecallers showed equivalently less clustering at T_d than T_b or T_a . In addition, clustering returned to pre-suggestion levels after suggestion cancellation in both groups.

A potential artifact in the data renders these conclusions equivocal. Although two different clustering measures were used in these

studies, neither is insensitive to the number of words being analyzed. Thus a decrease in clustering could reflect either a breakdown in organization or simply the fact that amnesic subjects by definition recall fewer items at T_d than T_b and T_a . In a subsequent reanalysis of three previous studies, Spanos et al. Expt. III (in press) equalized for the number of words analyzed at T_b , T_d and T_a . For example, if a subject recalled only 5 words at T_d , then only the first 5 words recalled by this subject at T_b and T_a were considered for analysis. If 6 words were recalled at T_d , then the first 6 words recalled at T_b and T_a were included, and so on. Partially amnesic subjects continued to show a breakdown in clustering at T_d indicating that the finding cannot be accounted for as a statistical artifact. However, Spanos et al. (Expt. III, in press) also dichotomized their partially amnesic subjects into those who showed a breakdown at T_d and those who did not, and found that only about half of the partial amnesics showed a breakdown. This suggests that although disorganization may operate in some instances, it does not appear to be a necessary mediator of suggested amnesia.

A final study in this series addressed the problem of whether the disorganization effect could be accounted for by faking. Spanos et al., Experiment IV (in press), utilized a modification of Orne's (1959, 1971) simulation paradigm. Simulating subjects were yoked

to "real" partial amnesics and told to report a specific number of words (while faking). Their finding that the disorganization effect obtained for "reals" but not "simulators, is inconsistent with a "partial compliance" interpretation of partial amnesia.

Spanos et al. (in press) postulated an "inattention hypothesis" to account for suggested amnesia. This hypothesis posits that suggested amnesia and disorganization occur to the extent that subjects do not attend to the recall task during the suggestion period. Spanos, Stam, D'Eon, Pawlack & Radke-Bodorik (Note 5) tested this hypothesis by informing one group of subjects that the challenge to "try and remember the words" meant to focus attention on the recall task. A control group was instructed to continue "attending away" from the recall task during the challenge period. As predicted, amnesia was practically eliminated in the former condition and greatly enhanced in the latter.

The present investigation was designed to allow the inattention hypothesis to compete with the "dissociation" hypothesis (to be discussed below) as an explanation of suggested amnesia.

Functional ablation or dissociation hypothesis. The functional ablation hypothesis posits that during suggested amnesia, specific consolidated memories become functionally isolated but maintain a structural existence. During the ablation period (i.e., the time

during which the amnesia suggestion is in effect) these memories are inaccessible and cannot influence behavior. Cancellation cues remove the ablation mechanism and memories are reinstated. This hypothesis is akin to the neuropathological notion of dissociation proposed by Janet (1925) and revived by Hilgard (1974, 1977). Memories, cognitions and behaviors which become dissociated as a result of hypnotic suggestion, are purportedly independent of and functionally unrelated to their counterparts in the waking state. Thus the functional ablation hypothesis can be considered a special case of state-dependent memory.

Several methods have been employed to measure the extent of ablation. Because complete ablation (i.e., a strong definition) presumes the unavailability as well as the inaccessibility of memories, indirect tests of the effects of learning have been considered valid indices of ablation. These tests are presumed to be beyond subjects' voluntary ability to suppress performance. Studies measuring re-learning (Strickler, 1930), practice effects (Patten, 1932), autonomic response to single words (Bitterman & Marcuse, 1945), associative responses on such tests as the WAT (Barber & Calverley, 1966; Williamson et al., 1965) and memory for sequences of coloured patterns (Goldstein & Sippelle, 1970) have provided evidence that ablation, if it occurs at all, is far from complete. The general rationale in

these experiments rests on the idea that if dissociation is complete, then the learned material should not interact in any way with performance. The evidence generally fails to support the ablation hypothesis but poor methodology in some of these studies makes this conclusion tentative. The methodological difficulties in the earlier work include lack of controls for normal forgetting (Marston, 1938), no explicit amnesia suggestion (Patten, 1932, Strickler, 1930) and subjects serving as their own controls (Strickler, 1930).

The studies by Barber & Calverley (1966) and Williamson et al., (1965) were better designed. With respect to the dissociation hypothesis, the critical data from these experiments involve word association tests and partial recognition tests given during the "ablation" period. On the WAT, the stimulus words were high frequency associates of the TBF words. According to functional ablation, the TBF material should have been unavailable for associative responding on the WAT despite their high associative probability to the pre-selected stimulus words. However, hypnotic subjects used the TBF words as responses on the WAT just as often as controls, and with equivalent latencies. Similar results were found on partial word tests where subjects had to identify words that were constructed by deleting parts of the letters. To-be-forgotten words were recognized as often as distractors for both groups, demonstrating the availability

of the material for associative responding despite nonrecall of some of the items. These two experiments constitute damaging evidence to the functional ablation hypothesis in its strongest form. Clearly, acquired memories continue to affect behavior during hypnotic amnesia.

Another indirect method used to study the functional isolation of "trance memories" employs the retroactive inhibition (RI) paradigm. In this paradigm subjects learn a list (List 1) of meaningful or nonmeaningful items to criterion and are then tested for recall or recognition of this list. After a second list (List 2) is similarly learned, List 1 is retested. Inferior performance on retention of List 1 under these conditions, compared to a group which does not undergo the interpolated learning of List 2, is taken as evidence of the retroactive action of List 2 on List 1 (Kausler, 1974).

In the context of hypnosis research, List 1 is learned, tested, and retested in the waking condition. Interpolated learning of List 2 is performed after induction procedures. Often the learning of List 2 is followed by suggestions to forget List 2. According to the functional ablation hypothesis, learning List 2 in "trance" should be sufficient to eliminate or at least attenuate its retroaction on List 1. Amnesia suggestions to forget List 2 should augment this effect.

Several early studies seemed to support this contention

(Messerschmidt, 1927; Nagge, 1935; Takahashi, 1958) but were not replicated (Mitchell, 1932; Stevenson, Stoyva & Beach, 1962). All of these investigations have been criticized for using small sample sizes, differing instructions and failing to suggest amnesia (Cooper, 1972). More recently, at least two well-designed studies have failed to find evidence of the breakdown of RI as a result of suggested amnesia for List 2.

In the first of these, Graham and Patten (1968) used an RI design to compare four groups of ten subjects. All subjects first learned twelve adjectives to criterion. Next, one of the following conditions was implemented for each subject: (a) learning List 2 in the waking state; (b) learning List 2 after receiving an induction unaccompanied by an amnesia suggestion; (c) learning List 2 after an induction and then receiving amnesia suggestions for List 2; and (d) spending the interpolated time reading simple, irrelevant material. (Subjects in groups b and c were Highs; those in a and d were unselected.) Finally, recall and savings scores for relearning List 1 were obtained for all subjects. Groups a, b and c showed substantial RI when compared to group d that learned no intervening list. Savings and recall scores for the two hypnotic groups (b and c) did not differ from the group that learned List 2 in the waking state (group a). The authors concluded that dissociation neither by virtue of being

in "trance" nor as a result of specific hypnotic suggestion was sufficient to produce a breakdown in the RI effect.

In the second study, Coe, Basden, Basden and Graham (1976) measured free recall in a modified version of the earlier RI designs. They were interested in whether or not a breakdown of the RI effect would be evidenced only during the period during which the amnesia suggestion was in effect, disappearing after cancellation. Accordingly, two tests of RI were adopted- one before posthypnotic amnesia was removed (subjects were asked to recall all the words they could remember from List 1 and 2) and a second after cancellation of the amnesia suggestion. On the ablation hypothesis, subjects for whom amnesia was suggested should have recalled more items from List 1 than subjects who did not receive such a suggestion. But this difference should only be evidenced on the first free recall trial. After retaining amnesic subjects in the suggestion group and high susceptible nonamnesics in the no-suggestion group, Coe et al., found no differences between the two groups on recall of List 1 either before or after amnesia was lifted.

These results appear to support the conclusion that the functional ablation hypothesis is untenable. Suggestions to forget portions of the input not only remain available for associative responding but also appear to interfere with TBF material as though the TBF material

was tagged for remembering. It is therefore surprising that some amnesic subjects report no awareness of purposeful rehearsal of the TBF material which they know they will be subsequently responsible for. If we assume that at least some of these individuals are not faking (simulation studies tend to substantiate this) how can the inaccessibility of this material be accounted for without postulating dissociation in its strongest form? One alternative is that dissociation occurs in a weak form. That is, memories become functionally "ablated" to degrees allowing the items to interact with some forms of behavior (e.g., recall performance) but not others (e.g., WATs and recognition performance). The construct shows its limitations however, by not specifying why particular forms of behavior are affected and not others. We can now examine a comparable mechanism that derives from theorizing in the directed forgetting literature and involves selective memory search.

Directed forgetting, segregated search sets and amnesia.

Directed forgetting is a phenomenon related to suggested amnesia (Hilgard, 1977). In this paradigm, verbal materials presented to subjects are subsequently designated to be remembered (TBR) or TBF. In the latter case, subjects are instructed to "erase" TBF material from memory. Contrary to the suggested amnesia instruction, subjects do not expect the instruction to be subsequently cancelled; their

task is construed as one of "permanent" forgetting. Occasionally, investigators are interested in the fate of the TBF items and test for TBF recognition and/or recall probability by adding a "trick" trial at the end of an experiment (e.g., Davis & Okada, 1971). When this is done, TBF item recall performance is severely impaired relative to TBR items. On the other hand, paired-associate probe experiments and recognition tests which supposedly facilitate the retrieval of otherwise inaccessible material (Tulving and Pearlstone, 1966), show little or no impairment (Reitman, Halpin, Bjork & Higman, 1971; Elmes, Adams, & Roediger, 1970). From this it is inferred that TBF material is available and is not erased. Most investigators in the area agree that superior performance on TBR items results from mechanisms operating predominantly at the time of retrieval (Bjork, 1972; Epstein, 1972). Similarly, suggested amnesia appears to be related to retrieval processes, simply because most nonrecalled material is subsequently recovered (Cooper, 1972; Kihlstrom, 1977). Consequently, the possibility exists that similar mechanisms underly suggested amnesia and directed forgetting phenomena despite differences in experimental procedure. This possibility is explored in the present study, which directly compares the operations differentiating suggested amnesia and directed forgetting. However, before continuing, three differences between these two phenomena must be made more explicit.

First, induction procedures have never been used in directed forgetting. Therefore it is not known whether or not hypnotic induction procedures can enhance this effect. Second, in the directed forgetting paradigm the TBF material is not subject to C-cuing as it is in hypnotic amnesia. Thus, the subject's task is quite different in each paradigm. In the case of hypnotic amnesia subjects are implicitly instructed to forget temporarily. In directed forgetting they are asked to forget the material permanently: "... do your best to erase the letters from your memory" (Weiner & Reed, 1969, p. 226). This difference is probably one of degree. In a sense, the limiting case of "permanent" forgetting cannot be operationalized because one could conceivably administer an indefinite number of retention tests after a study period. Thus no lag between study and test would sufficiently demonstrate "permanent" forgetting. From this perspective, the directed forgetting F-cue can be seen as a suggestion for more "profound" forgetting than its counterpart in hypnotic amnesia. If the two sets of instruction were directly compared, one would expect more forgetting under the F-cue than F + C-cue condition.

A third difference between paradigms is that in suggested amnesia, subjects are always challenged to try to recall TBF material during the suggestion period. Here the instruction implies that the subject is to try to recall even though he/she will be unable to. In

the directed forgetting paradigm, explicit tests of TBF material rarely occur, and when they do they are couched in an instructional context that connotes: "Try to recall as much of the TBF material as you can." Nothing is mentioned about not being able to recall while trying to do so.

These three parameters were independently manipulated in the present study to observe their effects on a phenomenon observed in the directed forgetting situation called the "only-effect." This effect occurs when subjects are given the opportunity to study all of a set of input material, portions of which are designated TBF. An only-effect occurs when an F-cue signifying that the subject is not responsible for portions of the material, produces recall facilitation for the remaining material relative to a non-cued condition. For example, in one series of studies (Epstein, 1969), 8 lists of numbers paired with 8 lists of words were presented for study. Immediately after input of each word-number list, a pre-arranged cue signalled one of four recall conditions: recall only the first list; recall only the second list; recall both lists, first list first and recall both lists, second list first. Epstein compared recall performance of a list on an "only" trial to performance of the same list on a "both" trial, and attributed observed differences to the advantage of not being responsible for recall of part of the

input. Facilitation accrued for recall on "only" trials regardless of the relative order of TBF and TBR material, although the effect was more pronounced in the proactive than the retroactive case. This effect was replicated over a variety of conditions (e.g., type of materials, modalities and presentation times) and time allowed for recall was eliminated as a possible artifact.

These data indicate that items designated TBF are tagged and then functionally segregated at some point in time between input and test. To accomplish the task of nonrecall, subjects seem to exclude the entire TBF set from search at the time of retrieval. They restrict their search to the TBR set.

A question which can now be asked is whether or not the selective search hypothesis is tenable in the case of suggested amnesia. If subjects can temporarily restrict a search to a TBR set they should evidence an "only-effect" similar to subjects directed to forget permanently. On the other hand, if retrieval involves a search that includes all (or none) of the input material, then the only-effect should not manifest. If the selective search hypothesis is not viable, future theorizing concerning suggested amnesia should exclude notions of dissociation, functional ablation and segregated search sets.

EXPERIMENT

In this study, the nature of the cue that informs subjects that they are not responsible for part of the input during recall was manipulated in order to assess the effects of (1) expectations of recovery and (2) recovery expectations plus a challenge to try to remember, on the relative size of the only-effect. In one condition the typical directed forgetting instructions were used (i.e., forget permanently) to establish a "base rate" only-effect. In a second condition an "only" trial signified that part of the material was not required immediately, but would be tested when a prearranged signal was presented (i.e., forget temporarily). Differences in the relative size of the only-effect could therefore be compared under these two conditions with the only difference being inclusion of expectations of cancellation. After a series of trials that assessed the only-effect, a recall test of all presented items was administered to all subjects. Destroying subjects' faith in the forget-permanent directive should have had no detrimental effect on the previous manipulation at this point in the experiment. Subjects in the "forget-temporarily" condition were not given the C-cue at this point but were asked to try to recall all of the presented items. This test is analogous to direct tests of TBF material typically found in the suggested amnesia literature (i.e., T_d). Subsequently, a second overall

recall test was administered. For subjects in the forget-temporarily condition, a C-cue was interposed between the two tests. In the forget-permanently condition a second recall test of all presented items was administered with no intervening C-cue. If amnesia occurred, recall should be higher after cancellation than before cancellation in the forget-temporarily condition. If amnesia involves a functional segregation of TBF material, amnesics should display larger only-effects than nonamnesics.

Because amnesia is assessed after the only-effect tests in the above conditions, it would be impossible to determine whether individuals who were amnesic at this point in the experiment had been amnesic during the previous only-effect tests. Thus a condition assessing amnesia during the only-effect testing phase was added. Accordingly, after receiving forget-temporary instructions, subjects in this "challenge" condition were asked to try to recall the TBF in addition to the TBR material on only-trials. Their instructions stated that although they were to try to recall the TBF material, they wouldn't be able to.

These conditions were set as three levels of an independent variable and arranged factorially with the two other variables discussed above: Induction vs. TM preliminary instructions and High vs. Low susceptible individuals, producing a 2x2x3 between-subjects design.

Postexperimental questionnaires were used to assess verbal inhibition of TBF material during the challenge periods on only-trials and during the first overall recall test.

The experiment provided controls for two major sources of confound identified in much of the previous amnesia literature. The first is the extent of initial mastery of TBF material. The procedure involved presentation of each item individually for a fixed interval which was constant across all conditions. Second, normal forgetting could be controlled for in this paradigm in two ways. The first was to compare retention of TBR and TBF items. Equivalent recall performance (there were an equal number of TBR and TBF items in the study) would indicate that nothing beyond normal forgetting had occurred. Second, in the Forget-temporarily and Challenge conditions, significant recovery after suggestion cancellation would indicate against normal forgetting.

The functional segregation and inattention hypotheses were construed as competing hypotheses. On the functional segregation hypothesis, subjects in conditions cued for temporary forgetting (Temporary and Challenge) should show only-effects equivalent in size and direction to subjects in a condition where material is cued for permanent forgetting (Permanent). Alternatively, the inattention hypothesis predicts absence of the only-effect in the Temporary and

Challenge conditions. This would be expected if attention is directed to events other than the recall task.

Method

Subjects

Eighty-five female and 62 male Carleton University undergraduate students served as subjects. Two females and one male did not complete the experiment because they failed to follow instructions. The remaining 144 subjects had been selected from a larger pool of volunteers who were assessed on the HGSHS. Half of the subjects were high susceptible, having scored between 8 and 12 on the HGSHS ($M = 9.2$) and half were low susceptible, having scored between zero and 4 ($M = 2.5$). Fifty-five of the subjects were second-year students and received \$3.00 for participating. The remainder were introductory psychology students and received points toward course credit. None of the subjects had participated in other amnesia experiments conducted by this laboratory. On sign-up sheets the experiment was advertised as one involving two one-hour sessions conducted on different days. Session one was simply described as the "administration of a standard scale for assessing hypnotic susceptibility." Session two was described as "listening to recorded lists of words which subjects would have to try to remember for later recall." No mention was made of forgetting or amnesia until subjects reported for session two.

Materials

Seventy-two animal names (consisting of seventy 1-3 syllable words and two 4-syllable words) and 72 persons' names (all contained 1-3 syllables) were selected from Kučera and Francis' (1967) word frequency corpus. (For a complete index of these materials see Appendix A.) For animal names, the frequency of occurrence in the 50,406 word corpus ranged between one and 14. The frequency of occurrence for persons' names ranged between one and 8. These materials were randomized into 12 lists containing 6 animal and 12 lists containing 6 persons' names. The two sets of lists were randomly paired to produce 12 animal-person lists. All 12 lists had mean frequencies of occurrence which failed to differ from each other. These materials, together with the recall instructions, were read onto a Sony TC-630 stereo tape recorder. Because counterbalancing was required for the type of instruction (i.e., recall cue) following each of the 12 lists, twelve separate tapes were recorded. Each of the 11 new tapes required the same word presentation order and timing as the master tape. Consequently, a second tape recorder was used to directly (electronically) copy the word lists from the master tape onto the 11 new tapes. The counterbalanced recall cues were interspersed between lists on the copied tapes during the copying procedure. Two additional tapes were made, one containing a 10-minute hypnotic

induction procedure (see Appendix B) and one containing standard task motivational instructions (Appendix C). Postexperimental inquiries were presented in mimeographed response booklets (Appendix D).

Design

Independent variables. The design was a 2x2x3 factorial with 3 between-subject factors (Table 2): (1) Preliminary set with two levels; hypnotic induction procedure vs. task motivational instructions; (2) Hypnotic susceptibility with two levels; High (8-12) vs. Low (0-4) as pre-measured on the HGSHS; and (3) Forget-cue-type with three levels; instructions to forget permanently (Permanent) vs. instructions to forget until explicitly cued to recover the material (Temporary) vs. instructions to forget but to try to recall (Challenge).

Within susceptibility levels subjects were randomly assigned to one of the 6 factorial cells. Each subject received 12 study-test trials of animal-person lists incorporating 5 types of output: animals only (A), person only (P), animals then persons (AP), persons then animals (PA) and neither persons nor animals (No Recall). Each subject received two A, P, AP and PA trials and 4 No Recall trials. This provided for the presentation of an equal number of TBR and TBF items. To control for proactive interference effects over the 12 trials, each of the 12 subjects in each of the 12 cells was administered one of

Table 2
Experimental Design

Group	Cell	Recall-cue-type Trials				
		P	A	PA	AP	NR
1	High-Ind-Perm	2	2	2	2	4
2	High-Ind-Temp.	2	2	2	2	4
3	High-Ind-Chall.	2	2	2	2	4
4	High-TM-Perm.	2	2	2	2	4
5	High-TM-Temp.	2	2	2	2	4
6	High-TM-Chall.	2	2	2	2	4
7	Low-Ind-Perm.	2	2	2	2	4
8	Low-Ind-Temp.	2	2	2	2	4
9	Low-Ind-Chall.	2	2	2	2	4
10	Low-TM-Perm.	2	2	2	2	4
11	Low-TM-Temp.	2	2	2	2	4
12	Low-TM-Chall.	2	2	2	2	4

Key: Ind = hypnotic induction, TM = task-motivational, Perm = forget permanently, Temp = forget temporarily, Chall = challenge to verbalize TBF items, P = report persons only, A = report animals only, PA = report persons then animals, AP = report animals then persons, NR = no recall.

Note: for each cell, n = 12.

12 different output orders. The first six orders were created by haphazardly arranging the 12 outputs 6 times with the restriction that the same output was never solicited twice in a row. The remaining orders counterbalanced the first 6, so that order 7 was the reverse of order 1, 8 the reverse of 2 and so on (Appendix E).

Dependent variables. (1) Only effect. The only-effect was defined as the difference between the mean number of list items correctly recalled on trials soliciting only part of the input (i.e., P trials and A trials) and the mean number of items correctly recalled first on trials soliciting all of the input (i.e., PA trials and AP trials). For example, if a mean of 4 animals was obtained on trials where only animals were solicited compared to a mean of 2 animals on trials where animals and persons were solicited (with animals solicited first), the only effect would have been 2. Thus an only effect was calculated for A trials (O-A) and P trials (O-P) yielding two potential only effects for each subject. An only effect of zero would indicate no functional segregation of the TBF set. The potential range for this effect was -6 to +6.

(2) Nonrecall during interlist challenge periods (NRD). This variable only applied to subjects in the Challenge condition. These subjects were challenged to try to verbalize any material designated TBF. For example, on P trials after reporting the persons, subjects

were challenged to verbalize the animals from the list they had just heard. Similarly, on No Recall trials they were challenged to say any material from the list they had just heard. Nonrecall-during was defined as the difference between the total number of TBR and the total number of TBF items recalled correctly over the 12 lists. This measure had a potential range of -72 to +72.

(3) Final free recall. Two written free recall tests were administered to each subject, one immediately following the 12 study-test trials (R-1) and one following either a C-cue in the Temporary and Challenge conditions or a statement asking subjects to try again in the Permanent condition (R-2). Separate recall scores were obtained for items that had been designated TBR and TBF by totalling the number of correct responses in each category. Consequently, 4 free recall scores were available: TBR at R-1, TBR at R-2, TBF at R-1 and TBF at R-2.

✓(4) Postexperimental inquiry. Likert-type scales, and a forced-choice question were used to assess subjective experiences. These materials appear verbatim in Appendix D. The Likert-type scales were used to assess response withholding (during interlist challenge periods and again at R-1) and self-rated depth of hypnosis. The forced-choice (Yes-No) question asked subjects in the Permanent condition whether or not they anticipated the final free recall test of TBF materials.

Procedure

Subjects participated in two sessions. Session-1 involved administration of the HGSHS in groups of 2 to 8 people. Scale administration followed the procedure outlined in the manual (Shor & Orne, 1962). Performance on the scale was scored immediately and subjects scoring either in the High (8-12) or Low (0-4) range were asked to schedule a time for the second session. Session-2 always took place within a week of session-1, and involved individual testing of all subjects by the same experimenter (the author).

Upon entering the testing room, the subject sat at a desk facing away from the experimenter and the recording apparatus, and then listened to the following preliminary instructions:

In this experiment you will be presented a tape recorded series of lists for learning. Each list in the series contains a group of animal names and a group of persons' names. After you have heard and tried to remember each list, there will be a recall test. This test will be signalled by one of 5 different recall cues. If you hear the cue 'animals then persons' this is asking you to report all the material from the previous list, giving the animals first, then the persons' names. The cue 'persons then animals' also requires you to say all the material that you can

remember, only this time I would like the persons' names before

the animal names. The cue 'animals only' is asking you to say only the ~~animal~~ names from the previous list. Similarly, the cue 'persons only' is asking you to report only the persons' names from the previous list. Finally, if you hear the cue 'no recall' report none of the material and just rest until the next list begins. Remember, you will be given one of these five cues only after you have heard all the material in any one list. Since you may hear any one of the five recall cues after each list (they'll come at random), you won't be able to guess ahead of time whether you will be asked for all, part, or none of the material. So do your best to remember all of the list items until you hear one of the cues. When reporting the individual animal and/or persons' names, you may recall in any order you wish as long as you maintain the groupings specified by the cues. You will have 40 seconds to give your response to each list. Are there any questions? ... O.K. Let's try a couple of example lists before we begin.³ In these practice lists, foods and cities are used instead of animals and persons' names, so you won't get confused later on as to what was practice and what wasn't.

After questions were answered, two practice trials were administered. Items were presented at a rate of one per 1.5 secs. There was a 5 sec. pause between the block of 6 animals and the block of

6 persons' names and a 5 sec. pause between the last person and the recall cue. Forty secs. were allowed for each recall test. The intertrial interval during which subjects were told to "stop trying and rest," was 10 secs. After questions regarding the practice trials were answered, appropriate instructions regarding the recall cues were administered to subjects in the Permanent, Temporary and Challenge conditions.

Permanent-forget instruction. Subjects in this condition were read the following instruction:

In a little while you will hear a series of lists like the ones you just practiced, except animals and persons' names will be substituted for foods and cities. Now, as we have already said, on 'animals only' and 'persons only' lists you only have to report part of the material and on 'no recall' lists, none of the material. For these types of lists I now want you to permanently erase the material that you do not have to recall from your memory. I am interested in the extent to which you can permanently erase material that you do not have to recall from your memory. You will be reminded to do this at the appropriate time.

For this condition, the following instructions represented each of the respective recall cues: P = persons only, erase animals per-

manently; A = animals only, erase persons permanently; PA = persons then animals; AP = animals then persons; and No Recall = erase persons and animals permanently.

Temporary-forget instruction. Subjects in this condition heard the following:

In a little while you will hear a series of lists like the ones you just practiced, except animals and persons' names will be substituted for foods and cities. Now, as we have already said, on 'animals only' and 'persons' only' lists you only have to report part of the material and on 'no recall' lists, none of the material. For these types of lists, I now want you to erase the material that you do not have to recall from your memory until I tap your shoulder later on in the experiment and you hear me specifically say; 'Now you can remember everything.' No matter how hard you will try to remember the erased items you won't be able to recall them under any circumstance - whether trying to say them or write them down- until I give you permission by tapping you on the shoulder and saying 'Now you can remember everything.' I am interested in the extent to which material that you do not have to recall can be temporarily erased from your memory until such time as I tell you 'Now you can remember everything.' You will be reminded to do this at the appropriate time.

For this condition, the following instructions applied: P = persons only, erase animals until I tap you; A = animals only, erase persons until I tap you; PA = persons then animals; AP = animals then persons and No Recall = erase persons and animals until I tap you.

Challenge instruction. Subjects in the challenge condition were read the following:

In a little while you will hear a series of lists like the ones you just practiced, except animals and persons' names will be substituted for foods and cities. Now, as we have already said, on 'animals only' and 'persons' only' lists you only have to report part of the material and on 'no recall' lists, none of the material. For these types of lists, I now want you to erase the material that you do not have to recall from your memory until I tap your shoulder later on in the experiment and you hear me specifically say; 'Now you can remember everything'. No matter how hard you will try to remember the erased items you won't be able to recall them under any circumstance - whether trying to say them or write them down until I give you permission by tapping you on the shoulder and saying: 'Now you can remember everything'. In addition, on those lists where some or all of the material is to be temporarily erased, you will be asked to try to recall the erased material as a check on whether or not

it was erased. For example, after a particular list you may hear the following: 'Persons only. Erase animals until I tap you. Say the persons and then, even though you won't be able to, just try to say the animals.' This instruction means that you are to erase the animals temporarily, say all the persons' names that you can recall, and then as a check on whether or not the animals were erased, you are to try to recall the animals. I am interested in the extent to which material that you do not have to recall can be temporarily erased from your memory until such time as you are told: 'Now you can remember everything.' You will be reminded to do this at the appropriate time.

For this condition the following instructions applied: P = persons only. Erase animals until I tap you. Say the persons and then, even though you won't be able to, just try to say the animals; A = animals only. Erase persons until I tap you. Say the animals and then, even though you won't be able to, just try to say the persons; PA = persons then animals; AP = animals then persons and No Recall = erase persons and animals until I tap you. Even though you won't be able to, just try to say the persons and animals.

After questions regarding these instructions were answered, tape recorded standard induction or TM instructions were administered

in the appropriate conditions. (See Appendices B and C respectively.)

At the conclusion of these procedures, a second tape recorder was turned on and 12 study-test trials followed. Verbal responses were recorded manually by the experimenter on prepared response sheets (Appendix F). After trial 12, the following instruction was played to subjects in all conditions:

Stop trying and listen. This completes the first part of the experiment. In the second part to follow, I will ask you to recall all of the material - animals and persons - from all the lists. Although I asked you to erase some of this material from your memory ('until I tap you' was added in the Temporary and Challenge conditions), I want you to now try to recall any material that you can remember including these items. You may recall the material in any order you wish and you will have 3 minutes to do this. (Subjects in the Induction condition were told to open their eyes at this point.) Ready ... begin.

Paper and a pen were provided while the last instruction was playing. After 3 minutes, Temporary and Challenge subjects heard the following as the experimenter tapped their shoulders, removed the first response sheet and placed a clean sheet in front of them:

Stop writing please. Now listen carefully to my words: 'Now you can remember everything.' Once again I would like you to

recall any material that you can remember in any order you wish. This includes the items that you already wrote on the first sheet and any extras that you can now remember. You will have another 3 minutes to do this. Ready ... begin.

Alternatively, subjects in the Permanent condition heard:

Stop writing please. It is often said that two tries are better than one. Once again I would like you to recall Ready ... begin.

After this recall trial TM subjects were asked to complete the postexperimental questionnaire. They were then informed that the experiment was over, debriefed and reimbursed. Subjects in the Induction condition underwent a standard "waking" procedure (Appendix B) before completing the questionnaire, debriefing and reimbursement.

Results

The results will be presented in 6 parts: (1) only-effects, (2) final free recall, (3) nonrecall-during, (4) HGSHS amnesia vs. session-2, (5) postexperimental inquiry and (6) supplementary group.

Only-effects. For each of the 12 experimental cells two means were generated, one for the O-P (only-effect for persons) effect (where the first put-in material was designated TBF) and one for the O-A (only-effect for the animals) effect (where the second put-in material was designated TBF). These means were calculated as follows:

For O-P, the mean number of persons recalled across the two PA trials was subtracted from the mean number of persons recalled across the two P trials. Similarly, O-A was calculated as the difference between the mean number of animals recalled on A and AP trials. Table 3 provides the 24 means with their respective standard deviations, Ns, and t-ratios.

It was decided a priori that the only-effect means for each cell should be subjected to individual t-tests to determine whether or not each mean deviated significantly from zero. Previous research (Epstein, 1969, 1970) indicated that the only-effect was unreliable in cases where the block of items presented second in a list was designated TBF (i.e., O-A). Inspection of Table 3 reveals that 3 of the means for O-P (TBF = first put-in) deviated significantly from zero whereas none of the O-A (TBF = second put-in) means did. This finding is consistent with previous research. Accordingly, no further analyses were performed on O-A.

Analysis proceeded with a 2x2x3 (High/Low x Induction/TM x F-cue-Type; Permanent/Temporary/Challenge) Analysis of Variance (ANOVA) on the O-P means using Kirk's (1968) model for completely randomized factorial designs. The O-P means are displayed in Figure 1. The line running horizontally through the zero-point on the ordinate represents no effect of F-cuing. Points above this line reflect an

Table 3

24 Only-effect Means and T-ratios for O-P and O-A (n = 12)

Cell	O-P			O-A		
	<u>M</u>	<u>sd</u>	<u>t</u>	<u>M</u>	<u>sd</u>	<u>t</u>
High-Induction-Permanent	1.2	.89	4.7*	-.04	1.2	.12
High-Induction-Temporary	.25	.91	.94	.42	1.5	.99
High-Induction-Challenge	-1.2	.96	4.3*	.08	1.5	.19
High-TM-Permanent	.75	1.1	2.4*	0.0	.71	0.0
High-TM-Temporary	.12	.96	.45	-.17	1.01	.57
High-TM-Challenge	-.17	1.2	.47	.21	1.3	.54
Low-Induction-Permanent	0.0	1.1	0.0	.08	1.6	.18
Low-Induction-Temporary	.17	.89	.65	.63	1.5	1.4
Low-Induction-Challenge	-.17	1.01	.57	.21	1.3	.58
Low-TM-Permanent	.42	1.2	1.2	.08	1.1	.26
Low-TM-Temporary	-.04	1.1	.13	.15	1.3	.44
Low-TM-Challenge	-.12	.88	.49	.25	1.5	.58

Note. * = $p < .05$

Figure 1. Mean Only-effect for 12 Experimental Cells.

advantage to TBR recall owing to designation of some of the list material TBF (positive only-effect). Points below this line indicate a inhibitory effect of F-cuing on TBR material (negative only-effect). This analysis showed the main effect of Forget-cue-type and the interaction between Forget-cue-type and Susceptibility to be significant, $F(2,132) = 11.76$, $p < .001$ and $F(2,132) = 4.95$, $p < .008$, respectively. This interaction appears in Figure 2. Post hoc tests (Tukey, 1949) on these means (see Table 4) showed that High-Permanent subjects (i.e., High susceptibles who received instructions to forget permanently) showed a positive only-effect that differed significantly from the null effect shown by the High-Temporary group. By contrast, the High-Challenge group demonstrated a negative only-effect that also differed significantly from the High-Temporary group. No other differences were significant.

Although the 3-way interaction was only marginally significant, $F(2,132) = 2.53$, $p < .08$, analysis proceeded with the planned comparisons of the simple simple main effects. Pair-wise comparisons among all means (Table 3) indicated that the pattern of results described above was moderated by the Induction/TM factor. This interaction is depicted in Figure 1 and can be summarized as follows:

- (1) Highs in both Induction and TM conditions who were given the permanent F-cue showed positive only-effects;
- (2) all Temporary F-cue

Figure 2. Susceptibility X Forget-cue-type Interaction on Only-effect.

Table 4

Mean Only-effect for Susceptibility x Forget-cue-type Interaction

	Highs		Lows	
	<u>M</u>	<u>sd</u>	<u>M</u>	<u>sd</u>
Permanent	.98	.99	.21 _b	1.1
Temporary	.19 _b	.92	.06 _b	.98
Challenge	-.69 _a	1.2	-.15 _{ab}	.93

Note. Means sharing the same subscript fail to differ significantly.

For all treatments, n = 24

groups scored at or about zero. Evidently, informing subjects that they would be responsible for the TBF material at the end of the experiment cancelled the facilitatory effect of the F-cue found in the Permanent condition; (3) the High-Induction-Challenge group was the only one to show a significant negative only effect and (4) all Low groups and High-TM subjects scored at or about zero. In short, Highs in the Induction condition evidenced significant differences in the size and direction of O-P under the three F-cue type levels. With Permanent instructions they showed a significant positive effect, with temporary instructions no significant effect and a significant negative effect when challenged. None of the other combinations of groups showed this pattern. In addition, the High-TM-Permanent group yielded a significant positive only-effect comparable to that shown by the High-Induction-Permanent group.

Final free recall. The total number of correct responses was counted on each of the two recall trials at the end of the experiment (i.e., R-1 and R-2) and then broken down by type of item (i.e., TBR and TBF). Thus, 4 recall scores were obtained for each subject: TBF: R-1, TBR: R-1, TBF: R-2 and TBR: R-2. The group means were subjected to a 2x2x3x2x2 split ANOVA containing the three original between-subject factors (Susceptibility x Induction/TM x Forget-cue-type) and two within-subject factors: (1) Item-type with two levels

(TBR vs. TBF) and (2) Trials with two levels (R-1 vs. R-2). Two of the 2-way interactions, Item-type x Trials and Forget-cue-type x Item-type were significant (Tables 5 and 6), $F(1,132) = 22.17$, $p < .006$ and $F(2,132) = 9.41$, $p < .001$, respectively. A third 2-way interaction, Susceptibility x Forget-cue-type (Table 7), was marginally significant, $F(2,132) = 2.79$, $p < .06$. These three interactions appear in Figures 3, 4 and 5.

Post hoc tests on the means in the Item-type x Trials interaction (see Figure 3) showed that significantly more TBR than TBF items were recalled on both free recall trials and that TBF performance increased from R-1 to R-2. This increase in TBF performance across trials reflected increases for all Forget-cue-type levels since the 3-way interaction (Forget-cue-type x Item-type x Trials) was not significant.

The 6 Forget-cue-type x Item-type interaction means in Figure 4 were analyzed for differences using Tukey's (1949) test. Pair-wise comparisons among means showed that subjects in the Permanent and Temporary conditions recalled significantly more TBR than TBF material (collapsed across the two recall trials). The striking finding from this analysis is that significantly fewer TBR items were recalled in both the Temporary and Challenge conditions than in the Permanent condition. Apparently, knowledge of cue-cancellation (i.e., that a TBF test would come at the end of the experiment) did

Table 5

Mean Final Recall for Item-type x Trials Interaction

	TBF		TBR	
	<u>M</u>	<u>sd</u>	<u>M</u>	<u>sd</u>
Recall - 1	8.9	4.0	11.8 _a	4.8
Recall - 2	9.6	4.2	11.7 _a	5.0

Note. Means sharing the same subscript fail to differ significantly.

N = 144

Table 6

Mean Final Recall for Forget-cue-type x Item-type Interaction

	TBF		TBR	
	<u>M</u>	<u>sd</u>	<u>M</u>	<u>sd</u>
Permanent	9.3 _a	4.0	13.9	4.8
Temporary	8.4 _a	3.5	10.9 _b	5.1
Challenge	9.98 _{ab}	4.5	10.4 _{ab}	4.0

Note. Means sharing the same subscript fail to differ significantly.

For all treatments, n = 96

Table 7

Mean Final Recall for Susceptibility x Forget-cue-type Interaction

	Highs		Lows	
	<u>M</u>	<u>sd</u>	<u>M</u>	<u>sd</u>
Permanent	15.2 _b	5.1	12.7 _b	4.7
Temporary	9.7 _{ac}	6.1	12.1 _{bc}	4.0
Challenge	9.8 _{ac}	4.3	10.6 _{bc}	3.6

Note. Means sharing the same subscript fail to differ significantly.

For all treatments, n = 24

Figure 3. Item-type X Trials Interaction on Final Free Recall.

Figure 4. Forget-cue-type X Item-type Interaction on Final Free Recall.

Figure 5. Susceptibility X Forget-cue-type Interaction on Final Free Recall.

not facilitate TBF recall. Rather, expectation of cancellation reduced recall of TBR material.

Figure 5 displays the Susceptibility by Forget-cue-type interaction, and the relevant means are shown in Table 7. Post hoc tests indicated that Lows recalled the same total number of (TBR + TBF) items across the two recall trials. On the other hand, Temporary-Highs and Challenge-Highs recalled significantly fewer items than Permanent-Highs. None of the other differences between high and low susceptibles attained significance.

In summary, these analyses indicate that (a) the nature of the F-cue effected the total amount of material retained for final recall in high susceptible subjects. However, type of F-cue failed to affect final recall in low susceptibles; (b) Relative to Permanent instructions, Temporary and Challenge instructions inhibited the accessibility of TBR material. To-be-forgotten materials were unaffected by the different forget instructions; and (c) although TBF performance increased from R-1 to R-2, this increase was not a function of F-cue cancellation.

Nonrecall-during amnesia suggestion. The challenge condition was designed to simulate the prototypal suggested amnesia paradigm. For this reason the data for the 48 subjects assigned to this condition were analyzed for effects considered germane to the

phenomenon of suggested amnesia. Usually the effects of amnesia suggestions are measured in terms of TBF nonrecall, often without appropriate TBR control material or measures of reversibility (see pp. 2-8). In the present study both controls were used. The extent of nonrecall during the list presentation phase of the experiment (NRD) was defined as the difference between the total number of TBR items recalled and the total number of TBF items recalled (verbalized) when challenged. Because there were 72 TBR and 72 TBF items the potential NRD range was -72 to +72. (Two Lows actually recalled more TBF than TBR material, obtaining negative NRD scores of -4 and -3.)

For these 48 subjects the mean number of TBF items recalled ($\bar{M} = 15.6$) was about half the mean number of TBR items recalled ($\bar{M} = 31.1$). Mean NRD was 15.5 ($SD = 10.2$). A 2x2 (High/Low x Induction/TM) ANOVA was performed on these data. The data appearing in Table 8 and Figure 6 revealed a significant Susceptibility main effect, $F(1,144) = 6.13$, $p < .017$. Highs yielded significantly more NRD than Lows ($\bar{M} = 19.0$ and 11.92 , respectively), a finding that is consistent with most of the suggested amnesia literature. There was no main effect of Induction/TM and no interaction between this factor and Susceptibility.

A subsequent analysis (prompted by a nonsignificant correlation

Table 8

Mean Nonrecall-during for High/Low x Induction/TM ANOVA

	Highs		Lows	
	<u>M</u>	<u>sd</u>	<u>M</u>	<u>sd</u>
Induction	19.2	7.8	11.2	11.3
Task Motivation	18.8	10.1	12.7	10.1
<hr/>				
Marginals	19.0	8.8	11.9	10.5

Note. For High/Low main effect, n = 72

Figure 6. Susceptibility vs. Induction/Task-motivation NRD Means.

of $-.19$ between O-P and NRD in the expected direction) was carried out, to determine whether there was a relationship between NRD and the negative only-effect. Two groups were formed, based on subjects' NRD scores. Extreme Nonrecallers were identified as subjects having scored at least one standard deviation higher than the NRD mean (i.e., $\text{NRD} \geq 26$). Extreme Recallers were subjects whose NRD scores had been at least one standard deviation below the NRD mean (i.e., $\text{NRD} \leq 6$). Eight Extreme Nonrecallers (6 Highs and 2 Lows) and 8 Extreme Recallers (7 Lows and 1 High) were identified and their mean O-P scores compared. Extreme Nonrecallers obtained a mean O-P of -1.31 ($\text{SD} = 1.03$) compared to a mean of $.06$ ($\text{SD} = 1.21$) for Extreme Recallers. These means differ significantly ($t = 2.06$, $\text{df} = 15$, $p < .05$).

Additionally, it was of considerable interest to observe the relationship between NRD and recovery of TBF material either at R-1 or R-2. Table 9 displays both the extent of nonrecall and the absolute number of TBF items recalled by Extreme Recallers and Extreme Nonrecallers at three points in the experiment: (1) during the challenge periods following the list presentations (i.e., NRD and TBF-D), (2) during the first free recall trial (i.e., NR: R-1 and TBF: R-1) and (3) during the second free recall trial following the C-cue (i.e., NR: R-2 and TBF: R-2). Although none of the Extreme Recallers recalled more TBF material at R-1 than during list pre-

Table 9

Mean TBF and Nonrecall for Extreme Nonrecallers and Extreme
Recallers During List Presentations, R-1 and R-2

	Extreme Nonrecallers		Extreme Recallers	
	<u>M</u>	<u>sd</u>	<u>M</u>	<u>sd</u>
TBF:D	-1.9	1.7	28.2	4.5
TBF:R-1	8.4	1.8	13.1	3.7
TBF:R-2	10.5	3.7	14.0	4.8
NRD	32.2	3.2	3.4	4.5
NR:R-1	3.0	3.8	-2.4	4.5
NR:R-2	-1.0	2.9	-3.4	5.5

Key. TBF = recall of TBF material, NR = extent of nonrecall (TBR-TBF),
D = during list presentations, R-1 = first final recall trial and
R-2 = final recall after cancellation.

sentations, each of the Extreme Nonrecallers recovered between 4 and 10 TBF items that had not been verbalized during the earlier challenge periods. Inspection of Table 9 indicates that mean recovery for the Extreme Nonrecallers at R-1 was 6.5 items. (Seemingly, these individuals interpreted the amnesia suggestion to have been cancelled at R-1 since most of the recovery occurred at this point in the experiment. This will be discussed further below.)

One experimental prediction was that compared to Extreme Recallers, Extreme Nonrecallers would maintain inferior TBF recall at R-1 but recover some of these items after cancellation, at R-2. To determine whether the C-cue differentially affected performance for these two groups, two 2x2 (Extreme Recall/Nonrecall x Trials) ANOVAS were performed, using TBF recall and Extent of Nonrecall as the dependent variables, respectively. The means for these analyses are depicted in Figures 7a and 7b.

The first analysis using TBF recall as the dependent variable, showed a significant main effect for Extreme Recall/Nonrecall, $F(1,14) = 6.33, p < .02$. The Trials main effect approached significance, $F(1,14) = 3.32, p < .08$. However, the interaction effect was not significant.

A similar but not identical pattern of results was observed using Nonrecall as the dependent variable. The main effect for

Figure 7a. TBF Final Recall for Extreme Nonrecallers/Recallers.

Figure 7b. Nonrecall on Final Free Recall for Extreme Nonrecallers/Recallers.

Extreme Recall/Nonrecall approached significance, $F(1,14) = 3.7$, $p < .07$ and the Trials main effect attained significance, $F(1,14) = 11.11$, $p < .005$. However, unlike the finding for TBF recall, the Nonrecall interaction effect was marginally significant, $F(1,14) = 4.0$, $p < .06$.

These results can be summarized as follows: (a) Extreme Recallers recalled more TBF material and evidenced less nonrecall than Extreme Nonrecallers, (b) TBF recall tended to increase from R-1 to R-2 for both groups and (c) a tendency existed for Extreme Non-Recallers to show more of a decrease in nonrecall after cancellation than Extreme Recallers.

HGSHS amnesia vs. session-2. To establish the relationship between performance on the HGSHS amnesia suggestion and performance on various indices of nonrecall in session-2, the following analyses were carried out.

First, the 48 Challenge subjects were coded nominally and numerically on the basis of their HGSHS amnesia performance. Recallers, assigned a score of zero, were individuals who failed the amnesia suggestion by the conventional HGSHS criterion (i.e., recalled more than 3 items during the suggestion period); Nonrecallers, assigned a score of 1, were identified as having passed the HGSHS amnesia suggestion by conventional standards (i.e., recalled 3 or

fewer items during the suggestion period). Finally, Amnesics were individuals who had recalled 3 or fewer items during the suggestion and recovered at least two additional items after cancellation.

These individuals were assigned a score of 2. This scheme yielded 31 Recallers, 8 Nonrecallers and 8 Amnesics. The aim of this analysis was to compare these groups on session-2 performance using the following dependent variables: O-P, NRD and Nonrecall at R-1 (NR: R-1).

Because of the large discrepancy in the number of subjects falling into the Recaller and the other two categories, a subset of observations was selected from the former group to match the size of the other two groups. Consequently, 8 Recallers were randomly drawn

from the larger group of 31. T-tests showed that O-P, NRD and NR:

R-1 means for the 8-person sample failed to differ from the corresponding means for the entire Recaller group ($M_s = -.38, 11.38, -.38$ and $-.34, 14.16, .81$, respectively). Next, a one-way Multivariate Analysis of Variance (MANOVA) was carried out, comparing the HGSRS Recallers, Nonrecallers and Amnesics on O-P, NRD and NR: R-1.

The means for this analysis appear in Table 10. Although most of the means were in the expected direction (with the exception that Nonrecallers had a higher only-effect mean than Recallers), the overall test of the greatest characteristic root only approached significance, $F(6,38) = 1.96, p < .096, R^2 = .37$.

Table 10

Mean O-P, NRD and NR:R-1 for HGSIS Recalls, Nonrecalls
and Amnesics

	Recalls		Nonrecalls		Amnesics	
	<u>M</u>	<u>sd</u>	<u>M</u>	<u>sd</u>	<u>M</u>	<u>sd</u>
O-P	-.38	1.2	0.0	1.1	-1.2	1.5
NRD	11.4	13.7	15.4	11.8	22.6	7.3
NR:R-1	-.38	4.3	.75	5.5	3.8	2.3

Note. For all treatments, $n = 8$

Key. O-P = only-effect, NRD = nonrecall during list presentations and

NR:R-1 = nonrecall at R-1

In a further exploration of these data a multiple regression analysis was performed to determine the amount of variance in the HGSHS amnesia scores explained by the following session-2 variables:

$X_1 = \text{NRD}$, $X_2 = \text{NR: R-1}$, $X_3 = \text{O-P}$, $X_4 = X_1 \cdot X_2$, $X_5 = X_1 \cdot X_3$, $X_6 = X_2 \cdot X_3$ and $X_7 = X_1 \cdot X_2 \cdot X_3$. Table 11 presents the regression coefficients,

T-statistic for the coefficients and beta-weights for each variable.

The only regression coefficient to differ significantly from zero

was associated with X_5 , which was the interaction between NRD and

O-P ($t = -3.7$, $p < .05$). The effect due to regression was significant,

$F(7,40) = 13.4$, $p < .001$, with $R^2 = .70$.

Postexperimental inquiry. (1) Response withholding. Subjects

checked off the appropriate categorical response to a question

concerning response withholding. For Challenge subjects this item

was given twice - once pertaining to response withholding during

interlist challenge periods, and once pertaining to withholding

during R-1. Subjects in the remaining Forget-cue-type conditions

were asked this question in relation to R-1 only. Three responses

were available for this question. Subjects could rate themselves

as (1) Nonsuppressors (i.e., "I said all the material I remembered

and I was actually unable to remember the material that I did not

say"), (2) Voluntary Suppressors (i.e., "I was able to remember some

material that I chose not to say") or (3) Involuntary Suppressors

Table 11

Coefficients, T-statistics and Beta-weights for Regression
of HGSHS Amnesia Scores on Seven Session-2 Variables

Variable	Regression Coefficient	T-statistic	Beta-weight
NRD (1)	-.03	-1.2	-.14
NR:R-1 (2)	.05	.53	.11
O-P (3)	.46	1.4	.22
1 x 2	.008	1.3	.30
1 x 3	-.07	-3.7*	-.73
2 x 3	.11	1.3	.36
1 x 2 x 3	.01	1.8	.57

Note. * = regression coefficient differs significantly from zero

Variance accounted for (R^2) = .70

Key. NRD = nonrecall during list presentations, NR:R-1 = non-recall
at R-1 and O-P = only-effect

(i.e., "I was able to remember some material that I was unable to say"). For challenge periods during list presentations, the proportions of subjects (in the Challenge condition) falling into each of the above categories was calculated and entered into Table 12a. It can be seen that over three-quarters (77%) of these subjects rated themselves as Nonsuppressors. The remaining 23% admitted to either "voluntary" or "involuntary" suppression. When these 48 subjects were broken down by Extreme Nonrecallers and Extreme Recallers (see p. 70), the majority of Extreme Recallers (55%) reported either type of suppression (Table 12b). However, only 22% of these subjects were "voluntary" suppressors. Only 25% of the Extreme Recallers fell into one of these two categories. These figures are generally in line with other estimates of the extent of (admitted) verbal inhibition (Spanos & Bodorik, 1977; Spanos et al., in press).

Next, the verbal inhibition question pertaining to R-1 was analyzed for all 144 subjects. Table 13 shows that 85% of the subjects reported nonsuppression at R-1 whereas only 2% reported "voluntary" suppression. Because the later number was small, "voluntary" and "involuntary" suppressors were pooled for the following analysis. Table 14 presents the proportion of the total number of admitted suppressors ($n = 21$) falling into each experimental cell. The marginal proportions indicated that the greatest amount of

Table 12a

Proportion of Challenge Subjects in each Response Withholding
Category Pertaining to Interlist Challenge Periods

Nonsuppressors	Involuntary suppressors	Voluntary Suppressors
.77	.15	.08

Note. Total $N = 48$

Table 12b

Proportion of Extreme Nonrecallers/Extreme Recallers in each
Response Withholding Category Pertaining to Interlist Challenge Periods

	Extreme Nonrecallers	Extreme Recallers
Nonsuppressors	.45	.75
Involuntary suppressors	.33	.13
Voluntary suppressors	.22	.12
	$n = 8$	$n = 8$

Table 13

Proportion of Subjects in each Response Withholding Category

Pertaining to R - 1

Nonsuppressors	.85
Involuntary Suppressors	.13
Voluntary Suppressors	.02

Note. Total N = 144

Table 14.

Proportion of Admitted Suppressors in each Experimental Cell

	Induction		Task Motivational	
	Highs	Lows	Highs	Lows
Permanent	.05	0	.14	.05
Temporary	.14	0	.10	.05
Change	.14	.10	.14	.10

Note. Total N = 21

admitted suppression (48%) was obtained in the Challenge condition - about as much as the other two Forget-cue-type conditions combined (53%). It is also noteworthy that 71% of the admitted suppressors were Higs. Nonetheless, the total amount of suppression reported at R-1 was relatively low (15%). About equal proportions came from Induction and TM conditions (43% and 57%, respectively).

(2) Anticipation of TBF test. Subjects in the Permanent condition were presented with the following question and asked to respond YES or NO: "When you were asked to permanently 'erase' some of the material from your memory, did you believe that you would later be tested on this material? Please be honest when checking one of the following:"

Because 29% of the subjects in this condition reported that they anticipated TBF testing later in the experiment, it was decided to compare Anticipators and Nonanticipators for differences on (1) O-P, (2) TBF: R-1 and (3) TBF: R-2. These data appear in Table 15. No differences were found for any of these variables. This finding is important with respect to testing the hypothesis that subjects in the Temporary and Challenge conditions, having been informed of the final recall test, simply increased TBF rehearsal time. I suggested earlier that the decrease in TBF performance across Forget-cue-type levels (see Figure 4) was not due to TBF rehearsal during interlist recall periods, because on this hypothesis superior TBF performance should

Table 15

Mean O-P, TBF:R-1 and TBF:R-2 for Anticipators and Nonanticipators

	Anticipators		Nonanticipators	
	<u>M</u>	<u>sd</u>	<u>M</u>	<u>sd</u>
O-P	.21	.94	.75	1.2
TBF:R-1	8.0	2.9	9.2	4.2
TBF:R-2	9.1	3.2	10.1	4.5

Note. For Anticipators $n = 14$, for Nonanticipators $n = 34$

have been observed in the two "informed" (Temporary and Challenge) conditions compared to the "uninformed" (Permanent) condition.

However, such a comparison is only meaningful if subjects in the Permanent condition followed instructions and did not rehearse in anticipation of later TBF testing. The finding reported above, that TBF recall for Anticipators and Nonanticipators did not differ, suggests that TBF performance in the Permanent condition reflects minimal TBF rehearsal.

(3) Self-rated hypnotic depth. Subjects in the Induction condition were asked to indicate on a Likert-type scale, the degree to which they felt hypnotized during list administration and recall. Scores of zero, 1, 2 or 3 were assigned respectively to the following responses: a) not at all hypnotized, (b) slightly hypnotized, (c) moderately hypnotized and (d) deeply hypnotized. The mean depth reported was 1.2 (SD = .74). As seen in Table 16, this variable was intercorrelated with 7 other variables: O-P, TBF: R-1, TBF: R-2, NR: R-1, NR: R-2, TBR-D and recoded status on the HGSMS amnesia item (AMN: HGS). The only variable that self-rated depth predicted was status on the HGSMS amnesia item ($r = .27, p < .05$). Subjects who reported feeling more deeply hypnotized (during session-2) tended to successfully perform the HGSMS amnesia suggestion (in terms of both nonrecall and recovery).

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SUGGESTED AMNESIA IN THE
CONTEXT OF DIRECTED FORGETTING

by

• Stephen Rivers, M.A.

A Thesis Submitted to the Faculty of Graduate Studies in
Partial Fulfillment of the Requirements for the Degree of
Doctor of Philosophy

Carleton University

July, 1979

SUGGESTED AMNESIA IN THE

CONTEXT OF

DIRECTED FORGETTING

The undersigned recommend to the Faculty
of Graduate Studies acceptance of the thesis

"Suggested Amnesia in the Context of
Directed Forgetting"

submitted by

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ABSTRACT

Empirical consistencies in the suggested amnesia literature are reviewed and summarized. Individual differences, the role of hypnotic induction procedures and the problem of faking are discussed. The experiment was designed to compare and contrast the suggested amnesia and directed forgetting paradigms by manipulating the nature of the instruction to forget. 72 high and 72 low susceptible subjects were tested under both hypnotic and nonhypnotic conditions. Subjects listened to 12 tape recorded 12 word lists and were instructed (after list input) to recall some, all or none of each list. Portions of lists not required for recall were to-be-forgotten either "permanently" or "temporarily." Some subjects were challenged to verbalize to-be-forgotten material. The notion that to-be-forgotten items are functionally segregated (and not accessed during retrieval) and an "inattention" hypothesis vied as alternative explanations of suggested amnesia. Both the only-effect (the advantage that accrues when portions of input material are to-be-forgotten) and final free recall data supported the inattention hypothesis. Suggested amnesia and directed forgetting appear to be divergent phenomena involving different processes.

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Historians generally agree that hypnotic phenomena can be traced to the work of the eighteenth century physician Franz Anton Mesmer (Darnton, 1970; Dingwall, 1968; Ellenberger, 1970; Tinterow, 1974).

Posthypnotic amnesia, a temporary inability to remember events occurring during a hypnotic session, has been associated with hypnosis since the early nineteenth century (Ellenberger, 1970). Interestingly, the discovery of an association between mesmeric procedures and amnesia was not made by Mesmer himself but by a disciple, the Marquis de Puysegur (1751-1825).

Since that time various classification schemes have been proposed to differentiate the major forms of hypnotic amnesia (Erickson & Rossi, 1974; Evans, Note 1; Hilgard, 1965a, 1965b, 1966; Thorne, 1967). The broadest classification identifies "spontaneous" and "suggested" amnesias. Spontaneous amnesia purportedly occurred regularly in the nineteenth and early twentieth centuries but is reported much more rarely now (Hilgard & Cooper, 1965). In sessions where the amnesia suggestion is purposefully omitted, nonrecall of session events posthypnotically is taken as an index of spontaneous amnesia (Cooper, 1972). However, it now appears that spontaneous amnesia can be explained in terms of normal forgetting processes (Evans & Thorne, 1966). Because of the difficulty in separating "spontaneous" amnesia and normal forgetting, few investigations have been undertaken on this

topic. This thesis deals only with "suggested" forms of amnesia.

Table 1 lists articles that fall under the general rubric "suggested amnesia." The table also provides definitional and learning criteria and type of learning material used in each study. These design features will be elaborated as they become relevant to the discussion.

Definition and Measurement

Because of certain commonalities between the hypnotic amnesia and directed forgetting literatures (for reviews of the latter see Bjork, 1972 and Epstein, 1972), some of the terminology from the latter will be applied to the former. The suggestion that the subject forget will be called the forget cue (F-cue) and the specific instructions to once again remember what had been "forgotten" will be labelled the cancellation cue (C-cue). Material or events designated to-be-forgotten will be abbreviated (TBF). For further convenience three retention tests found in various paradigms will be labelled as follows: A test taken after input of TBF material but before an F-cue (T_b); a test taken during the period of forgetting prescribed by the F-cue (T_d); and a test taken after the C-cue is administered (T_a).

One third of the studies listed in Table 1 assessed amnesia using one of the standard hypnotic susceptibility scales¹ (Cooper,

Table 1

Summary of Suggested Amnesia Studies

Study	TBF Material	Level of Mastery	Reversibility tested/used	Subject Testimony tested/used	Amnesia Measure
Barber & Calverley, 1966	6 nouns	one perf. rep.	+/-	+/-	R_{Td}
Bitterman & Marcuse, 1945	8 nouns	N.A.	+/+	+/+	autonomic
Bodorik & Spanos	9 nouns	two perf. reps.	+/+	+/+	$R_{Ta} - R_{Td}$
Bowers, 1966	Taffel task	N.A.	+/-	+/+	R_{Td}
Clemes, 1964	10/18 words	5 study trials	+/+	+/-	R_{Td}
Coe, Basden et al., 1976	35 words	3 study trials	+/+	+/-	R_{Td}
Coe, Baugher et al., 1976	11 SHSS items	N.A.	+/-	+/-	R_{Td}
Coe, Taul et al., 1973	35 words	3 study trials	+/-	-/-	R_{Td}
Cooper, 1972	10 HGSHS items	N.A.	-/-	-/-	R_{Td}
Evans, Note 1	Source of learning	N.A.	-/-	+/+	New Knowledge
Evans & Kihlstrom, 1973	9 SHSS items	N.A.	+/-	-/-	$R_{Td} < 3$
Goldstein & Sippelle, 1970	colour pattern	3 perf. reps.	-/-	-/-	cf. chance
Graham & Patten, 1968	12 adjectives	1 perf. rep.	-/-	-/-	$R_{Td} < 3$
Hilgard & Cooper, 1965	9 SHSS items	N.A.	+/-	-/-	$R_{Td} < 5$
Kihlstrom, Note 2	9 HGSHS items	N.A.	+/+	-/-	$R_{Td} < 4/R_{Ta} = R_{Td} + 2$

Study	TBP Material	Level of Mastery	Reversibility tested/used	Subject Testimony tested/used	Amnesia Measure
Kihlström & Evans, 1976	9 HGSHS items	N.A.	+/+	-/-	R_T
Kihlström & Evans, Note 3	9 HGSHS items	N.A.	+/-	-/-	R_{Td}
Nace et al., 1974	9 SHSS items	N.A.	+/+	-/-	$R_T - R_{Td}$ R_a
Nagge, 1935	11 nonsense syll.	1 perf. rep.	-/-	-/-	RI-breakdown
Norris, 1973	I.Q. test	N.A.	-/-	+/-	No I.Q. change
O'Connell, 1966	9 SHSS or HGSHS items	N.A.	+/-	-/-	R_{Td}
Pettinati & Evans, 1978	9 HGSHS items	N.A.	+/-	-/-	R_{Td}
Spanos & Bodorik, 1977	9 words	2 perf. reps.	+/+	+/+	$R_T - R_{Td}$ R_a
Spanos et al., in press (Expts. I-IV)	9 words	2 perf. reps.	+/+	+/+	$R_T - R_{Td}$ R_a
Spanos & Ham, 1973	number "4"	overlearned	-/-	+/-	items not verbalized
Spanos & Ham, 1976	number "4"	overlearned	+/-	+/-	items not verbalized
Stern et al., 1963	auditory tones	OR adaptation	+/+	+/+	adaptation rate
Stewart & Dunlap, 1976	12 words	1 study trial	-/-	-/-	R_{Td}
Strickler, 1930	9 PA nonsense syll.	2 perf. reps.	-/-	-/-	Savings
Thorne, 1969	25 PA response words	1 study trial	-/-	-/-	R_{Td}
Thorne & Hall, 1974	25 PA response words	1 study trial	-/-	-/-	No carryover
Williamson et al., 1965	6 nouns	2 study trials	+/+	-/-	R_{Td}

1972; Evans & Kihlstrom, 1973; Hilgard, 1965b; Hilgard & Cooper, 1965; Hilgard & Hommel, 1961; Kihlstrom, Note 2; Kihlstrom & Evans, Note 3, 1976, 1977; O'Connell, 1966; Pettinati & Evans, 1978; Wagstaff, 1977). Because this procedure for assessing amnesia is used frequently, it will be described in detail.

Most scales used to assess hypnotic susceptibility include, as a final item, a suggestion that the subject will be unable to remember any of the test suggestions administered during the session until he/she is given specific instructions to do so. Amnesia is suggested during hypnosis and tested posthypnotically, i.e., after the subject has been "awakened." The F- and C-cues are established simultaneously and take the following form:

You will probably have the impression that you have slept because you will have difficulty in remembering all the things I have told you and all the things you did and felt. In fact, you will find it to be so much of an effort to recall any of these things that you will have no wish to do so. It will be much easier simply to forget everything until after I tell you that you can remember. You will remember nothing of what has happened until I say to you: "Now you can remember everything!" You will not remember anything until then. (Shor & E.C. Orne, 1962).

The C-cue is the sentence "Now you can remember everything!" and is imbedded in the amnesia suggestion. Because the entire set of instructions contains both an F-cue and a C-cue, we can label the set F + C-cue. The procedure entails the establishment of both cues after TBF material input and before any retention tests are called for. After "awakening," subjects are asked to write down everything they can remember happening from the time the session began. If a minimum number of items are recalled (e.g., less than 4 on the HGSHS) "amnesia" is defined as present (regardless of subsequent reversibility) and the subject receives one point on the hypnotic susceptibility scale. Nevertheless, after the allotted time interval for completing T_d , the C-cue is given and subjects are asked to write any additional items that come to mind. Performance at T_a is not used for scoring purposes unless investigators are specifically interested in the extent to which subjects can recover "forgotten" material (e.g., Kihlstrom & Evans, 1976; Nace et al., 1974). In these cases, the difference between the number of items recalled at T_d and T_a has been used as the measure of reversibility.

The use of performance of T_d as the sole index of amnesia has a number of serious problems. Poor performance at T_d could reflect poor initial mastery of the TBF material or rapid forgetting just as it could index direct effects of the F-cue. The possibility also

exists that some subjects respond to the C-cue and not to the F-cue. Conceivably, a subject could score above four at T_d and still show substantial improvement at T_a . He would not be scored "amnesic" but would nonetheless have responded to a critical element of the original suggestion (namely, the C-cue). All of these possibilities point to an inadequate criterion of amnesia.

To use T_d as the amnesia criterion, the minimum control requirement is to include a no-F-cue condition. Equivalent retention in control and F-cue conditions indicates that nothing beyond normal forgetting occurred. However, a difference between conditions would suggest that some of the retention failure could not be explained by normal forgetting and could be directly attributed to the F-cue (assuming equivalent levels of initial "mastery" of the TBF material). Using this control procedure some evidence has been provided demonstrating F-cue efficacy in the hypnotic amnesia literature (Cooper, 1972; Hilgard, 1965b; Hilgard, Weitzenhoffer, Landes & Moore, 1961).

Another control for normal forgetting involves requiring subjects to demonstrate substantial recovery after C-cue presentation. If retention loss during suggested amnesia is primarily a function of normal forgetting, we would expect the instructions: "Now you can remember everything!" to have little effect on this process. On the other hand, substantial recovery at T_a would argue against normal

forgetting. Although most investigators acknowledge reversibility to be an essential characteristic of suggested amnesia, Table 1 shows that only 29% of the investigations included this criterion. A few studies which have incorporated it (e.g., Spanos & Bodorik, 1977; Spanos, Radtke-Bodorik & Stam, Expt. I & II, in press) have shown that with the particular paradigm used, recovery of material learned to criterion is almost always complete despite significant nonrecall during the suggestion period. Although non-cued controls were not used in these studies, complete recovery clearly demonstrated that normal forgetting did not operate. These two control procedures (i.e., a "remember" condition and reversibility) are used in the present investigation.

The next section deals with the following issues: 1) individual differences in response to amnesia suggestions, 2) the contribution of hypnotic induction procedures to elicitation of amnesic responding and 3) the problem of faking.

Variables Associated with Suggested Amnesia

Hypnotic susceptibility. With respect to the question of individual differences and response to amnesia suggestions, several empirical consistencies have emerged. One finding is that subjects who display amnesia also tend to respond "appropriately" to other suggested items on standardized scales. Group data also show a

consistent relationship between hypnotic susceptibility (defined as a person variable measured by these scales) and suggested amnesia (Barber & Calverley, 1966; Coe, Taul, Basden & Basden, 1973; Hilgard & Cooper, 1965; Kihlstrom, Note 2; Kihlstrom & Evans, 1976; Nace, Orne & Hammer, 1974; Spanos & Bodorik, 1977, Spanos et al., in press; Thorne & Hall, 1974; Williamson, Johnson & Eriksen, 1965).

Studies using the various criteria discussed above, have shown that the relationship between amnesia and hypnotic susceptibility is not definition-specific. Table 1 reveals that of the ten studies cited in the preceding paragraph, four employed a 2-component criterion of amnesia (Kihlstrom, Note 2; Nace et al., 1974; Spanos & Bodorik, 1977; Spanos et al., in press). In Spanos' series, subjects were classified "amnesic" only if they showed more recall at T_a than T_d , provided they subsequently testified that they did not remember the words during T_d . (The extent of amnesia was taken as retention (R) at T_a minus retention at T_d and is expressed in Table 1 as $R_{T_a} - R_{T_d}$). For Kihlstrom (Note 2), passing the amnesia item on the HGSHS required a score of less than four at T_d and at least two additional items recalled at T_a (expressed in Table 1 as $R_{T_d} < 4 / R_{T_a} = R_{T_d} + 2$). This study yielded a .45 point-biserial correlation between amnesia and the overall score for the remaining HGSHS: A items. In another 2-component study, Nace et al. (1974) used the three forms of the

SHSS to identify groups of "High", "Medium" and "Low" susceptible subjects. During the amnesia suggestion the High susceptible subjects consistently recalled less TBF material than the Low susceptible subjects.

In addition to the above investigations, six others that used a single component criterion of "amnesia" (i.e., T_d) reported positive associations between hypnotic susceptibility and "amnesia." Four of these found group differences between high and low susceptible subjects (Barber & Calverley, 1966; Coe, et al., 1973; Thorne & Hall, 1974; Williamson et al., 1965) and two found significant correlations between these variables (Hilgard & Cooper, 1965, $r = .53$; and Kihlstrom & Evans, 1976, $r = .35$).

The relationship between hypnotic susceptibility and amnesia also appears to be independent of the particular scale used to assess hypnotic susceptibility. Positive associations have been observed using the HGSHS:A (Kihlstrom, Note 2; Kihlstrom & Evans, 1976; Spanos et al., in press), the three forms of the SHSS (Coe et al., 1973; Hilgard & Cooper, 1965; Nace et al., 1974; Williamson et al., 1965) and the BSS (Barber & Calverley, 1966; Spanos & Bodorik, 1977).

At the same time, a growing body of literature has provided evidence that hypnotic susceptibility reflects cognitive skills such as the ability to sustain "non-analytic" attending (Spanos, Rivers & Gottlieb, 1978). Supposedly, these skills enable some subjects to

successfully carry out suggestions. The association between hypnotic susceptibility and suggested amnesia implies that the latter may be partly determined by abilities brought to the experimental situation by particular individuals. Thus comparative studies of high- and low-susceptible subjects (hereafter referred to as "Highs" and "Lows" respectively) both optimize the probability of observing the phenomenon and provide a condition whereby the relative contribution of hypnotic susceptibility to suggested amnesia phenomena can be assessed. This factor is examined in the present investigation.

Hypnotic induction procedures. Another issue related to suggested amnesia is the contribution of hypnotic induction procedures to the elicitation of the phenomenon. Investigations employing somewhat different procedures have yielded anomalous findings in this regard.

One line of evidence has shown that equivalent levels of recall and recognition amnesia can be obtained with hypnotic induction procedures and task motivational (TM) instructions. The latter are intended to match the enhanced motivation implied in most hypnotic induction procedures. With no mention of hypnosis, drowsiness, relaxation or sleep, TM subjects are asked to try their best to accomplish the tasks the experimenter asks them to perform. They are told that the tasks are easy and interesting and that other subjects have successfully carried them out (Barber, 1969).

Barber & Calverley (1966) tested subjects under induction and TM conditions for amnesia of six words learned to criterion. Recall and recognition tests were administered at T_d and recall was retested at T_a . Subjective reports were also secured but were not included in the amnesia scoring criterion. (According to these reports the majority of subjects in both conditions were scored as "withholders" in this study.) In comparing induction versus TM conditions, equal levels of recall and recognition "amnesia" were demonstrated with authoritatively-worded instructions. Under no-suggestion control conditions amnesia was found in neither group (i.e., performance remained at the learning criterion). Moreover, induction and TM groups did not differ on T_a , demonstrating equivalent recovery in the two conditions. Overall, Barber & Calverley demonstrated that recall and recognition amnesia could be elicited to an equal extent in Induction and TM groups and could not be accounted for in either case by differential learning or normal forgetting. However, response withholding did seem to play a substantial role.

Spanos and Ham (1973) tested selective amnesia for the number "four" in groups of hypnotic and TM subjects. They found that subjects in these conditions did not differ in the extent to which they failed to verbalize the number 4 as they counted from 1 to 5. Forty percent of the hypnotic subjects and 55% of the TM subjects passed

this behavioral criterion. These groups also failed to differ in self-ratings of amnesia. However, 73% of the hypnotic and 75% of the TM subjects who passed the behavioral criterion indicated that they had been at least partially aware of the number 4 while counting. This finding corroborates other work (Barber & Calverley, 1966; Spanos & Bodorik, 1977; Spanos et al., Expt. 111, in press) which suggests that a good deal of ostensible amnesia in hypnotic subjects may result from voluntary inhibition of verbal responding. It also shows that this kind of withholding may occur to the same extent using "non-hypnotic" procedures as it does when standard hypnotic induction procedures are used.

Another line of evidence suggests that induction procedures may produce more amnesia than TM instructions. In each of six studies (Radtke-Bodorik, Spanos & Haddad, in press; Radtke-Bodorik, Planas & Spanos, Note 4; Spanos & Bodorik, 1977; Spanos et al., Expt. I-III; Spanos, Spillane & McPeake, 1976), subjects who had been administered a standard hypnotic induction showed more suggested amnesia than those administered TM instructions.

In the Spanos et al. (1976) study, both hypnotic and TM subjects were given suggestions to forget the number "four" and then asked to count from one to five as was done in the Spanos and Ham study. Objective scores and subjective ratings of the extent to which for-

getting occurred were significantly greater for subjects in the Induction condition than the TM condition.

In the five other studies cited above the investigators were primarily interested in the extent of disorganized recall resulting from suggested recall amnesia (discussed below), but obtained data on the number of items reported as well. These studies had a number of common procedural characteristics that differentiate them from previous work. Any one or combination of these could account for the differences between these studies and those that found no differences in amnesia between hypnotic and control subjects. For instance, the procedure used in Spanos' laboratory had subjects tested at T_b , T_d , and T_a and all three tests were conducted while the hypnotic subjects were in "trance". The procedures used previously all employed two retention tests (T_d and T_a) and both of these were conducted after subjects were "brought out of trance" i.e., posthypnotically.

Spanos & Bodorik (1977) suggested differential arousal levels to account for the superior performance of the hypnotic subjects. They speculated that relaxation instructions which are contained in hypnotic inductions but not in TM instructions, lowered autonomic arousal levels for hypnotic relative to TM subjects. According to this formulation the arousal level of hypnotic subjects fell below

a threshold required to maintain a postulated automatic retrieval mechanism. This hypothesis was tested by Spanos et al. Expt. II, (in press) in a study that manipulated arousal levels for hypnotic subjects by including either relaxation or arousal directives in otherwise typical induction procedures. The hypothesis was not supported however, as the manipulation had no effect on extent of amnesia.

The present investigation includes TM control groups. This is not intended to clarify which of the paradigm-specific differences outlined above account for hypnotic-TM differences, but to establish whether or not such differences obtain using a novel methodology.

Simulation instructions and honesty demands. The problem of faking (i.e., withholding TBF material) has been approached primarily through the use of simulation studies. Some of the problems in the use of such designs have been described elsewhere (Sheehan & Perry, 1976), and with these in mind, it can be stated that the findings in general indicate that suggested amnesia cannot be parsimoniously accounted for wholly by faking.

Williamson et al. (1965) and Barber and Calverley (1966) compared hypnotic, simulating and control subjects on recall and recognition of six words. The words had been presented for a fixed interval of time to all subjects. Attempting to test for the availability of nonrecalled items as associative responses, both sets

of investigators included a recognition test of partial words and a word association test (WAT). Comparable results were obtained in both studies. Findings indicated that both low susceptible and high susceptible simulators tended to overplay the role of the amnesic subjects. These subjects showed complete amnesia (reversibility was assessed), low degrees of recognition of the critical items and impaired performance on the partial word test and on the WAT. High susceptible hypnotic subjects (but not low susceptible hypnotic subjects) demonstrated partial impairment on the memory tasks but no impairment on the associative tests. Nonhypnotic control subjects showed no impairment on any of the tests.

Bowers (1966) found clear differences between hypnotic and simulating subjects. Subjects in each of these conditions were given amnesia suggestions for an experimental task (Taffel task) after its completion. Later, in another setting after the experiment was ostensibly completed, a different "experimenter" asked each subject whether or not he or she remembered the experimental task. Over half of the hypnotic subjects but none of the simulators reported that they could not remember. Contrary to the first two studies discussed in this section, Bowers demonstrated more amnesia for hypnotic subjects than for simulators. It could possibly be argued, however, that high susceptible subjects who made up the hypnotic

group simply "saw through" the "extra-experimental" interview. This possibility was not assessed in Bower's study.

Goldstein and Sippelle (1970) randomly assigned high susceptible subjects to one of three groups: (a) Induction, (b) Simulation and (c) Hypnotic Model (i.e., subjects watched a previous subject - really a confederate demonstrate hypnotic amnesia and were then treated as subjects in the Induction group). After subjects learned a seven-item colour pattern to criterion, amnesia was suggested for the pattern. Simulators responded as if they had never seen the pattern, demonstrating random guessing behavior for the elements of the pattern. On the other hand, both hypnotic groups made significantly fewer errors than the simulators, indicating "overacting" on the simulators' part. These data are consistent with the findings of both Barber & Calverley (1966) and Williamson et al. (1965).

Although the simulation paradigm is open to criticism, it is currently the best method of tackling the problem of faking. Because simulation experiments show that hypnotic subjects and simulators do not perform identically (regardless of susceptibility level) faking constitutes an incomplete account of suggested amnesia. The next section evaluates some alternative explanations.

Underlying Processes

Three major theories have been promulgated to explain the tempo-

rary, reversible loss of recall memory resulting from verbal suggestion. These are the repression hypothesis, the disrupted retrieval hypothesis and the functional ablation hypothesis.

Repression hypothesis. The repression hypothesis states that memories associated with negative affect (i.e., "ego-threatening") are spontaneously kept out of awareness through selective forgetting (Gill & Brenman, 1959). By comparison, enhancement is the process whereby positive affect-laden memories are selectively remembered. Most tests of the repression hypothesis have focussed on partial amnesics (subjects who forget some but not all suggested test items). An early finding (Hilgard & Hommel, 1961) indicated that failed items (suggestions on standard susceptibility scales) were forgotten more often than passed items, supposedly due to the negative affect associated with perceiving oneself as an unsuccessful hypnotic subject.

Pettinati and Evans (1978) considered some of the methodological problems in measuring recall of passed versus failed suggestions. The main problem addressed was the difference in recall pool size between Highs and Lows which tends to inflate the apparent number of forgotten failed suggestions for low susceptible subjects. This situation normally results because Highs tend to pass more suggestions than Lows and therefore have a smaller pool of failed items to remember. Pettinati and Evans developed a measure of selective re-

call of passed versus failed suggestions which served to remove this artifact. They found that an equal number of Highs and Lows recalled more passed than failed items. Because the repression hypothesis did not predict this finding, the data were considered to be more parsimoniously explained in terms of normal memory processes. The authors cited several studies (reviewed by Butterfield, 1964) which demonstrated that passing skill-oriented tasks positively effected recall of the task.

Several subsequent studies (Clemes, 1964; Coe, Baugher, Krimm & Smith, 1976; O'Connell, 1966) yielded contradictory findings although most failed to support the repression hypothesis. Moreover, the concept of repression has been criticized on grounds unrelated to hypnosis. Holmes (1974) reviewed an extensive literature of over 60 articles which tested predictions derived from the repression hypothesis. These studies attempted to manipulate "ego-threat" by inducing various kinds of failure experience, test anxiety and cognitive dissonance or by presenting pleasant and unpleasant stimuli and testing for differential recall. For all of these studies, Holmes concluded that no strong supporting evidence for the notion of repression has been provided: "The conclusion ... should not be interpreted as suggesting that there is no selectivity in what persons are able to report of their previous experiences. ... However ... the

patterning of selectivity is often inconsistent with the predictions derived from the theory of repression, and/or the findings can be better accounted for by processes other than repression" (p. 649).

One alternative process suggested by Holmes was nondefensive selective attention acting at the time of an experience and/or at recall.

Disrupted Retrieval and the Inattention Hypothesis. Recently

Kausler (1974) suggested that in a free recall paradigm (outside of the hypnosis context), subjects frequently employ some organizational strategy or combination of strategies to aid in retrieval. One organizational strategy is the use of temporal information to access item information (Murdock, 1974). That is, recall can be enhanced by cuing subjects to recall items in the same order in which they were learned (Tulving, 1972). A second organizational strategy is the categorization or clustering of items by semantic commonalities (Collins & Quillian, 1970; Katz & Fodor, 1963). Subjects who learn nouns taken from various semantic categories recall the nouns by category, even though the items were originally presented in a random sequence (Bousfield, 1953). Subjects also tend to increase subjective organization of responses with continued practice for word lists which were not pre-categorized (Tulving, 1962).

In hypnosis research, one line of investigation has provided evidence that at least some successful amnesic subjects fail to employ these retrieval strategies during free recall. In one study, Evans and Kihlstrom (1973) examined the organization of recalled material in partially amnesic subjects. After administering three separate susceptibility scales to their subjects, they compared the actual order of occurrence of the suggested tasks on these scales with the order of recall of these tasks during the amnesia suggestion (for subjects remembering at least three items). They found that Highs tended to recall the scale items randomly, whereas the Lows recalled the items sequentially. This relationship disappeared after the C-cue was given, demonstrating a relationship between hypnotic susceptibility and a "breakdown" of temporal sequencing during an amnesia suggestion. Unfortunately, data pertaining to whether or not this disruption was related directly to extent of amnesia were not presented.

Spanos and Bodorik (1977) demonstrated the effects of an amnesia suggestion on organization of recall. Subjects were randomly assigned to either an Induction or a TM treatment condition. They then learned to a criterion of two perfect repetitions, a list of 9 words taken from three Taxonomic categories. In a split-plot design, clustering and recall were measured before, during and after an amnesia suggestion,

permitting assessment of pre-amnesia levels of clustering. Of 52 subjects tested, only 5 hypnotic and 2 TM subjects evidenced partial nonrecall (i.e., recalling some words at T_d but more at T_a). Analysis of variance showed that hypnotic and TM subjects did not differ on degree of clustering at T_b and T_a , while hypnotic subjects did show less clustering than TM subjects at T_d . Moreover, it was the hypnotic partial nonrecallers who accounted for this difference as hypnotic full recall (i.e., remembering the same words at T_d and T_a) subjects' performance remained unchanged over recall trials. Full recall and partial nonrecall TM subjects did not appear to differ across recall trials although the small number of subjects in the partial nonrecall group obviated statistical testing. A replication study (Spanos, Radtke-Bodorik & Stam, Expt. 1, in press), incorporated moderate to high susceptible subjects and obtained sufficient numbers of partial nonrecallers to do these tests (i.e., 21 hypnotic and 12 TM). Again, the number of words recalled and the extent to which they were clustered were compared at T_b , T_d and T_a . In terms of a breakdown in clustering, both hypnotic and TM nonrecallers showed equivalently less clustering at T_d than T_b or T_a . In addition, clustering returned to pre-suggestion levels after suggestion cancellation in both groups.

A potential artifact in the data renders these conclusions equivocal. Although two different clustering measures were used in these

studies, neither is insensitive to the number of words being analyzed.

Thus a decrease in clustering could reflect either a breakdown in

organization or simply the fact that amnesic subjects by definition

recall fewer items at T_d than T_b and T_a . In a subsequent reanalysis of three previous studies, Spanos et al. Expt. III (in press) equalized

for the number of words analyzed at T_b , T_d and T_a . For example, if

a subject recalled only 5 words at T_d , then only the first 5 words

recalled by this subject at T_b and T_a were considered for analysis.

If 6 words were recalled at T_d , then the first 6 words recalled at

T_b and T_a were included, and so on. Partially amnesic subjects con-

tinued to show a breakdown in clustering at T_d indicating that the

finding cannot be accounted for as a statistical artifact. However,

Spanos et al. (Expt. III, in press) also dichotomized their partially

amnesic subjects into those who showed a breakdown at T_d and those

who did not, and found that only about half of the partial amnesics

showed a breakdown. This suggests that although disorganization may

operate in some instances, it does not appear to be a necessary

mediator of suggested amnesia.

A final study in this series addressed the problem of whether

the disorganization effect could be accounted for by faking. Spanos

et al., Experiment IV (in press), utilized a modification of Orne's

(1959, 1971) simulation paradigm. Simulating subjects were yoked

to "real" partial amnesics and told to report a specific number of words (while faking). Their finding that the disorganization effect obtained for "reals" but not simulators, is inconsistent with a "partial compliance" interpretation of partial amnesia.

Spanos et al. (in press) postulated an "inattention hypothesis" to account for suggested amnesia. This hypothesis posits that suggested amnesia and disorganization occur to the extent that subjects do not attend to the recall task during the suggestion period. Spanos, Stam, D'Eon, Pawlack & Radke-Bodorik (Note 5) tested this hypothesis by informing one group of subjects that the challenge to "try and remember the words" meant to focus attention on the recall task. A control group was instructed to continue "attending away" from the recall task during the challenge period. As predicted, amnesia was practically eliminated in the former condition and greatly enhanced in the latter.

The present investigation was designed to allow the inattention hypothesis to compete with the "dissociation" hypothesis (to be discussed below) as an explanation of suggested amnesia.

Functional ablation or dissociation hypothesis. The functional ablation hypothesis posits that during suggested amnesia, specific consolidated memories become functionally isolated but maintain a structural existence. During the ablation period (i.e., the time

during which the amnesia suggestion is in effect) these memories are inaccessible and cannot influence behavior. Cancellation cues remove the ablation mechanism and memories are reinstated. This hypothesis is akin to the neuropathological notion of dissociation proposed by Janet (1925) and revived by Hilgard (1974, 1977). Memories, cognitions and behaviors which become dissociated as a result of hypnotic suggestion, are purportedly independent of and functionally unrelated to their counterparts in the waking state. Thus the functional ablation hypothesis can be considered a special case of state-dependent memory.

Several methods have been employed to measure the extent of ablation. Because complete ablation (i.e., a strong definition) presumes the unavailability as well as the inaccessibility of memories, indirect tests of the effects of learning have been considered valid indices of ablation. These tests are presumed to be beyond subjects' voluntary ability to suppress performance. Studies measuring re-learning (Strickler, 1930), practice effects (Patten, 1932), autonomic response to single words (Bitterman & Marcuse, 1945), associative responses on such tests as the WAT (Barber & Calverley, 1966; Williamson et al., 1965) and memory for sequences of coloured patterns (Goldstein & Sipprelle, 1970) have provided evidence that ablation, if it occurs at all, is far from complete. The general rationale in

these experiments rests on the idea that if dissociation is complete, then the learned material should not interact in any way with performance. The evidence generally fails to support the ablation hypothesis but poor methodology in some of these studies makes this conclusion tentative. The methodological difficulties in the earlier work include lack of controls for normal forgetting (Marston, 1938), no explicit amnesia suggestion (Patten, 1932, Strickler, 1930) and subjects serving as their own controls (Strickler, 1930).

The studies by Barber & Calverley (1966) and Williamson et al. (1965) were better designed. With respect to the dissociation hypothesis, the critical data from these experiments involve word association tests and partial recognition tests given during the "ablation" period. On the WAT, the stimulus words were high frequency associates of the TBF words. According to functional ablation, the TBF material should have been unavailable for associative responding on the WAT despite their high associative probability to the pre-selected stimulus words. However, hypnotic subjects used the TBF words as responses on the WAT just as often as controls, and with equivalent latencies. Similar results were found on partial word tests where subjects had to identify words that were constructed by deleting parts of the letters. To-be-forgotten words were recognized as often as distractors for both groups, demonstrating the availability

of the material for associative responding despite nonrecall of some of the items. These two experiments constitute damaging evidence to the functional ablation hypothesis in its strongest form. Clearly, acquired memories continue to affect behavior during hypnotic amnesia.

Another indirect method used to study the functional isolation of "trance memories" employs the retroactive inhibition (RI) paradigm. In this paradigm subjects learn a list (List 1) of meaningful or nonmeaningful items to criterion and are then tested for recall or recognition of this list. After a second list (List 2) is similarly learned, List 1 is retested. Inferior performance on retention of List 1 under these conditions, compared to a group which does not undergo the interpolated learning of List 2, is taken as evidence of the retroactive action of List 2 on List 1 (Kausler, 1974).

In the context of hypnosis research, List 1 is learned, tested, and retested in the waking condition. Interpolated learning of List 2 is performed after induction procedures. Often the learning of List 2 is followed by suggestions to forget List 2. According to the functional ablation hypothesis, learning List 2 in "trance" should be sufficient to eliminate or at least attenuate its retroaction on List 1. Amnesia suggestions to forget List 2 should augment this effect.

Several early studies seemed to support this contention

(Messerschmidt, 1927; Nagge, 1935; Takahashi, 1958) but were not replicated (Mitchell, 1932; Stevenson, Stoyva & Beach, 1962). All of these investigations have been criticized for using small sample sizes, differing instructions and failing to suggest amnesia (Cooper, 1972). More recently, at least two well-designed studies have failed to find evidence of the breakdown of RI as a result of suggested amnesia for List 2.

In the first of these, Graham and Patten (1968) used an RI design to compare four groups of ten subjects. All subjects first learned twelve adjectives to criterion. Next, one of the following conditions was implemented for each subject: (a) learning List 2 in the waking state; (b) learning List 2 after receiving an induction unaccompanied by an amnesia suggestion; (c) learning List 2 after an induction and then receiving amnesia suggestions for List 2; and (d) spending the interpolated time reading simple, irrelevant material. (Subjects in groups b and c were Highs; those in a and d were unselected.) Finally, recall and savings scores for relearning List 1 were obtained for all subjects. Groups a, b, and c showed substantial RI when compared to group d that learned no intervening list. Savings and recall scores for the two hypnotic groups (b and c) did not differ from the group that learned List 2 in the waking state (group a). The authors concluded that dissociation neither by virtue of being

in "trance" nor as a result of specific hypnotic suggestion was sufficient to produce a breakdown in the RI effect.

In the second study, Coe, Basden, Basden and Graham (1976) measured free recall in a modified version of the earlier RI designs. They were interested in whether or not a breakdown of the RI effect would be evidenced only during the period during which the amnesia suggestion was in effect, disappearing after cancellation. Accordingly, two tests of RI were adopted- one before posthypnotic amnesia was removed (subjects were asked to recall all the words they could remember from List 1 and 2) and a second after cancellation of the amnesia suggestion. On the ablation hypothesis, subjects for whom amnesia was suggested should have recalled more items from List 1 than subjects who did not receive such a suggestion. But this difference should only be evidenced on the first free recall trial. After retaining amnesic subjects in the suggestion group and high susceptible nonamnesics in the no-suggestion group, Coe et al., found no differences between the two groups on recall of List 1 either before or after amnesia was lifted.

These results appear to support the conclusion that the functional ablation hypothesis is untenable. Suggestions to forget portions of the input not only remain available for associative responding but also appear to interfere with TBF material as though the TBF material

was tagged for remembering. It is therefore surprising that some amnesic subjects report no awareness of purposeful rehearsal of the TBF material which they know they will be subsequently responsible for. If we assume that at least some of these individuals are not faking (simulation studies tend to substantiate this) how can the inaccessibility of this material be accounted for without postulating dissociation in its strongest form? One alternative is that dissociation occurs in a weak form. That is, memories become functionally "ablated" to degrees allowing the items to interact with some forms of behavior (e.g., recall performance) but not others (e.g., WATs and recognition performance). The construct shows its limitations however, by not specifying why particular forms of behavior are affected and not others. We can now examine a comparable mechanism that derives from theorizing in the directed forgetting literature and involves selective memory search.

Directed forgetting, segregated search sets and amnesia.

Directed forgetting is a phenomenon related to suggested amnesia (Hilgard, 1977). In this paradigm, verbal materials presented to subjects are subsequently designated to-be-remembered (TBR) or TBF. In the latter case, subjects are instructed to "erase" TBF material from memory. Contrary to the suggested amnesia instruction, subjects do not expect the instruction to be subsequently cancelled; their

task is construed as one of "permanent" forgetting. Occasionally, investigators are interested in the fate of the TBF items and test for TBF recognition and/or recall probability by adding a "trick" trial at the end of an experiment (e.g., Davis & Okada, 1971). When this is done, TBF item recall performance is severely impaired relative to TBR items. On the other hand, paired-associate probe experiments and recognition tests which supposedly facilitate the retrieval of otherwise inaccessible material (Tulving and Pearlstone, 1966), show little or no impairment (Reitman, Halin, Bjork & Higman, 1971; Elmes, Adams, & Roediger, 1970). From this it is inferred that TBF material is available and is not erased. Most investigators in the area agree that superior performance on TBR items results from mechanisms operating predominantly at the time of retrieval (Bjork, 1972; Epstein, 1972). Similarly, suggested amnesia appears to be related to retrieval processes, simply because most nonrecalled material is subsequently recovered (Cooper, 1972; Kihlstrom, 1977). Consequently, the possibility exists that similar mechanisms underly suggested amnesia and directed forgetting phenomena despite differences in experimental procedure. This possibility is explored in the present study, which directly compares the operations differentiating suggested amnesia and directed forgetting. However, before continuing, three differences between these two phenomena must be made more explicit.

First, induction procedures have never been used in directed forgetting. Therefore it is not known whether or not hypnotic induction procedures can enhance this effect. Second, in the directed forgetting paradigm the TBF material is not subject to C-cuing as it is in hypnotic amnesia. Thus, the subject's task is quite different in each paradigm. In the case of hypnotic amnesia subjects are implicitly instructed to forget temporarily. In directed forgetting they are asked to forget the material permanently: "... do your best to erase the letters from your memory" (Weiner & Reed, 1969, p. 226). This difference is probably one of degree. In a sense, the limiting case of "permanent" forgetting cannot be operationalized because one could conceivably administer an indefinite number of retention tests after a study period. Thus no lag between study and test would sufficiently demonstrate "permanent" forgetting. From this perspective, the directed forgetting F-cue can be seen as a suggestion for more "profound" forgetting than its counterpart in hypnotic amnesia. If the two sets of instruction were directly compared, one would expect more forgetting under the F-cue than F + C-cue condition.

A third difference between paradigms is that in suggested amnesia, subjects are always challenged to try to recall TBF material during the suggestion period. Here the instruction implies that the subject is to try to recall even though he/she will be unable to. In

the directed forgetting paradigm, explicit tests of TBF material rarely occur, and when they do they are couched in an instructional context that connotes: "try to recall as much of the TBF material as you can." Nothing is mentioned about not being able to recall while trying to do so.

These three parameters were independently manipulated in the present study to observe their effects on a phenomenon observed in the directed forgetting situation called the "only-effect." This effect occurs when subjects are given the opportunity to study all of a set of input material, portions of which are designated TBF. An only-effect occurs when an F-cue signifying that the subject is not responsible for portions of the material, produces recall facilitation for the remaining material relative to a non-cued condition. For example, in one series of studies (Epstein, 1969), 8 lists of numbers paired with 8 lists of words were presented for study. Immediately after input of each word-number list, a pre-arranged cue signalled one of four recall conditions: recall only the first list; recall only the second list; recall both lists, first list first and recall both lists, second list first. Epstein compared recall performance of a list on an "only" trial to performance of the same list on a "both" trial, and attributed observed differences to the advantage of not being responsible for recall of part of the

input. Facilitation accrued for recall on "only" trials regardless of the relative order of TBF and TBR material, although the effect was more pronounced in the proactive than the retroactive case. This effect was replicated over a variety of conditions (e.g., type of materials, modalities and presentation times) and time allowed for recall was eliminated as a possible artifact.

These data indicate that items designated TBF are tagged and then functionally segregated at some point in time between input and test. To accomplish the task of nonrecall, subjects seem to exclude the entire TBF set from search at the time of retrieval. They restrict their search to the TBR set.

A question which can now be asked is whether or not the selective search hypothesis is tenable in the case of suggested amnesia. If subjects can temporarily restrict a search to a TBR set they should evidence an "only-effect" similar to subjects directed to forget permanently. On the other hand, if retrieval involves a search that includes all (or none) of the input material, then the only-effect should not manifest. If the selective search hypothesis is not viable, future theorizing concerning suggested amnesia should exclude notions of dissociation, functional ablation and segregated search sets.

EXPERIMENT

In this study, the nature of the cue that informs subjects that they are not responsible for part of the input during recall was manipulated in order to assess the effects of (1) expectations of recovery and (2) recovery expectations plus a challenge to try to remember, on the relative size of the only-effect. In one condition the typical directed forgetting instructions were used (i.e., forget permanently) to establish a "base rate" only-effect. In a second condition an "only" trial signified that part of the material was not required immediately, but would be tested when a prearranged signal was presented (i.e., forget temporarily). Differences in the relative size of the only-effect could therefore be compared under these two conditions with the only difference being inclusion of expectations of cancellation. After a series of trials that assessed the only-effect, a recall test of all presented items was administered to all subjects. Destroying subjects' faith in the forget-permanent directive should have had no detrimental effect on the previous manipulation at this point in the experiment. Subjects in the "forget-temporarily" condition were not given the C-cue at this point but were asked to try to recall all of the presented items. This test is analogous to direct tests of TBF material typically found in the suggested amnesia literature (i.e., T_d). Subsequently, a second overall

recall test was administered. For subjects in the forget-temporarily condition, a C-cue was interposed between the two tests. In the forget-permanently condition a second recall test of all presented items was administered with no intervening C-cue. If amnesia occurred, recall should be higher after cancellation than before cancellation in the forget-temporarily condition. If amnesia involves a functional segregation of TBF material, amnesics should display larger only-effects than nonamnesics.

Because amnesia is assessed after the only-effect tests in the above conditions, it would be impossible to determine whether individuals who were amnesic at this point in the experiment had been amnesic during the previous only-effect tests. Thus a condition assessing amnesia during the only-effect testing phase was added. Accordingly, after receiving forget-temporary instructions, subjects in this "challenge" condition were asked to try to recall the TBF in addition to the TBR material on only-trials. Their instructions stated that although they were to try to recall the TBF material, they wouldn't be able to.

These conditions were set as three levels of an independent variable and arranged factorially with the two other variables discussed above: Induction vs. TM preliminary instructions and High vs. Low susceptible individuals, producing a 2x2x3 between-subjects design.

Postexperimental questionnaires were used to assess verbal inhibition of TBF material during the challenge periods on only-trials and during the first overall recall test.

The experiment provided controls for two major sources of confound identified in much of the previous amnesia literature. The first is the extent of initial mastery of TBF material. The procedure involved presentation of each item individually for a fixed interval which was constant across all conditions. Second, normal forgetting could be controlled for in this paradigm in two ways. The first was to compare retention of TBR and TBF items. Equivalent recall performance (there were an equal number of TBR and TBF items in the study) would indicate that nothing beyond normal forgetting had occurred. Second, in the Forget-temporarily and Challenge conditions, significant recovery after suggestion cancellation would indicate against normal forgetting.

The functional segregation and inattention hypotheses were construed as competing hypotheses. On the functional segregation hypothesis, subjects in conditions cued for temporary forgetting (Temporary and Challenge) should show only-effects equivalent in size and direction to subjects in a condition where material is cued for permanent forgetting (Permanent). Alternatively, the inattention hypothesis predicts absence of the only-effect in the Temporary and

Challenge conditions. This would be expected if attention is directed to events other than the recall task.

Method

Subjects

Eighty-five female and 62 male Carleton University undergraduate students served as subjects. Two females and one male did not complete the experiment because they failed to follow instructions. The remaining 144 subjects had been selected from a larger pool of volunteers who were assessed on the HGSHS. Half of the subjects were high susceptible, having scored between 8 and 12 on the HGSHS ($M = 9.2$) and half were low susceptible, having scored between zero and 4 ($M = 2.5$). Fifty-five of the subjects were second-year students and received \$3.00 for participating. The remainder were introductory psychology students and received points toward course credit. None of the subjects had participated in other amnesia experiments conducted by this laboratory. On sign-up sheets the experiment was advertised as one involving two one-hour sessions conducted on different days. Session-one was simply described as the "administration of a standard scale for assessing hypnotic susceptibility." Session-two was described as "listening to recorded lists of words which subjects would have to try to remember for later recall." No mention was made of forgetting or amnesia until subjects reported for session-two.

Materials

Seventy-two animal names (consisting of seventy 1-3 syllable words and two 4-syllable words) and 72 persons' names (all contained 1-3 syllables) were selected from Kučera and Francis' (1967) word frequency corpus. (For a complete index of these materials see Appendix A.) For animal names, the frequency of occurrence in the 50,406 word corpus ranged between one and 14. The frequency of occurrence for persons' names ranged between one and 8. These materials were randomized into 12 lists containing 6 animal and 12 lists containing 6 persons' names. The two sets of lists were randomly paired to produce 12 animal-person lists. All 12 lists had mean frequencies of occurrence which failed to differ from each other. These materials, together with the recall instructions, were read onto a Sony TC-630 stereo tape recorder. Because counterbalancing was required for the type of instruction (i.e., recall cue) following each of the 12 lists, twelve separate tapes were recorded. Each of the 11 new tapes required the same word presentation order and timing as the master tape. Consequently, a second tape recorder was used to directly (electronically) copy the word lists from the master tape onto the 11 new tapes. The counterbalanced recall cues were interspersed between lists on the copied tapes during the copying procedure. Two additional tapes were made, one containing a 10-minute hypnotic

induction procedure (see Appendix B) and one containing standard task motivational instructions (Appendix C). Postexperimental inquiries were presented in mimeographed response booklets (Appendix D).

Design

Independent variables. The design was a 2x2x3 factorial with 3 between-subject factors (Table 2): (1) Preliminary set with two levels; hypnotic induction procedure vs. task motivational instructions; (2) Hypnotic susceptibility with two levels; High (8-12) vs. Low (0-4) as pre-measured on the HGSHS; and (3) Forget-cue-type with three levels; instructions to forget permanently (Permanent) vs. instructions to forget until explicitly cued to recover the material (Temporary) vs. instructions to forget but to try to recall (Challenge). Within susceptibility levels subjects were randomly assigned to one of the 6 factorial cells. Each subject received 12 study-test trials of animal-person lists incorporating 5 types of output: animals only (A), person only (P), animals then persons (AP), persons then animals (PA) and neither persons nor animals (No Recall). Each subject received two A, P, AP and PA trials and 4 No Recall trials. This provided for the presentation of an equal number of TBR and TBF items. To control for proactive interference effects over the 12 trials, each of the 12 subjects in each of the 12 cells was administered one of

Table 2
Experimental Design

Group	Cell	Recall-cue-type Trials				
		P	A	PA	AP	NR
1	High-Ind-Perm	2	2	2	2	4
2	High-Ind-Temp.	2	2	2	2	4
3	High-Ind-Chall.	2	2	2	2	4
4	High-TM-Perm.	2	2	2	2	4
5	High-TM-Temp.	2	2	2	2	4
6	High-TM-Chall.	2	2	2	2	4
7	Low-Ind-Perm.	2	2	2	2	4
8	Low-Ind-Temp.	2	2	2	2	4
9	Low-Ind-Chall.	2	2	2	2	4
10	Low-TM-Perm.	2	2	2	2	4
11	Low-TM-Temp.	2	2	2	2	4
12	Low-TM-Chall.	2	2	2	2	4

Key: Ind = hypnotic induction, TM = task-motivational, Perm = forget permanently, Temp = forget temporarily, Chall = challenge to verbalize TBF items, P = report persons only, A = report animals only, PA = report persons then animals, AP = report animals then persons, NR = no recall.

Note: for each cell, n = 12.

12 different output orders. The first six orders were created by haphazardly arranging the 12 outputs 6 times with the restriction that the same output was never solicited twice in a row. The remaining orders counterbalanced the first 6, so that order 7 was the reverse of order 1, 8 the reverse of 2 and so on (Appendix E).

Dependent variables. (1) Only effect. The only-effect was defined as the difference between the mean number of list items correctly recalled on trials soliciting only part of the input (i.e., P trials and A trials) and the mean number of items correctly recalled first on trials soliciting all of the input (i.e., PA trials and AP trials). For example, if a mean of 4 animals was obtained on trials where only animals were solicited compared to a mean of 2 animals on trials where animals and persons were solicited (with animals solicited first), the only effect would have been 2. Thus an only effect was calculated for A trials (O-A) and P trials (O-P) yielding two potential only effects for each subject. An only effect of zero would indicate no functional segregation of the TBF set. The potential range for this effect was -6 to +6.

(2) Nonrecall during interlist challenge periods (NRD). This variable only applied to subjects in the Challenge condition. These subjects were challenged to try to verbalize any material designated TBF. For example, on P trials after reporting the persons, subjects

were challenged to verbalize the animals from the list they had just heard. Similarly, on No Recall trials they were challenged to say any material from the list they had just heard. Nonrecall-during was defined as the difference between the total number of TBR and the total number of TBF items recalled correctly over the 12 lists. This measure had a potential range of -72 to +72.

(3) Final free recall. Two written free recall tests were administered to each subject, one immediately following the 12 study-test trials (R-1) and one following either a C-cue in the Temporary and Challenge conditions or a statement asking subjects to try again in the Permanent condition (R-2). Separate recall scores were obtained for items that had been designated TBR and TBF by totalling the number of correct responses in each category. Consequently, 4 free recall scores were available: TBR at R-1, TBR at R-2, TBF at R-1 and TBF at R-2.

(4) Postexperimental inquiry. Likert-type scales, and a forced-choice question were used to assess subjective experiences. These materials appear verbatim in Appendix D. The Likert-type scales were used to assess response withholding (during interlist challenge periods and again at R-1) and self-rated depth of hypnosis. The forced-choice (Yes-No) question asked subjects in the Permanent condition whether or not they anticipated the final free recall test of TBF materials.

Procedure

Subjects participated in two sessions. Session-1 involved administration of the HGSHS in groups of 2 to 8 people. Scale administration followed the procedure outlined in the manual (Shor & Orne, 1962). Performance on the scale was scored immediately and subjects scoring either in the High (8-12) or Low (0-4) range were asked to schedule a time for the second session. Session-2 always took place within a week of session-1, and involved individual testing of all subjects by the same experimenter (the author).

Upon entering the testing room, the subject sat at a desk facing away from the experimenter and the recording apparatus, and then listened to the following preliminary instructions:

In this experiment you will be presented a tape recorded series of lists for learning. Each list in the series contains a group of animal names and a group of persons' names. After you have heard and tried to remember each list, there will be a recall test. This test will be signalled by one of 5 different recall cues. If you hear the cue 'animals then persons' this is asking you to report all the material from the previous list, giving the animals first, then the persons' names. The cue 'persons then animals' also requires you to say all the material that you can remember, only this time I would like the persons' names before

the animal names. The cue 'animals only' is asking you to say only the animal names from the previous list. Similarly, the cue 'persons only' is asking you to report only the persons' names from the previous list. Finally, if you hear the cue 'no recall' report none of the material and just rest until the next list begins. Remember, you will be given one of these five cues only after you have heard all the material in any one list. Since you may hear any one of the five recall cues after each list (they'll come at random), you won't be able to guess ahead of time whether you will be asked for all, part, or none of the material. So do your best to remember all of the list items until you hear one of the cues. When reporting the individual animal and/or persons' names, you may recall in any order you wish as long as you maintain the groupings specified by the cues. You will have 40 seconds to give your response to each list. Are there any questions? ... O.K. Let's try a couple of example lists before we begin. In these practice lists, foods and cities are used instead of animals and persons' names, so you won't get confused later on as to what was practice and what wasn't.

After questions were answered, two practice trials were administered. Items were presented at a rate of one per 1.5 secs. There was a 5 sec. pause between the block of 6 animals and the block of

6 persons' names and a 5' sec. pause between the last person and the recall cue. Forty secs. were allowed for each recall test. The intertrial interval during which subjects were told to "stop trying and rest," was 10 secs. After questions regarding the practice trials were answered, appropriate instructions regarding the recall cues were administered to subjects in the Permanent, Temporary and Challenge conditions.

Permanent-forget instruction. Subjects in this condition were read the following instruction:

In a little while you will hear a series of lists like the ones you just practiced, except animals and persons' names will be substituted for foods and cities. Now, as we have already said, on 'animals only' and 'persons only' lists you only have to report part of the material and on 'no recall' lists, none of the material. For these types of lists I now want you to permanently erase the material that you do not have to recall from your memory. I am interested in the extent to which you can permanently erase material that you do not have to recall from your memory. You will be reminded to do this at the appropriate time.

For this condition, the following instructions represented each of the respective recall cues: P = persons only, erase animals per-

manently; A = animals only, erase persons permanently; PA = persons then animals; AP = animals then persons; and No Recall = erase persons and animals permanently.

Temporary-forget instruction. Subjects in this condition heard the following:

'In a little while you will hear a series of lists like the ones you just practiced, except animals and persons' names will be substituted for foods and cities. Now, as we have already said, on 'animals only' and 'persons' only' lists you only have to report part of the material and on 'no recall' lists, none of the material. For these types of lists, I now want you to erase the material that you do not have to recall from your memory until I tap your shoulder later on in the experiment and you hear me specifically say; 'Now you can remember everything.' No matter how hard you will try to remember the erased items you won't be able to recall them under any circumstance - whether trying to say them or write them down- until I give you permission by tapping you on the shoulder and saying 'Now you can remember everything.' I am interested in the extent to which material that you do not have to recall can be temporarily erased from your memory until such time as I tell you 'Now you can remember everything.' You will be reminded to do this at the appropriate time.

For this condition, the following instructions applied: P = persons only, erase animals until I tap you; A = animals only, erase persons until I tap you; PA = persons then animals; AP = animals then persons and No Recall = erase persons and animals until I tap you.

Challenge instruction. Subjects in the challenge condition were read the following:

In a little while you will hear a series of lists like the ones you just practiced, except animals and persons' names will be substituted for foods and cities. Now, as we have already said, on 'animals only' and 'persons' only' lists you only have to report part of the material and on 'no recall' lists, none of the material. For these types of lists, I now want you to erase the material that you do not have to recall from your memory until I tap your shoulder later on in the experiment and you hear me specifically say; 'Now you can remember everything'. No matter how hard you will try to remember the erased items you won't be able to recall them under any circumstance - whether trying to say them or write them down until I give you permission by tapping you on the shoulder and saying: 'Now you can remember everything'. In addition, on those lists where some or all of the material is to be temporarily erased, you will be asked to try to recall the erased material as a check on whether or not

it was erased. For example, after a particular list you may hear the following: 'Persons only. Erase animals until I tap you.' Say the persons and then, even though you won't be able to, just try to say the animals.' This instruction means that you are to erase the animals temporarily, say all the persons' names that you can recall, and then as a check on whether or not the animals were erased, you are to try to recall the animals. I am interested in the extent to which material that you do not have to recall can be temporarily erased from your memory until such time as you are told: 'Now you can remember everything.' You will be reminded to do this at the appropriate time.

For this condition the following instructions applied: P = persons only. Erase animals until I tap you. Say the persons and then, even though you won't be able to, just try to say the animals; A = animals only. Erase persons until I tap you. Say the animals and then, even though you won't be able to, just try to say the persons; PA = persons then animals; AP = animals then persons and No Recall = erase persons and animals until I tap you. Even though you won't be able to, just try to say the persons and animals.

After questions regarding these instructions were answered, tape recorded standard induction or TM instructions were administered

in the appropriate conditions. (See Appendices B and C respectively.)

At the conclusion of these procedures, a second tape recorder was turned on and 12 study-test trials followed. Verbal responses were recorded manually by the experimenter on prepared response sheets (Appendix F). After trial 12, the following instruction was played to subjects in all conditions:

Stop trying and listen. This completes the first part of the experiment. In the second part to follow, I will ask you to recall all of the material - animals and persons - from all the lists. Although I asked you to erase some of this material from your memory ('until I tap you' was added in the Temporary and Challenge conditions), I want you to now try to recall any material that you can remember including these items. You may recall the material in any order you wish and you will have 3 minutes to do this. (Subjects in the Induction condition were told to open their eyes at this point.) Ready ... begin.

Paper and a pen were provided while the last instruction was playing.

After 3 minutes, Temporary and Challenge subjects heard the following as the experimenter tapped their shoulders, removed the first response sheet and placed a clean sheet in front of them:

Stop writing please. Now listen carefully to my words: 'Now you can remember everything.' ' Once again I would like you to

recall any material that you can remember in any order you wish. This includes the items that you already wrote on the first sheet and any extras that you can now remember. You will have another 3 minutes to do this. Ready ... begin.

Alternatively, subjects in the Permanent condition heard:

Stop writing please. It is often said that two tries are better than one. Once again I would like ybu to recall Ready ... begin.

After this recall trial TM subjects were asked to complete the postexperimental questionnaire. They were then informed that the experiment was over, debriefed and reimbursed. Subjects in the Induction condition underwent a standard "waking" procedure (Appendix B) before completing the questionnaire, debriefing and reimbursement.

Results

The results will be presented in 6 parts: (1) only-effects, (2) final free recall, (3) nonrecall-during, (4) HGSMS amnesia vs. session-2, (5) postexperimental inquiry and (6) supplementary group.

Only-effects. For each of the 12 experimental cells two means were generated, one for the O-P (only-effect for persons) effect (where the first put-in material was designated TBF) and one for the O-A (only-effect for the animals) effect (where the second put-in material was designated TBF). These means were calculated as follows:

For O-P, the mean number of persons recalled across the two PA trials was subtracted from the mean number of persons recalled across the two P trials. Similarly, O-A was calculated as the difference between the mean number of animals recalled on A and AP trials. Table 3 provides the 24 means with their respective standard deviations, *Ns*, and *t*-ratios.

It was decided a priori that the only-effect means for each cell should be subjected to individual *t*-tests to determine whether or not each mean deviated significantly from zero. Previous research (Epstein, 1969, 1970) indicated that the only-effect was unreliable in cases where the block of items presented second in a list was designated TBF (i.e., O-A). Inspection of Table 3 reveals that 3 of the means for O-P (TBF = first put-in) deviated significantly from zero whereas none of the O-A (TBF = second put-in) means did. This finding is consistent with previous research. Accordingly, no further analyses were performed on O-A.

Analysis proceeded with a 2x2x3 (High/Low x Induction/TM x F-cue-Type; Permanent/Temporary/Challenge) Analysis of Variance (ANOVA) on the O-P means using Kirk's (1968) model for completely randomized factorial designs. The O-P means are displayed in Figure 1. The line running horizontally through the zero-point on the ordinate represents no effect of *F*-cuing. Points above this line reflect an

Table 3

24 Only-effect Means and T-ratios for O-P and O-A (n = 12)

Cell	O-P			O-A		
	<u>M</u>	<u>sd</u>	<u>t</u>	<u>M</u>	<u>sd</u>	<u>t</u>
High-Induction-Permanent	1.2	.89	4.7*	-.04	1.2	.12
High-Induction-Temporary	.25	.91	.94	.42	1.5	.99
High-Induction-Challenge	-1.2	.96	4.3*	.08	1.5	.19
High-TM-Permanent	.75	1.1	2.4*	0.0	.71	0.0
High-TM-Temporary	.12	.96	.45	-.17	1.01	.57
High-TM-Challenge	-.17	1.2	.47	.21	1.3	.54
Low-Induction-Permanent	0.0	1.1	0.0	.08	1.6	.18
Low-Induction-Temporary	.17	.89	.65	.63	1.5	1.4
Low-Induction-Challenge	-.17	1.01	.57	.21	1.3	.58
Low-TM-Permanent	.42	1.2	1.2	.08	1.1	.26
Low-TM-Temporary	-.04	1.1	.13	.17	1.3	.44
Low-TM-Challenge	-.12	.88	.49	.25	1.5	.58

Note. * = $p < .05$

Figure 1. Mean Only-effect for 12 Experimental Cells.

advantage to TBR recall owing to designation of some of the list material TBF (positive only-effect). Points below this line indicate a inhibitory effect of F-cuing on TBR material (negative only-effect). This analysis showed the main effect of Forget-cue-type and the interaction between Forget-cue-type and Susceptibility to be significant, $F(2,132) = 11.76, p < .001$ and $F(2,132) = 4.8$, $p < .008$, respectively. This interaction appears in Figure 2. Post hoc tests (Tukey, 1949) on these means (see Table 4) showed that High-Permanent subjects (i.e., High susceptibles who received instructions to forget permanently) showed a positive only-effect that differed significantly from the null effect shown by the High-Temporary group. By contrast, the High-Challenge group demonstrated a negative only-effect that also differed significantly from the High-Temporary group. No other differences were significant.

Although the 3-way interaction was only marginally significant, $F(2,132) = 2.53, p < .08$, analysis proceeded with the planned comparisons of the simple main effects. Pair-wise comparisons among all means (Table-3) indicated that the pattern of results described above was moderated by the Induction/TM factor. This interaction is depicted in Figure 1 and can be summarized as follows:

- (1) Highs in both Induction and TM conditions who were given the permanent F-cue showed positive only-effects;
- (2) all Temporary F-cue

Figure 2. Susceptibility X Forget-cue-type Interaction on Only-effect.

Table 4

Mean Only-effect for Susceptibility x Forget-cue-type Interaction

	Highs.		Lows	
	<u>M</u>	<u>sd</u>	<u>M</u>	<u>sd</u>
Permanent	.98	.99	.21 _b	1.1
Temporary	.19 _b	.92	.06 _b	.98
Challenge	-.69 _a	1.2	-.15 _{ab}	.93

Note. Means sharing the same subscript fail to differ significantly.

For all treatments, n = 24

groups scored at or about zero. Evidently, informing subjects that they would be responsible for the TBF material at the end of the experiment cancelled the facilitatory effect of the F-cue found in the Permanent condition; (3) the High-Induction-Challenge group was the only one to show a significant negative only effect and (4) all Low groups and High-TM subjects scored at or about zero. In short, Highs in the Induction condition evidenced significant differences in the size and direction of O-P under the three F-cue type levels. With Permanent instructions they showed a significant positive effect, with temporary instructions no significant effect and a significant negative effect when challenged. None of the other combinations of groups showed this pattern. In addition, the High-TM-Permanent group yielded a significant positive only-effect comparable to that shown by the High-Induction-Permanent group.

Final free recall. The total number of correct responses was counted on each of the two recall trials at the end of the experiment (i.e., R-1 and R-2) and then broken down by type of item (i.e., TBR and TBF). Thus, 4 recall scores were obtained for each subject:

TBF: R-1, TBR: R-1, TBF: R-2 and TBR: R-2. The group means were subjected to a $2 \times 2 \times 3 \times 2 \times 2$ split ANOVA containing the three original between-subject factors (Susceptibility $\times$ Induction/TM $\times$ Forget-cue-type) and two within-subject factors: (1) Item-type with two levels

(TBR vs. TBF) and (2) Trials with two levels (R-1 vs. R-2). Two of the 2-way interactions, Item-type x Trials and Forget-cue-type x Item-type were significant (Tables 5 and 6), $F(1,132) = 22.17$, $p < .006$ and $F(2,132) = 9.41$, $p < .001$, respectively. A third 2-way interaction, Susceptibility x Forget-cue-type (Table 7), was marginally significant, $F(2,132) = 2.79$, $p < .06$. These three interactions appear in Figures 3, 4 and 5.

Post hoc tests on the means in the Item-type x Trials interaction (see Figure 3) showed that significantly more TBR than TBF items were recalled on both free recall trials and that TBF performance increased from R-1 to R-2. This increase in TBF performance across trials reflected increases for all Forget-cue-type levels since the 3-way interaction (Forget-cue-type x Item-type x Trials) was not significant.

The 6 Forget-cue-type x Item-type interaction means in Figure 4 were analyzed for differences using Tukey's (1949) test. Pair-wise comparisons among means showed that subjects in the Permanent and Temporary conditions recalled significantly more TBR than TBF material (collapsed across the two recall trials). The striking finding from this analysis is that significantly fewer TBR items were recalled in both the Temporary and Challenge conditions than in the Permanent condition. Apparently, knowledge of cue-cancellation (i.e., that a TBF test would come at the end of the experiment) did

Table 5

Mean Final Recall for Item-type x Trials Interaction

	TBF		TBR	
	<u>M</u>	<u>sd</u>	<u>M</u>	<u>sd</u>
Recall - 1	8.9	4.0	11.8 _a	4.8
Recall - 2	9.6	4.2	11.7 _a	5.0

Note. Means sharing the same subscript fail to differ significantly.

N = 144

Table 6

Mean Final Recall for Forget-cue-type x Item-type Interaction

	TBF		TBR	
	<u>M</u>	<u>sd</u>	<u>M</u>	<u>sd</u>
Permanent	9.3 _a	4.0	13.9	4.8
Temporary	8.4 _a	3.5	10.9 _b	5.1
Challenge	9.98 _{ab}	4.5	10.4 _{ab}	4.0

Note. Means sharing the same subscript fail to differ significantly.

For all treatments, $n = 96$

Table 7

Mean Final Recall for Susceptibility x Forget-cue-type Interaction

	Highs		Lows	
	<u>M</u>	<u>sd</u>	<u>M</u>	<u>sd</u>
Permanent	15.2 _b	5.1	12.7 _b	4.7
Temporary	9.7 _{ac}	6.1	12.1 _{bc}	4.0
Challenge	9.8 _{ac}	4.3	10.6 _{bc}	3.6

Note. Means sharing the same subscript fail to differ significantly.

For all treatments, n = 24

Figure 3. Item-type X Trials Interaction on Final Free Recall.

Figure 4. Forget-cue-type X Item-type Interaction on Final Free Recall.

Figure 5. Susceptibility X Forget-cue-type Interaction on Final Free Recall.

not facilitate TBF recall. Rather, expectation of cancellation reduced recall of TBR material.

Figure 5 displays the Susceptibility by Forget-cue-type interaction, and the relevant means are shown in Table 7. Post hoc tests indicated that Lows recalled the same total number of (TBR + TBF) items across the two recall trials. On the other hand, Temporary-Highs and Challenge-Highs recalled significantly fewer items than Permanent-Highs. None of the other differences between high and low susceptibles attained significance.

In summary, these analyses indicate that (a) the nature of the F-cue effected the total amount of material retained for final recall in high susceptible subjects. However, type of F-cue failed to affect final recall in low susceptibles; (b) Relative to Permanent instructions, Temporary and Challenge instructions inhibited the accessibility of TBR material. To-be-forgotten materials were unaffected by the different forget instructions; and (c) although TBF performance increased from R-1 to R-2, this increase was not a function of F-cue cancellation.

Nonrecall during amnesia suggestion. The challenge condition was designed to simulate the prototypal suggested amnesia paradigm. For this reason the data for the 48 subjects assigned to this condition were analyzed for effects considered germane to the

phenomenon of suggested amnesia. Usually the effects of amnesia suggestions are measured in terms of TBF nonrecall, often without appropriate TBR control material or measures of reversibility (see pp. 2-8). In the present study both controls were used. The extent of nonrecall during the list presentation phase of the experiment (NRD) was defined as the difference between the total number of TBR items recalled and the total number of TBF items recalled (verbalized) when challenged. Because there were 72 TBR and 72 TBF items the potential NRD range was -72 to +72. (Two Lows actually recalled more TBF than TBR material, obtaining negative NRD scores of -4 and -3.)

For these 48 subjects the mean number of TBF items recalled ($\bar{M}$ = 15.6) was about half the mean number of TBR items recalled ($\bar{M}$ = 31.1). Mean NRD was 15.5 (SD = 10.2). A 2x2 (High/Low x Induction/TM) ANOVA was performed on these data. The data appearing in Table 8 and Figure 6 revealed a significant Susceptibility main effect, $F(1,144) = 6.13, p < .017$: Highs yielded significantly more NRD than Lows ($\bar{M}$ = 19.0 and 11.92, respectively), a finding that is consistent with most of the suggested amnesia literature. There was no main effect of Induction/TM and no interaction between this factor and Susceptibility.

A subsequent analysis (prompted by a nonsignificant correlation

Table 8

Mean Nonrecall-during for High/Low x Induction/TM ANOVA

	Highs		Lows	
	<u>M</u>	<u>sd</u>	<u>M</u>	<u>sd</u>
Induction	19.2	7.8	11.2	11.3
Task Motivation	18.8	10.1	12.7	10.1
<hr/>				
Marginals	19.0	8.8	11.9	10.5

Note. For High/Low main effect, n = 72.

Figure 6. Susceptibility vs. Induction/Task-motivation NRD Means.

of $-.19$ between O-P and NRD in the expected direction) was carried out, to determine whether there was a relationship between NRD and the negative only-effect. Two groups were formed, based on subjects' NRD scores. Extreme Nonrecallers were identified as subjects having scored at least one standard deviation higher than the NRD mean (i.e., $\text{NRD} \geq 26$). Extreme Recallers were subjects whose NRD scores had been at least one standard deviation below the NRD mean (i.e., $\text{NRD} \leq 6$). Eight Extreme Nonrecallers (6 Highs and 2 Lows) and 8 Extreme Recallers (7 Lows and 1 High) were identified and their mean O-P scores compared. Extreme Nonrecallers obtained a mean O-P of -1.31 ($\text{SD} = 1.03$) compared to a mean of $.06$ ($\text{SD} = 1.21$) for Extreme Recallers. These means differ significantly ($t = 2.06$, $df = 15$, $p < .05$).

Additionally, it was of considerable interest to observe the relationship between NRD and recovery of TBF material either at R-1 or R-2. Table 9 displays both the extent of nonrecall and the absolute number of TBF items recalled by Extreme Recallers and Extreme Nonrecallers at three points in the experiment: (1) during the challenge periods following the list presentations (i.e., NRD and TBF-D), (2) during the first free recall trial (i.e., NR: R-1 and TBF: R-1) and (3) during the second free recall trial following the C-cue (i.e., NR: R-2 and TBF: R-2). Although none of the Extreme Recallers recalled more TBF material at R-1 than during list pre-

Table 9

Mean TBF and Nonrecall for Extreme Nonrecallers and Extreme
Recallers During List Presentations, R-1 and R-2

	Extreme Nonrecallers		Extreme Recallers	
	<u>M</u>	<u>sd</u>	<u>M</u>	<u>sd</u>
TBF:D	1.9	1.7	28.2	4.5
TBF:R-1	8.4	1.8	13.1	3.7
TBF:R-2	10.5	3.7	14.0	4.8
NRD	32.2	3.2	3.4	4.5
NR:R-1	3.0	3.8	-2.4	4.5
NR:R-2	-1.0	2.9	-3.4	5.5

Key. TBF = recall of TBF material, NR = extent of nonrecall (TBR-TBF),
D = during list presentations, R-1 = first final recall trial and
R-2 = final recall after cancellation.

sentations, each of the Extreme Nonrecallers recovered between 4 and 10 TBF items that had not been verbalized during the earlier challenge periods. Inspection of Table 9 indicates that mean recovery for the Extreme Nonrecallers at R-1 was 6.5 items. (Seemingly, these individuals interpreted the amnesia suggestion to have been cancelled at R-1 since most of the recovery occurred at this point in the experiment. This will be discussed further below.)

One experimental prediction was that compared to Extreme Recallers, Extreme Nonrecallers would maintain inferior TBF recall at R-1 but recover some of these items after cancellation, at R-2. To determine whether the C-cue differentially affected performance for these two groups, two 2x2 (Extreme Recall/Nonrecall x Trials) ANOVAS were performed, using TBF recall and Extent of Nonrecall as the dependent variables, respectively. The means for these analyses are depicted in Figures 7a and 7b.

The first analysis using TBF recall as the dependent variable, showed a significant main effect for Extreme Recall/Nonrecall, $F(1,14) = 6.33, p < .02$. The Trials main effect approached significance, $F(1,14) = 3.32, p < .08$. However, the interaction effect was not significant.

A similar but not identical pattern of results was observed using Nonrecall as the dependent variable. The main effect for

Figure 7a. TBF Final Recall for Extreme Nonrecallers/Recallers.

Figure 7b. Nonrecall on Final Free Recall for Extreme Nonrecallers/Recallers.

Extreme Recall/Nonrecall approached significance, $F(1,14) = 3.7$, $p < .07$ and the Trials main effect attained significance, $F(1,14) = 11.11$, $p < .005$. However, unlike the finding for TBF recall, the Nonrecall interaction effect was marginally significant, $F(1,14) = 4.0$, $p < .06$.

These results can be summarized as follows: (a) Extreme Recallers recalled more TBF material and evidenced less nonrecall than Extreme Nonrecallers, (b) TBF recall tended to increase from R-1 to R-2 for both groups and (c) a tendency existed for Extreme Non-Recallers to show more of a decrease in nonrecall after cancellation than Extreme Recallers.

HGSHS amnesia vs. session-2. To establish the relationship between performance on the HGSHS amnesia suggestion and performance on various indices of nonrecall in session-2, the following analyses were carried out.

First, the 48 Challenge subjects were coded nominally and numerically on the basis of their HGSHS amnesia performance. Recallers, assigned a score of zero, were individuals who failed the amnesia suggestion by the conventional HGSHS criterion (i.e., recalled more than 3 items during the suggestion period); Nonrecallers, assigned a score of 1, were identified as having passed the HGSHS amnesia suggestion by conventional standards (i.e., recalled 3 or

fewer items during the suggestion period). Finally, Amnesics were individuals who had recalled 3 or fewer items during the suggestion and recovered at least two additional items after cancellation.

These individuals were assigned a score of 2. This scheme yielded 31 Recallers, 8 Nonrecallers and 8 Amnesics. The aim of this analysis was to compare these groups on session-2 performance using the following dependent variables: O-P, NRD and Nonrecall at R-1 (NR: R-1).

Because of the large discrepancy in the number of subjects falling into the Recaller and the other two categories, a subset of observations was selected from the former group to match the size of the other two groups. Consequently, 8 Recallers were randomly drawn

from the larger group of 31. T-tests showed that O-P, NRD and NR: R-1 means for the 8-person sample failed to differ from the corresponding means for the entire Recaller group ($M_s = -.38, 11.38, -.38$ and $-.34, 14.16, .81$, respectively). Next, a one-way Multivariate Analysis of Variance (MANOVA) was carried out, comparing the HGSHS Recallers, Nonrecallers and Amnesics on O-P, NRD and NR: R-1.

The means for this analysis appear in Table 10. Although most of the means were in the expected direction (with the exception that Nonrecallers had a higher only-effect mean than Recallers), the overall test of the greatest characteristic root only approached significance, $F(6,38) = 1.96, p < .096, R^2 = .37$.

Table 10

Mean O-P, NRD and NR:R-1 for HGSHS Recallers, Nonrecallers
and Amnesics

	Recallers		Nonrecallers		Amnesics	
	<u>M</u>	<u>sd</u>	<u>M</u>	<u>sd</u>	<u>M</u>	<u>sd</u>
O-P	-.38	1.2	0.0	1.1	-1.2	1.5
NRD	11.4	13.7	15.4	11.8	22.6	7.3
NR:R-1	-.38	4.3	.75	5.5	3.8	2.3

Note. For all treatments, n = 8

Key. O-P = only-effect, NRD = nonrecall during list presentations and
NR:R-1 = nonrecall at R-1.

In a further exploration of these data a multiple regression analysis was performed to determine the amount of variance in the HGSHS amnesia scores explained by the following session-2 variables:

$X_1 = \text{NRD}$, $X_2 = \text{NR: R-1}$, $X_3 = \text{O-P}$, $X_4 = X_1 \cdot X_2$, $X_5 = X_1 \cdot X_3$, $X_6 = X_2 \cdot X_3$ and $X_7 = X_1 \cdot X_2 \cdot X_3$. Table 11 presents the regression coefficients,

T-statistic for the coefficients and beta-weights for each variable.

The only regression coefficient to differ significantly from zero

was associated with X_5 , which was the interaction between NRD and

O-P ($t = -3.7$, $p < .05$). The effect due to regression was significant,

$F(7,40) = 13.4$, $p < .001$, with $R^2 = .70$.

Postexperimental inquiry. (1) Response withholding. Subjects checked off the appropriate categorical response to a question concerning response withholding. For Challenge subjects this item was given twice — once pertaining to response withholding during interlist challenge periods, and once pertaining to withholding during R-1. Subjects in the remaining Forget-cue-type conditions were asked this question in relation to R-1 only. Three responses were available for this question. Subjects could rate themselves as (1) Nonsuppressors (i.e., "I said all the material I remembered and I was actually unable to remember the material that I did not say"), (2) Voluntary Suppressors (i.e., "I was able to remember some material that I chose not to say") or (3) Involuntary Suppressors

Table 11

Coefficients, T-statistics and Beta-weights for Regression
of HGSHS Amnesia Scores on Seven Session-2 Variables

Variable	Regression Coefficient	T-statistic	Beta-weight
NRD (1)	-.03	-1.2	-.14
NR:R-1 (2)	.05	.53	.11
O-P (3)	.46	1.4	.22
1 x 2	.008	1.3	.30
1 x 3	-.07	-3.7*	-.73
2 x 3	.11	1.3	.36
1 x 2 x 3	.01	1.8	.57

Note. * = regression coefficient differs significantly from zero.

Variance accounted for (R^2) = .70

Key. NRD = nonrecall during list presentations, NR:R-1 = non-recall
at R-1 and O-P = only-effect

(i.e., "I was able to remember some material that I was unable to say"). For challenge periods during list presentations, the proportions of subjects (in the Challenge condition) falling into each of the above categories was calculated and entered into Table 12a. It can be seen that over three-quarters (77%) of these subjects rated themselves as Nonsuppressors. The remaining 23% admitted to either "voluntary" or "involuntary" suppression. When these 48 subjects were broken down by Extreme Nonrecallers and Extreme Recallers (see p. 70), the majority of Extreme Recallers (55%) reported either type of suppression (Table 12b). However, only 22% of these subjects were "voluntary" suppressors. Only 25% of the Extreme Recallers fell into one of these two categories. These figures are generally in line with other estimates of the extent of (admitted) verbal inhibition (Spanos & Bodorik, 1977; Spanos et al., in press).

Next, the verbal inhibition question pertaining to R-1 was analyzed for all 144 subjects. Table 13 shows that 85% of the subjects reported nonsuppression at R-1 whereas only 2% reported "voluntary" suppression. Because the later number was small, "voluntary" and "involuntary" suppressors were pooled for the following analysis. Table 14 presents the proportion of the total number of admitted suppressors ($n = 21$) falling into each experimental cell. The marginal proportions indicated that the greatest amount of

Table 12a

Proportion of Challenge Subjects in each Response Withholding
Category Pertaining to Interlist Challenge Periods

Nonsuppressors	Involuntary suppressors	Voluntary Suppressors
.77	.15	.08

Note. Total $N = 48$

Table 12b

Proportion of Extreme Nonrecallers/Extreme Recallers in each
Response Withholding Category Pertaining to Interlist Challenge Periods

	Extreme Nonrecallers	Extreme Recallers
Nonsuppressors	.45	.75
Involuntary suppressors	.33	.13
Voluntary suppressors	.22	.12
	<hr/> n = 8	<hr/> n = 8

Table 13

Proportion of Subjects in each Response Withholding Category

Pertaining to R - 1

Nonsuppressors	.85
Involuntary Suppressors	.13
Voluntary Suppressors	.02

Note. Total N = 144

Table 14

Proportion of Admitted Suppressors in each Experimental Cell

	Induction		Task Motivational	
	Highs	Lows	Highs	Lows
Permanent	.05	0	.14	.05
Temporary	.14	0	.10	.05
Change	.14	.10	.14	.10

Note. Total N = 21

admitted suppression (48%) was obtained in the Challenge condition - about as much as the other two Forget-cue-type conditions combined (53%). It is also noteworthy that 71% of the admitted suppressors were Highs. Nonetheless, the total amount of suppression reported at R-1 was relatively low (15%). About equal proportions came from Induction and TM conditions (43% and 57%, respectively).

(2) Anticipation of TBF test. Subjects in the Permanent condition were presented with the following question and asked to respond YES or NO: "When you were asked to permanently 'erase' some of the material from your memory, did you believe that you would later be tested on this material? Please be honest when checking one of the following:" Because 29% of the subjects in this condition reported that they anticipated TBF testing later in the experiment, it was decided to compare Anticipators and Nonanticipators for differences on (1) O-P, (2) TBF: R-1 and (3) TBF: R-2. These data appear in Table 15. No differences were found for any of these variables. This finding is important with respect to testing the hypothesis that subjects in the Temporary and Challenge conditions, having been informed of the final recall test, simply increased TBF rehearsal time. I suggested earlier that the decrease in TBF performance across Forget-cue-type levels (see Figure 4) was not due to TBF rehearsal during interlist recall periods, because on this hypothesis superior TBF performance should

Table 15

Mean O-P, TBF:R-1 and TBF:R-2 for Anticipators and Nonanticipators

	Anticipators		Nonanticipators	
	<u>M</u>	<u>sd</u>	<u>M</u>	<u>sd</u>
O-P	.21	.94	.75	1.2
TBF:R-1	8.0	2.9	9.2	4.2
TBF:R-2	9.1	3.2	10.1	4.5

Note. For Anticipators $n = 14$, for Nonanticipators $n = 34$

have been observed in the two "informed" (Temporary and Challenge) conditions compared to the "uninformed" (Permanent) condition.

However, such a comparison is only meaningful if subjects in the Permanent condition followed instructions and did not rehearse in anticipation of later TBF testing. The finding reported above, that TBF recall for Anticipators and Nonanticipators did not differ, suggests that TBF performance in the Permanent condition reflects minimal TBF rehearsal.

(3) Self-rated hypnotic depth. Subjects in the Induction condition were asked to indicate on a Likert-type scale, the degree to which they felt hypnotized during list administration and recall. Scores of zero, 1, 2 or 3 were assigned respectively to the following responses: a) not at all hypnotized (b) slightly hypnotized (c) moderately hypnotized and (d) deeply hypnotized. The mean depth reported was 1.2 (SD = .74). As seen in Table 16, this variable was intercorrelated with 7 other variables: O-P, TBF: R-1, TBF: R-2, NR: R-1, NR: R-2, TBR-D and recoded status on the HGSMS amnesia item (AMN: HGS). The only variable that self-rated depth predicted was status on the HGSMS amnesia item ($r = .27, p < .05$). Subjects who reported feeling more deeply hypnotized (during session-2) tended to successfully perform the HGSMS amnesia suggestion (in terms of both nonrecall and recovery).

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Table 16

Correlation Matrix for Induction Subjects on Self-rated Depth,

O-P, TBF: R-1, TBF: R-2, NR: R-1, NR: R-2 and AMN: HGS

	1	2	3	4	5	6	7	8
Depth	1.0							
O-P	-.04	1.0						
TBF:R-1	-.19	.02	1.0					
TBF:R-2	-.15	-.05	.81*	1.0				
NR:R-1	-.09	.02	-.51*	-.26*	1.0			
NR:R-2	-.07	.15	-.42*	-.49*	.74*	1.0		
TBR-D	-.06	.13	.26*	.39*	.21	.16	1.0	
AMN:HGS	.27*	-.01	-.18	-.30	-.01	-.03	-.17	1.0

Note. $p < .05$

Key. Depth = self-rated hypnotic depth, TBR-D = TBR recall during list presentations. See Table 9 or text for other symbols.

Supplementary group. After completing the main study described above, a potential confound was identified. The cues delivered subsequent to each of the 12 list presentations reiterated in abbreviated form the detailed instructions administered at the beginning of the experiment. These cues (i.e., P, A, PA, AP and No Recall) were presented between list administration and the 40 second recall period on each trial. It happened that the number of words contained in these reminder cues was not constant across the 3 levels of the Forget-cue-type factor. For example, on P trials, Permanent subjects heard: "Persons only, erase animals permanently;" Temporary subjects heard: "Persons only, erase animals until I tap you;" however, Challenge subjects heard: "Persons only, erase animals until I tap you. Say the persons and then, even though you won't be able to, just try to say the animals." Conceivably, the longer instruction in the Challenge condition (presented between input and recall) could have interfered with retention of TBR material on only-trials (i.e., P and A trials) producing the negative only effect.

To test this possibility, a supplementary group of 12 subjects was run under conditions identical to those associated with the cell that yielded the negative only-effect (High-Induction) with the exception that the interlist cue was shortened to match the cue length found in the Permanent and Temporary conditions. An example

of the modified only-trial cue is: "Persons - then try animals; you can't." The mean O-P for these subjects (-0.75 , $SD = 1.27$) did not differ from the mean of the original High-Induction group (-1.21 , $SD = .97$). Furthermore, to demonstrate that the original and supplementary High-Induction-Challenge groups performed similarly, two additional one-way ANOVAs were carried out. The first compared the High-Induction-Permanent vs. High-Induction-Temporary vs. High-Induction-Challenge (original) groups. The second ANOVA substituted the supplementary group for the original High-Induction-Challenge group. Significant overall F s resulted for both analyses, $F(2,33) = 20.79$, $p < .001$ and $F(2,33) = 10.63$, $p < .001$, respectively. Post hoc tests showed that all three groups differed from each other in both analyses.

Discussion

A positive only-effect occurs when instructions to forget part of a recently acquired input facilitate recall for the remaining input. This effect is observed when subjects are told that the TBF material will not be subsequently tested, and it has been explained in terms of two processes; the functional segregation of search sets and the selective rehearsal of TBR material. The present investigation demonstrated that suggested amnesia cannot be accounted for in terms of these processes.

The Temporary and Challenge conditions in the present study incorporated features that define suggested amnesia. The former condition contained one such feature (temporary forgetting) and the latter contained two features (temporary forgetting and a challenge to verbalize the TBF material). High susceptible subjects instructed to forget permanently demonstrated the positive only-effect. However the effect disappeared under both the Temporary forgetting and the Challenge conditions. The failure to observe a positive only-effect under these two conditions runs contrary to the functional segregation or dissociation hypotheses of suggested amnesia.

Recently, Hilgard (1977) presented a "neodissociation" interpretation of certain hypnotic phenomena, including amnesia. He argued that dissociation can occur to any degree and does not have to operate in an all-or-none fashion. However, the present paradigm provided the opportunity for subjects in the Temporary and Challenge conditions to show "partial dissociation." Given that a positive only-effect reflects the noninterference of TBF and TBR material, some advantage to TBR recall (on only trials) would have been expected even if dissociation had been incomplete. Because Temporary and Challenge groups showed either no TBR facilitation or TBR inhibition (i.e., negative only-effect) a partial dissociation interpretation also fails to adequately account for suggested amnesia.

Because the positive only-effect had always been investigated in extrahypnotic contexts it was surprising to find that Hypnotic Susceptibility moderated positive only-effect performance. Highs but not Lows showed the effect. Perhaps this finding is related to differences in the cognitive skills that individuals bring to the experimental situation. Other lines of research have shown that Susceptibility is related to various attentional skills (Graham & Evans, 1977; Spanos, Rivers and Gottlieb, 1978). If the inference is drawn that the functional segregation of stored material requires some internal manipulation (perhaps a tagging process), a plausible substrate for High-Low differences emerges. That is, Highs may outperform Lows either because they possess a greater ability to manipulate memorial items or because they are more willing to use this ability in an experimental setting.

The negative only-effect that appeared in the High-Induction-Challenge condition is a new finding and is consistent with the inattention hypothesis of suggested amnesia.

In the present study attention may have been directed from the recall task in several ways. Both Temporary and Challenge subjects received an ambiguous instruction to forget some material but also to retain it for later recall. (This ambiguity is present in most amnesia suggestions.) Attention directed at resolving this ambiguity

may have served as a distraction from both TBF and TBR rehearsal. Attenuated TBR rehearsal and elaboration (in relation to control lists) would account for the absence of a positive only-effect in the Temporary condition. However, in the Challenge conditions the subjects' task was compounded. Presentation of a challenge may have made the ambiguous "forget but retain" instruction more salient because subjects were now required to make an overt response. This would inhibit TBR recall to an even greater extent, producing a negative only-effect.

In other words, the negative only-effect may have been produced by two factors, one related to the problem of deciding what to do, with the TBF items and one related to the challenge itself. In order to carry out the instructions given to them, challenged subjects were required to resolve a dilemma. They either had to fail to verbalize words that they were thinking about (and become fakers) or find something else to occupy their attention for the entire recall period.

(The last point is italicized because the challenge affected TBR recall which preceded the challenge period.) On the other hand, the issue of faking would not be as salient for unchallenged subjects (in the Temporary condition) and the "dilemma" may not have even presented itself. This could account for the null rather than negative only-effect in the Temporary condition.

The fact that Task-motivated subjects failed to show a negative only-effect is consistent with recent findings indicating that these subjects show significantly less amnesia than hypnotic subjects (Spanos & Bodorik, 1977, Spanos et al., in press). Spanos et al., (Note 5) suggested that hypnotic and task-motivated subjects interpret the "remember challenge" of amnesia suggestions differently. Hypnotic subjects tend to interpret the challenge as a request to continue disattending to the recall task while task-motivated subjects interpret it as a request to attend to the recall task. When applied to the present study, this formulation suggests that high susceptible hypnotic subjects were disattending from both the TBF and TBR material to a greater extent than corresponding TM subjects, and therefore showed a negative only-effect.

Although inattention may have produced the negative only-effect by attenuating TBR rehearsal, it must also be determined whether inattention plausibly accounts for TBF nonrecall during challenge periods. If the challenge redirected attention from both TBR and TBF processing (as I have been arguing), nonrecall should be related to lower only-scores. The data support this idea. Individuals who showed large amounts of nonrecall during challenge periods obtained lower only-scores than full-recall subjects (i.e., subjects who responded to the challenge by verbalizing most of the TBF material).

Insofar as TBR recall was solicited prior to the challenge period, knowledge of an impending challenge seems to be tied to the negative only-effect. Thus the effect of the challenge was diffuse, affecting TBR and TBF recall. This conclusion is supported by the final free recall data.

On final free recall Temporary and Challenge subjects recalled fewer TBR items than Permanent forgetters. This result would be expected if the former groups had attenuated TBR rehearsal on only-trials. Alternatively, if the Temporary and Challenge subjects were simply complying with the experimental demand to retain the TBF material for final recall, they would have increased TBF rehearsal-time throughout the experiment. On this formulation TBF final recall should have been superior for the subjects informed of final recall compared to those who were not (i.e., Permanent condition). However, TBF final recall did not differ among these three conditions. This pattern of results - superior TBR recall in the Permanent than Temporary and Challenge conditions and no difference across conditions on TBF recall - implies that subjects directed to forget temporarily do not engage in more TBF rehearsal than those directed to forget permanently. Surprisingly, they engage in less TBR rehearsal. This suggests that other (internal?) events are attended to.

The Challenge group differed from the Permanent and Temporary

groups in a way that bolsters the notion that the challenge served to motivate subjects to disattend to the entire recall task. On final free recall Permanent and Temporary groups both recalled a greater number of TBR than TBF items, whereas Challenge subjects recalled an equal number of these items. Moreover, neither TBR nor TBF final recall for Challenge subjects exceeded TBF recall for Permanent forgetters. It follows that Challenge subjects spent little time rehearsing and elaborating any of the presented materials.

Now this argument assumes that TBF final recall performance in the case of Permanent forgetters reflected subjects' belief that they would not be tested on this material. This assumption was tested by comparing subjects who testified postexperimentally that they anticipated the final free recall test of the TBF items with those who did not anticipate such a test. The analysis showed that Anticipators recalled the same number of TBF items as Nonanticipators. Although Anticipators guessed that there would be a subsequent test they apparently followed the instruction to forget "permanently."

A final point with respect to the final recall data warrants attention. We have seen that the pattern of results obtained for the only-effect was moderated by Hypnotic Susceptibility. Highs demonstrated a positive effect when forgetting was defined as "permanent" and a negative effect in the Challenge condition. Lows, on the other

hand, showed no effects. A similar pattern carried over to final recall in these respective cells. Whereas Lows showed no variation across Forget-cue-type conditions, Highs in the Temporary and Challenge conditions recalled fewer items than Highs in the Permanent condition. According to the inattention hypothesis, the Temporary and Challenge instructions served to direct attention away from TBF and TBR elaboration which would result in inferior retention on final recall. This seems to be exactly what happened.

As stated earlier, the Challenge condition in session-2 was designed to parallel the paradigm used to test amnesia on the HGSHS. For this reason it was important to examine the relationship between session-2 nonrecall and recovery performance and HGSHS amnesia performance.

To begin with, Highs evidenced substantial amounts of nonrecall during challenge periods compared to Lows, which is a typical finding throughout the literature. Moreover, all Extreme Nonrecallers recovered at least some of the TBF material at R-1. If a lax "recovery" criterion is adopted, these subjects could be classified "amnesic".²

Nonetheless, the experiment was intended to have subjects maintain the amnesia suggestion until cancellation after R-1. When I compared Extreme Nonrecallers with Extreme Recallers on the degree to which TBF material was recovered at R-2, no additional recovery

was apparent. Subjects may have assumed at R-1 that they were to try to recover all previously presented material and that the amnesia suggestion was no longer in effect. This may have occurred because about 20 minutes had elapsed from the time they were given the original detailed instruction to remain amnesic until after the shoulder tap. Perry (1977) presented similar data showing that for uncanceled analgesia suggestions, the majority of subjects canceled spontaneously unless the experimenter made it clear that the effect was to persist as long as he requested it. Future studies using the present paradigm should emphasize the instruction that the amnesia suggestion is still in effect at R-1.

As a further test of the possibility that the C-cue had an indirect effect at R-2, the degree of nonrecall (i.e., the difference between TBR and TBF recall) was compared across R-1 and R-2. After cancellation, subjects may have tried to increase TBF recall relative to TBR recall because of the three minute time constraint. The data were consistent with this idea. Extreme Nonrecallers showed less nonrecall at R-2 than R-1. (Extreme Recallers did not vary across trials.) Thus a possible "recovery" strategy for subjects who tried to follow the cancellation instruction was to access fewer TBR-tagged items and spend more time trying to access TBF-tagged items. That they were unsuccessful on the latter task points to the likelihood

that maximal recovery had already occurred at R-1.

Finally, a regression analysis indicated that session-2 performance explained 70% of the variance in the HGSHS amnesia scores. The session-2 variables used in this analysis included only-effect scores, nonrecall scores (during list presentations and at R-1) and the interactions among these variables. The variable that received the largest weighting was the interaction between O-P and Nonrecall-during. (Separately, neither measure contributed significantly to the regression equation.) This indicated that both nonrecall (TBF inhibition) and low only scores (TBR inhibition) combined to predict successful HGSHS performance. This agrees with the arguments presented above that the challenge served to direct attention from TBF and TBR processing.

Conclusions. The directed forgetting and suggested amnesia paradigms produce divergent phenomena. Directed forgetting can be viewed as a straightforward task requiring retention of only part of the input, resulting in recall facilitation for the retained (TBR) material. This has been explained in terms of the functional segregation of TBR and TBF sets and differential TBR rehearsal.

In suggested amnesia all of the material is to be retained although part of it is to be temporarily kept out of awareness. The task of keeping cognitive events out of awareness (Knox, Crutchfield

& Hilgard, 1975; Stevenson, 1972, 1976) can be viewed as an ancillary event which reduces overall processing capacity.

Dissociation theory predicts the functional independence of "amnesic" materials which should not inhibit performance of other cognitive tasks. This prediction was not realized. For the (amnesia) task in the present investigation additional "processing capacity" or "cognitive effort" was required to prevent cognitive events from entering awareness.

A more appropriate description of this process may involve the notion of selective inattention. When presented with the task of becoming temporarily amnesic for particular memories, subjects may choose to attend to other events. Attention may be refocussed on events that constitute "appropriate" distraction such as "watching for the psychological and physiological changes associated with hypnosis." Attending to these events would allow a few motivated subjects to experience "genuine amnesia" without defining their behavior "faking."

Footnote

1. In 1959 the Stanford Hypnotic Susceptibility Scales (SHSS, Forms A, B and C) were developed (Weitzenhoffer & Hilgard, 1959, 1962).
Procedurally, subjects are individually administered a standard induction, suggesting relaxation, sleepiness, etc., followed by 12 suggestions requiring a behavioral response. Standardized scoring procedures are used to assign a score ranging between zero and 12. Test-retest reliabilities over a period of several days are satisfactory (Pearson r 's range between .83 and .90) using different hypnotists and alternate test forms (Hilgard, 1965a). A longitudinal study over an 8 to 12 year retest interval yielded correlation coefficients ranging between .57 and .62 ($N=85$), suggesting that responsivity to hypnotic suggestion as measured by these scales is a relatively enduring subject characteristic (Morgan, Johnson & Hilgard, 1974).
The Harvard Group Scale of Hypnotic Susceptibility (HGSHS) is a respondent-scored modified version of the SHSS: A, used for testing groups of subjects (Shor & E.C. Orne, 1962). Studies have shown that distributions for the HGSHS are similar to individually administered scales (Bentler & Hilgard, 1963; Bentler & Roberts, 1963; Coe, 1964; Shor & Orne, 1963) and that self-scoring correlates satisfactorily with observer-scoring (Pearson r 's range between .8 and .9) (Bentler

& Hilgard, 1963; Shor & E.C. Orne, 1963).

Another commonly used scale is the Barber Suggestibility Scale (BSS).

Barber, (1965, 1969) designed it to be used with or without an induction procedure. A direct comparison between the BSS and the SHSS under each condition yielded correlation coefficients ranging between .62 and .78 (Ruch, Morgan & Hilgard, 1974). In addition, the BSS, unlike the other scales, assesses subjective as well as objective response to suggestion. Reliability studies have yielded test-retest coefficients ranging between .75 and .88 for objective and subjective scores (Barber, 1969).

2. Spanos et al. (in press) suggested a mechanism that may allow subjects to recover "forgotten" material. The notion, derived from the "normal" memory literature, was first described by Tulving and Thomson (1973). The stimulus-encoding-specificity hypothesis holds that during acquisition, verbal materials become associated with the context in which they are presented. These contextual cues, if reinstated at the time of retrieval, partly determine recall efficiency. In the present study, one of the salient cues available during initial encoding was TBR-TBF category membership. Subjects who redirected attention during challenge periods avoided exposure to these and other retrieval cues. Nonrecallers' "spontaneous" recovery at R-1 could reflect motivated retrieval-cue reinstatement.

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Appendix A.

72 Animal Names and 72 Persons' Names used in Experiment.

alligator	locust	Adele	Jerome
anaconda	loon	Adrian	Jessie
ant	mackerel	Agnes	Joanne
ape	magpie	Allan	Joseph
beaver	mink	Andrea	Judy
bee	monkey	Barry	Julia
boar	moth	Beth	Karl
buffalo	mouse	Betty	Lawrence
bull	mule	Brian	Leon
butterfly	newt	Bruce	Leslie
calf	ox	Carole	Lillian
camel	oyster	Carmen	Lionel
canary	pig	Clara	Lisa
caribou	pigeon	Clarence	Lorraine
cheetah	pony	Clifford	Louise
clam	porpoise	Desmond	Lynn
cobra	python	Donna	Monica
coyote	rabbit	Doris	Marion
cricket	rat	Duncan	Martha
crow	reindeer	Edith	Maureen
deer	rooster	Edmund	Maurice
dolphin	salmon	Elliott	Murray
donkey	shark	Ethel	Nancy
duck	snail	Floyd	Naomi
eagle	spider	Gary	Nathan
eel	stag	Gerry	Neil
elephant	swine	Glenda	Norma
elk	tiger	Gloria	Patricia
fox	toad	Gracie	Rodney
giselle	trout	Gregory	Ronald
hawk	turkey	Helene	Sara
jaguar	walrus	Hilary	Sean
kitten	wasp	Irene	Simon
lamb	wolf	Ivan	Sharon
lion	woodpecker	Janet	Sophia
lobster	zebra	Jenny	Terry

Appendix B

Hypnotic Induction Procedure

Close your eyes. Your ability to be hypnotized depends entirely on your willingness to cooperate. It has nothing to do with your intelligence. As for your will power - if you want to, you can pay no attention to me and remain awake all the time. In that case, you might make me seem silly, but you are only wasting time. On the other hand, if you pay close attention to what I say, and follow what I tell you, you can easily learn to fall into a hypnotic sleep. In that case you will be helping this experiment and not wasting any time. Hypnosis is nothing fearful or mysterious. It is merely a state of strong interest in some particular thing. In a sense you are hypnotized whenever you see a good show and forget you are part of the audience, but instead feel part of the story. Your cooperation, your interest, is what I ask for. Your ability to be hypnotized is a measure of your willingness to cooperate. Nothing will be done that will in any way cause you the least embarrassment.

Now relax and make yourself entirely comfortable.

Relax completely. Relax the muscles in your arms. Make yourself perfectly comfortable. Let yourself be limp. Relax more and more, more and more. Relax completely. Relax completely. Relax completely.

Your legs feel heavy and limp. Your arms are heavy, heavy as lead. Your whole body feels heavy, heavier, and heavier. You feel tired and sleepy, tired and sleepy. You feel drowsy and sleepy, drowsy and sleepy. Your breathing is slow and regular, slow and regular.

You feel pleasantly drowsy and sleepy as you continue to listen to my voice. Just keep your thoughts on what I am saying. You are going to get much more drowsy and sleepy. Soon you will be deep asleep but you will have no trouble hearing me. You will not wake up until I tell you to. Remember that the dangers of hypnosis are a myth. Nothing will be done that is in any way harmful to you. I shall now begin to count. At each count you will feel yourself going down, down, down, into a deep, comfortable, a deep restful sleep. A sleep in which you will be able to do all sorts of things I ask you to do. One - you are going to go deeply sleep ... Two - down, down, into a deep, sound sleep ... Three - four - more and more, more and more asleep ... Five - six - seven - you are sinking, sinking into a deep, deep sleep. Nothing will disturb you. Pay attention only to my voice and the things I tell you ... Eight - nine - ten - eleven - twelve - deeper and deeper, always deeper sleep ... Thirteen - fourteen - fifteen. You will always hear me clearly no matter how deeply asleep you may be ... Sixteen - seventeen - deep asleep, fast asleep. Nothing

will disturb you. You are going to experience many things that I will tell you to experience ... Nineteen - twenty. Deep asleep! You will not awaken until I tell you to do so. You will wish to sleep and have the experiences I shall presently describe.

You are feeling comfortable, relaxed, thinking of nothing, nothing but what I say, your eyes are closed, comfortably closed, you are thinking of nothing, nothing but what I say, your arms and legs feel heavy, your arms and legs feel heavy and you are relaxed, relaxed, your whole body feels relaxed, your whole body feels relaxed, the muscles of your face, arms, and legs are relaxed, your whole body is relaxed. Drift deeper! It feels as though you are going backward into the darkness, backward into the darkness, and as you go backward into the darkness you are more and more relaxed, more and more comfortable, you are going backward, backward, and backward into the darkness and as you go backward you feel more and more comfortable, more and more relaxed, you are listening only to my voice, only to my voice, thinking of nothing, absolutely nothing, concentrating only on my voice, listening only to what I say, listening only to my voice, you are feeling comfortable and relaxed, comfortable and relaxed, comfortable and relaxed, and as you go backward and backward into the darkness you feel drowsy, very drowsy, and you are thinking of nothing, nothing but the sound of my voice, you feel comfortable and relaxed, comfortable and relaxed, breathing regularly and deeply, regularly and

deeply - thinking of nothing, nothing but the sound of my voice -
 breathing regularly and deeply, regularly and deeply, regularly and
 deeply, and you are in a sleep, a deep, sound comfortable sleep - a
 deep sound comfortable sleep, breathing regularly and deeply, regularly
 and deeply, regularly and deeply - your sleep is getting deeper, deeper,
 deeper, as you go backward into the darkness your sleep is getting
 deeper and deeper - deeper and deeper - deeper and deeper - you feel
 comfortable and relaxed - listening only to my voice breathing
 regularly and deeply, regularly and deeply, regularly and deeply - in
 a deep, sound sleep - deep, sound sleep - deep, sound sleep, and your
 sleep is getting deeper and deeper, deeper and deeper, deeper and
 deeper - you are in a deep sound sleep - deep sound sleep - deep sound
 sleep - breathing regularly and deeply - regularly and deeply -
 regularly and deeply and you are in a deep sound sleep - a deep sound
 sleep - sleep - sleep - sleep - sleep.

Wake-Up Procedure

"You are going to wake up in a few minutes. You will find re-
 freshed, wide awake, and in a good mood. I will count from 5 to 1
 and with each count you will be more fully awake - 5-4-3-2-1 Wide
 awake. Open your eyes. Wide awake."

Appendix C

Task-Motivation Instructions

Past research has indicated that subjects who are not hypnotized are able to perform suggestions with the same ease as hypnotized subjects. What seems to be important in that case is the subject's willingness to cooperate. This is what I ask for, that you give me your utmost cooperation. If you attend closely to what I say and cooperate to the fullest extent, you will have no difficulty performing the simple tasks I set out for you. As I have already mentioned, the tasks are simple to perform and in no way will cause you the least embarrassment. When I ask for your cooperation, I am asking you to focus your full attention on what I am saying and to try your best to do what I tell you. I want you to perform and the highest level possible. If you don't try to the best of your ability, this experiment will be worthless, not to mention the waste of your time. On the other hand, if you do pay close attention to what I say and try to the best of your ability to do what I tell you, you can easily accomplish the tasks I set out for you, and you will be helping this experiment and not wasting any time.

Now, simply relax and make yourself perfectly comfortable and pay close attention to what I am saying.

Appendix D

Postexperimental Questionnaire

1. Response withholding:

Please circle the number of the response which best describes your experience.

A. During the first part of the experiment when I was recalling material after each list,

1. I said all the material that I remembered and I was actually unable to remember the material that I did not say
2. I was able to remember some material that I chose not to say
3. I was able to remember some material that I was unable to say

B. During the second part of the experiment when I was recalling (writing) material from all the lists;

1. I wrote all the material that I remembered and I was actually unable to remember the material that I did not write
2. I was able to remember some material that I chose not to write
3. I was able to remember some material that I was unable to write.

2. Anticipation of final TBF test.

When you were asked to permanently "erase" some of the material from your memory, did you believe that you would later be tested on this material? Please be honest when checking one of the following:

YES _____ NO _____

3. Self-rated hypnotic depth.

Please circle the number of the response which best describes your experience.

During the time I was asked to forget some of the material, that is, from the time I first began to hear the lists of animals and persons' names until I was told that I could once again remember, I felt:

1. Deeply hypnotized
2. Moderately hypnotized
3. Lightly hypnotized
4. Not at all hypnotized

Appendix E

Twelve Counterbalanced Cue-type Orders

ORDER											
1	2	3	4	5	6	7	8	9	10	11	12
PA	A	NR	AP	PA	PA	NR	AP	P	A	AP	NR
AP	NR	PA	NR	A	P	PA	NR	AP	PA	NR	P
A	P	NR	PA	NR	AP	NR	AP	A	NR	P	NR
PA	PA	A	P	PA	PA	P	PA	NR	P	AP	A
NR	NR	P	AP	NR	A	A	NR	PA	NR	NR	NR
AP	A	NR	NR	A	NR	NR	P	AP	A	P	AP
NR	P	AP	A	P	AP	AP	A	NR	NR	A	NR
A	NR	PA	NR	NR	NR	NR	NR	P	AP	NR	A
P	PA	NR	P	AP	A	PA	PA	A	P	PA	PA
NR	AP	A	NR	P	NR	A	P	NR	PA	NR	AP
PA	NR	AP	PA	NR	P	AP	NR	PA	NR	A	P
NR	AP	P	A	AP	NR	PA	A	NR	AP	PA	PA

Key: A = Animals only

P = Persons only

AP = Animals then persons

PA = Persons then animals

NR = No recall

Appendix F

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Score Sheet

 Subject: _____
 Order: _____
 Cell: _____

<u>List-1</u>	<u>List-2</u>	<u>List-3</u>	<u>List-4</u>	<u>List-5</u>
eel	duck	donkey	cheetah	beaver
lobster	wasp	elk	oyster	rat
boar	toad	hawk	magpie	coyote
anaconda	butterfly	kitten	python	bee
clam	camel	moth	newt	buffalo
fox	bull	snail	canary	caribou
Clarence	Allan	Clifford	Adele	Donna
Irene	Jenny	Maurice	Nathan	Carole
Adrian	Clara	Nancy	Doris	Patricia
Beth	Brian	Gloria	Carmen	Elliott
Agnes	Jessie	Andrea	Terry	Helene
Betty	Desmond	Joseph	Leslie	Ronald
TRIAL TYPE				
SCORE				
<u>List-6</u>	<u>List-7</u>	<u>List-8</u>	<u>List-9</u>	<u>List-10</u>
dolphin	crow	trout	porpoise	salmon
lion	eagle	deer	locust	ox
cobra	cricket	mouse	zebra	pig
rabbit	loon	jaguar	mule	ant
wolf	calf	mackerel	walrus	woodpecker
pigeon	mink	monkey	pony	stag
Judy	Lawrence	Glenda	Norma	Edmund
Duncan	Janet	Jerome	Ivan	Lilian
Gary	Sara	Gregory	Maureen	Neil
Hillary	Rodney	Joanne	Karl	Lisa
Ethel	Edith	Simon	Sean	Monica
Lionel	Bruce	Sophia	Leon	Louise
TRIAL TYPE				
SCORE				
<u>List-11</u>			<u>List-12</u>	
elephant	Julia		swine	Marion
shark	Gerry		giselle	Floyd
rooster	Lynn		ape	Barry
spider	Sharon		alligator	Martha
tiger	Gracie		lamb	Lorraine
turkey	Naomi		reindeer	Murray
TRIAL TYPE				
SCORE				
P - TRIALS	PA - TRIALS	A - TRIALS	AR - TRIALS	
0-P effect				
0-A effect				

END

2 3 1 2 8 1

FIN