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PRIMING EFFECTS DURING HYPNOTIC AMNESIA

Lorne D. Bertrand

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Dissertation submitted to the Faculty of Graduate Studies
and Research in partial fulfillment of the requirements
for the degree of Doctor of Philosophy in Psychology

January, 1987

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Abstract

Considerable controversy in recent years has surrounded the issue of the cognitive processes underlying hypnotically suggested amnesia. Some investigators have argued that amnesia reflects a dissociation between episodic and semantic components of memory. This dissociation renders amnesic material inaccessible on tasks that are episodic in nature such as recall and recognition. However, this position holds that amnesic material remains accessible on semantic tasks such as word association or spelling and, in fact, may be generated with a higher frequency on these tasks than is neutral (i.e., not previously learned) material. In other words, the material for which subjects exhibit amnesia on episodic tasks is "primed" for use on semantic tasks.

On the other hand, researchers arguing from a social psychological position state that the failure to obtain deficits on semantic tasks during hypnotic amnesia does not reflect an underlying dissociative process, but rather is a function of subjects' interpretations of what constitutes role-appropriate responding. From this perspective, amnesic material is not inaccessible and subjects can and do utilize this material strategically.

The present investigation consists of two interrelated experiments that assessed these hypotheses within a novel amnesia testing paradigm. In Experiment 1, low and high susceptible subjects learned the low frequency forms of four homophones and the high frequency forms of four different homophones, as well as

neutral, nonhomophone words. After learning, one-half of the subjects in each susceptibility group received a standard amnesia suggestion for the word list. Subjects were then tested on two episodic memory tasks (recall and recognition) and one semantic task (spelling). During the spelling task, subjects were read a list of words which contained the previously learned items as well as novel items and were asked to write each word as they heard it. Results indicated that subjects in the high susceptible/amnesia suggestion group exhibited substantial levels of amnesia on both the recall and recognition tasks, but showed a priming effect on the spelling task by writing the forms of the homophones for which they had previously shown amnesia. No between-group differences emerged on this priming task. These findings replicated previous studies which indicated that, when given a standard amnesia suggestion, high susceptible subjects exhibited deficits on episodic but not semantic tasks.

Experiment 2 modified the wording of the amnesia suggestion in an attempt to manipulate the degree of priming exhibited by amnesic subjects. One group of high susceptible subjects received the standard suggestion used in Experiment 1 while a second group of high susceptibles received a modified suggestion which implied that amnesia should extend to other types of memory tasks. In addition, they were told that they would be amnesic for the suggestion itself. This modification to the amnesia suggestion resulted in a dramatic decrease in the priming effect: these subjects did not generate the previously learned forms of the homophones when asked to write the words on the spelling task. In

addition, subjects in the modified suggestion group exhibited significantly higher levels of recognition amnesia than subjects who received the standard suggestion.

This pattern of results did not support the episodic/semantic dissociation hypothesis. According to this hypothesis, subjects could not have responded to the demands contained in the suggestion if this suggestion was inaccessible to them during amnesia. On the other hand, these findings are consistent with a social psychological interpretation of hypnotic behaviour. These results could only have been obtained if the amnesic material remained accessible to subjects and they used this material strategically in order to respond in a role-appropriate manner.

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PRIMING EFFECTS DURING HYPNOTIC AMNESIA

Amnesia for the events occurring during a hypnotic session is considered by many investigators to be one of the most distinctive characteristics of hypnotic responding (e.g., Hilgard, 1980; Hilgard & Cooper, 1965; Kihlstrom, 1983). While most early experiments on this phenomenon dealt with posthypnotic amnesia, many recent investigators have studied amnesia that is suggested during the hypnotic session. No differences have emerged in the results obtained within these two paradigms. Originally, posthypnotic amnesia was believed to occur spontaneously (de Puysegur, 1970; Ellenberger, 1970). However, modern investigators have generally acknowledged that amnesia for the events of a hypnotic session rarely, if ever, occurs spontaneously and presently amnesia is viewed as the consequence of an implicit or explicit suggestion to forget. In one study comparing spontaneous and suggested posthypnotic amnesia, Hilgard and Cooper (1965) tested subjects on two consecutive days. One group received an amnesia suggestion for the hypnotic session on Day 1 and a test for spontaneous amnesia (i.e., no amnesia suggestion presented) on Day 2. A second group received the spontaneous amnesia test on Day 1 and an amnesia suggestion on Day 2. The order of amnesia testing had no effect on amount of spontaneous or suggested amnesia displayed. Seven percent of subjects exhibited spontaneous amnesia, while 35% of subjects responded to the explicit suggestion. These authors, and others,

concluded that in the few cases where spontaneous amnesia occurs, it is the result of implicit suggestion, and is not indicative of a state-dependent learning effect (Barber, 1962; Evans & Thorn, 1966; Hilgard, 1965, 1966; Kihlstrom, 1983).

Considerable controversy has surrounded the issue of voluntary control of memory processes during hypnotic amnesia. On the one hand, some investigators propose that amnesia involves processes that operate outside of the subject's voluntary control (e.g., Hilgard, 1966, 1974, 1979; Kihlstrom, 1978, 1980, 1985). On the other hand, some researchers argue that amnesia represents strategic behaviour carried out by subjects in order to meet the task demands they are presented (e.g., Coe, 1978, 1983; Spanos, 1982, 1986; Spanos & Radtke, 1981, 1982). Following a discussion of the research paradigms that have been employed to investigate hypnotic amnesia, the present paper will provide a review of the empirical data that have addressed this issue. Finally, two experiments will be presented that addressed a controversial issue in this area: the priming effects of amnesic material on subsequent performance on other tasks.

A Comparison of Paradigms

Two major methodologies have been used in the study of hypnotic amnesia. In the first, amnesia is assessed within the context of hypnotic susceptibility testing. In the second paradigm, word lists typically are used as the stimulus material. Each of these paradigms will be discussed below. In addition, a comparison of nonhypnotic directed forgetting and hypnotic

amnesia procedures will be presented.

Susceptibility scale paradigm

Initially, systematic investigation of suggested amnesia was conducted within the context of hypnotic susceptibility testing. Within this paradigm, subjects are administered a hypnotic induction procedure followed by a series of standard test suggestions such as arm levitation and immobility, and visual and auditory hallucinations (Shor & Orne, 1962; Weitzenhoffer & Hilgard, 1959, 1962). The last item on these scales involves a posthypnotic amnesia suggestion for all of the events of the preceding hypnotic session. On two commonly employed susceptibility scales (the Harvard Group Scale of Hypnotic Susceptibility: Form A; HGSHS:A; Shor & Orne, 1962 and the Stanford Hypnotic Susceptibility Scale: Form C; SHSS:C; Weitzenhoffer & Hilgard, 1962) a subject is considered amnesic if he/she recalls three or fewer of nine previously administered test suggestions. The resulting dichotomous amnesia score is then summed with subjects' responses to the other suggestions to yield a susceptibility score ranging from zero to twelve.

This paradigm poses a number of problems for assessing the presence and degree of amnesia (cf. Radtke & Spanos, 1981 for a detailed discussion of these issues). Because there is no test of recall prior to the administration of amnesia, it is impossible to assess the degree of initial encoding of the susceptibility scale items prior to amnesia. In addition, since recall is not tested after cancellation of the amnesia suggestion, the recovery

of items not recalled during amnesia cannot be assessed. As a number of investigators have argued, the temporary nature of this phenomenon as assessed by its reversibility is a defining characteristic of amnesia, and the demonstration of this reversibility should be a crucial component of any index of amnesia (Cooper, 1979; Nace, Orne & Hammer, 1974; Spanos & Radtke-Bodorik, 1980). However, earlier investigators appear to have assumed the presence of reversibility without actually assessing it. In short, the procedures used on most susceptibility scales for assessing amnesia do not allow a distinction to be drawn between actual amnesic responding and either poor initial encoding of the material or normal forgetting over the course of the session.

These problems have been rectified in one susceptibility scale currently in use (the Carleton University Responsiveness to Suggestion Scale; CURSS; Spanos, Radtke, Hodgins, Stam & Bertrand, 1983b). On this scale, subjects' recall of the test suggestions is assessed before administration of the amnesia suggestion as well as after its cancellation. Amnesia is indexed by the number of items that are not recalled during amnesia that are recalled both before and after the suggestion. Thus, this method allows for an unambiguous index of amnesia that is not confounded with either poor initial encoding or normal forgetting.

There are additional problems associated with utilizing the susceptibility scale paradigm to study memory processes within

the context of amnesia. For instance, learning within this paradigm is incidental in nature. In other words, subjects are not aware that they will be asked to recall the events of the session at a later point. This learning method is not ideal for the study of memory within the context of amnesia because it does not allow the experimenter any degree of control over the extent of initial encoding of the critical material, and because it confounds amnesia responding with other memorial processes such as temporary lapses in attention during the testing session (Kihlstrom, 1983). As discussed above, obtaining recall from subjects before and after, as well as during, amnesia ameliorates this problem somewhat; however, it does not allow the same degree of control that would be afforded by a task in which all subjects learned the critical material to a standard criterion.

Another problem with the amnesia item on some of the commonly employed susceptibility scales is that subjects typically are unsure what comprises the critical material to be recalled during amnesia testing. At recall, subjects are simply asked to remember as much about the preceding session as they can. Thus, even though some subjects may recall information regarding other aspects of the session (e.g., the initial hypnotic induction procedure), only their recall of the test suggestions is scored when assessing amnesia. This confusion regarding the to-be-recalled material may serve as an additional confound when assessing amnesia (Radtke & Spanos, 1981).

Word list paradigm

In response to these problems inherent in the susceptibility scale paradigm, a large number of recent studies of amnesia have employed standard verbal learning paradigms that allow much tighter control over learning and recall conditions. Most of these studies have utilized word lists as the critical material. Subjects typically are exposed to a hypnotic induction procedure and are then asked to learn a list of words. Thus, learning in this situation is intentional in nature; subjects are aware that they will be required to recall the material at a later time, and there is no confusion regarding the material for which they are responsible.

In addition, the word list paradigm affords the experimenter the ability to control the extent of initial encoding of the material. Most studies have employed a strict learning criterion of two correct successive recall trials. In other words, subjects are presented with the critical word list on a series of trials until they can recall the entire list correctly on two consecutive trials. This procedure provides a stable baseline across subjects against which decrements in recall during amnesia may be compared. The reduced variability in pre-amnesia recall levels allows for a more sensitive test of between-subjects differences in amnesia responding.

Support for the superiority of the multiple presentation word list paradigm for assessing amnesia was obtained in a recent study by Radtke, Spanos and Bertrand (1984; Expt. 3). This

experiment compared subjects who learned a twelve-word list to a criterion with a group of subjects that received a single presentation of the list. Both groups were then administered an amnesia suggestion for the list. The results indicated that some subjects in both groups exhibited amnesia defined by the criterion of reversibility as discussed above. Nevertheless, when subjects' amnesia scores were correlated with their susceptibility scores a significant positive correlation was obtained for the multiple presentation group, but not for the single presentation group. Previous research has indicated that degree of amnesia typically is related to hypnotic susceptibility (e.g., Cooper, 1979; Spanos & Bodorik, 1977). Therefore, the failure of Radtke, Spanos and Bertrand (1984; Expt. 3) to find such a correlation for the single presentation group indicates that the "amnesia" exhibited by these subjects more likely represents random fluctuations in recall rather than actual amnesic responding.

Another positive aspect of using word list paradigms in tests of suggested amnesia is that the results of these studies dovetail more closely with studies of other memorial processes in nonhypnotic contexts which also have made use of word list paradigms.

Directed forgetting and hypnotic amnesia

Directed forgetting refers to a paradigm in which subjects are specifically instructed to forget a portion of previously learned material in a nonhypnotic context. Because of its

apparent similarities to hypnotic amnesia, a number of investigators have attempted to evaluate underlying mechanisms that these phenomena may have in common (e.g., Coe & Basden, 1984; Geiselman, 1984; Geiselman, Bjork & Fishman, 1983a; Geiselman et al., 1983b; Kihlstrom, 1983). Unlike the amnesia testing situation, learning within the directed forgetting paradigm is invariably intentional (Geiselman et al., 1983a). Within this paradigm, two main methodologies typically are used (Kihlstrom, 1983). In the method of cuing by item sets, two sets of blocked items are presented, and subjects are instructed to forget one set but to remember the other. In the item-by-item cuing method, the two sets of items are intermixed, with the forget or remember cue following presentation of each item. The amnesia testing paradigm clearly is most similar to the method of cuing by item sets with one difference: in amnesia testing subjects are presented with a single stimulus set that they are instructed to forget. Within the method of cuing by item sets, three procedural variants are apparent, depending upon the temporal location of the forget cue. In the intraserial cuing method, the signal to forget occurs between the presentation of the to-be-remembered and to-be-forgotten sets. In the method of postinput cuing, the forget cue is given after presentation of both sets, and with the preinput cuing method, the forget instruction is given prior to the presentation of either set. Clearly, the typical amnesia testing paradigm most closely resembles the postinput cuing method; amnesia suggestions

typically are administered after learning has occurred.

A variety of underlying mechanisms have been proposed to account for the results obtained in directed forgetting studies (Bjork, 1972; Geiselman et al., 1983a; Geiselman, 1984). In his review of this literature, Kihlstrom (1983) attempted to assess the viability of each of these hypotheses for explaining hypnotic amnesia.

One hypothesis that can be rejected out of hand for both phenomena is that the material is simply forgotten. The fact that hypnotically amnesic subjects can recall the critical material following the cancellation cue indicates that the material has not been permanently forgotten. Likewise, in directed forgetting paradigms, the "forget" items are still present in memory as evidenced by recognition testing and intrusions of "forget" items into the recall of "remember" items.

The hypothesis of selective rehearsal has also been proposed to account for directed forgetting (Bjork, 1972). This formulation suggests that once a forget cue is administered the subject terminates rehearsal of the items that preceded it and focuses attention on the subsequent items. This hypothesis, however, can only be applicable to the method of intraserial cuing where the forget cue is administered between the forget and remember item sets. Postinput cuing of item sets cannot be explained by this hypothesis since all of the material is encoded and rehearsed prior to the administration of the forget cue. Likewise, such an explanation is not appropriate for the majority

of hypnotic amnesia studies in which the suggestion is given after learning has occurred.

The most recent hypothesis that has been offered to account for directed forgetting is the mechanism of retrieval inhibition (Geiselman, Bjork & Fishman, 1983a). This proposal suggests that the forget cue initiates some process that disrupts retrieval so that certain items become inaccessible under free recall conditions. Kihlstrom (1983) suggested that this mechanism may be implicated in hypnotic amnesia because amnesic subjects frequently display disorganized recall during amnesia, a finding that suggests some sort of retrieval disruption. However, the retrieval disruption discussed by Geiselman, Bjork and Fishman (1983a) is proposed as an automatic process, and considerable controversy exists surrounding the issue of automaticity in response to hypnotic amnesia suggestions. In addition, substantial research evidence suggests that disorganized recall is not a necessary accompaniment of amnesia, but rather is a function of the type of attentional strategies subjects use to bring about their forgetting. (e.g., Bertrand & Spanos, 1985; Spanos, Radtke-Bodórik, & Stam, 1980; Tkachyk, Spanos, & Bertrand, 1985).

Despite this considerable speculation concerning possible links between directed forgetting and hypnotic amnesia, very little research has directly compared these two paradigms. One such study was reported by Coe and Basden (1984). These investigators compared highly susceptible amnesic subjects with

low susceptible nonamnesics on either a directed forgetting or hypnotic amnesia task. Quite dramatic differences emerged between the low and high susceptible groups. The highs forgot equivalent amounts of material on both tasks; however, the low susceptibles did respond to the forget cue on the directed forgetting task but did not exhibit amnesia in response to the hypnotic suggestion. These results may suggest that different mechanisms are implicated in these two paradigms.

This conclusion was supported in a study conducted by Rivers (1979). In this experiment, the differences between the directed forgetting and amnesia paradigms were systematically varied in order to increase the comparability of results. Rivers (1979) pointed out that during amnesia testing, subjects are asked explicitly to forget temporarily the target material while the implication in directed forgetting studies is that forgetting should be permanent. In addition, directed forgetting studies rarely assess the recall of to-be-forgotten material; instead, such recall typically is assessed by intrusions of these items into the to-be-remembered material, or by recognition tasks. Conversely, in amnesia studies subjects are explicitly challenged to recall the material for which amnesia has been suggested. Rivers (1979) modified the directed forgetting paradigm to include instructions for temporary forgetting for one group and temporary forgetting instructions plus an explicit challenge to recall the to-be-forgotten material for another group. These modifications brought the directed forgetting procedures more in

line with those employed in amnesia studies.

The major variable of interest in the Rivers (1979) experiment was the "only-effect". Instructing subjects to forget only a portion of the critical material serves to enhance the recall of the to-be-remembered portion of the material, relative to similar control material that is not covered by a forget cue. For example, in a directed forgetting experiment subjects typically are asked to learn two discrete lists of material (e.g., words and numbers). In a postinput cuing method, immediately after the input of each word-number list, a cue signals one of four recall conditions: recall only the first list (e.g., words only); recall only the second list (e.g., numbers only); recall both lists, first list first; and recall both lists, second list first. When the recall performance on a list on an "only" trial is compared with performance on the same list on a "both" trial, recall typically is better on the only trial. This recall superiority for the "only list" condition is referred to as the only-effect. It has been hypothesized that the only-effect results from a segregation in memory of the to-be-forgotten and to-be-remembered items. Under these circumstances the memory search during recall is restricted to the to-be-remembered items, and results in enhanced recall for this material (Epstein, 1972).

Rivers (1979) found the typical only-effect when subjects were tested in the standard directed forgetting paradigm (i.e., told to forget the material with the implication that this

forgetting was to be permanent). However, this effect was not apparent in the directed forgetting groups that were told either to forget the material temporarily or were told to forget temporarily and were also administered a subsequent recall challenge. Rivers (1979) also found a negative only-effect in high susceptible hypnotic subjects who received a recall challenge. In other words, these subjects showed decreased performance on recall of the to-be-remembered as well as the to-be-forgotten items relative to the "recall both lists" group. Rivers (1979) accounted for this effect in terms of inattention to the recall task, a hypothesis that has also been used to describe hypnotic amnesia (see below). As Rivers (1979) pointed out, these subjects received an ambiguous instruction to forget some material but also to retain it for later recall. In an attempt to meet these demands, subjects may have diverted their attention from the entire set of material (i.e., both the to-be-remembered and to-be-forgotten items) which then resulted in decreased recall for both sets. In sum, the results of the Rivers (1979) study support the contention that directed forgetting and hypnotic amnesia result from different processes. This conclusion was supported in a recent theoretical review by Geiselman (1984).

Normative Findings on the Occurrence of Amnesia

Most studies that contain accounts of the incidence of amnesic responding have been conducted within normative reports of susceptibility scales. No studies have compared the incidence

of amnesia across various experiments which have employed a word list paradigm. For this reason the following discussion will deal with data that have been obtained using the susceptibility scale paradigm.

One of the most reliable findings to be reported is that the presence of amnesia is correlated with subjects' level of hypnotic susceptibility, although the magnitude of this relationship has varied greatly among various studies (Ashford & Hammer, 1978; Coe, Taul, Basden & Basden, 1973; Hilgard & Cooper, 1965; Kihlstrom & Shor, 1978; Spanos, Cobb & Gwynn, 1984; Spanos, de Groh & Bertrand, 1986; Spanos & Radtke, 1982; Thorne & Hall, 1974). For example, in the standardization norms published for the Stanford Hypnotic Susceptibility Scales: Forms A and B, Hilgard (1965) reported a correlation of .69 between subjects' susceptibility scores (minus the amnesia item) and amnesia scored dichotomously as present/absent. In the normative data presented on the SHSS:C, this correlation was reported as .85 (Hilgard, 1965). The magnitude of these correlations is highly atypical, however, and, as discussed above, reports of amnesia assessed by these scales must be interpreted with caution because of the possible confounding of amnesic responding with other memorial processes. In addition, on the Stanford scales subjects are not given a fixed interval during which to recall the suggestions during amnesia testing. Instead, subjects are allowed to recall until they reach an "impasse". Using this as a criterion for termination of recall calls for a subjective judgement on the

part of the experimenter, and it is impossible to determine if this criterion was employed in the same manner with all subjects. Recently, Spanos, de Groh and Bertrand (1986) obtained a correlation of .13 between SHSS:C scores and dichotomous amnesia when amnesia was assessed as originally proposed (i.e., simply the recall of three or fewer items during the suggestion period; Weitzenhoffer & Hilgard, 1962). However, when the suggestion was modified to include the criterion of reversibility, this correlation rose to .44.

The most common finding in the literature is a low to moderate, but significant, correlation between amnesia and susceptibility. For example, in normative data on the HGSHS:A obtained from various populations the correlations ranged from .18 for an Australian sample (Sheehan & McConkey, 1979) to .65 for a sample from Montreal (Laurence & Perry, 1982). Recently, Kihlstrom and Register (1984) tested a very large sample on the HGSHS:A and reported a correlation of .14 between dichotomously scored amnesia and susceptibility. In the original normative study of the HGSHS:A conducted in Boston, the amnesia/susceptibility correlation was .39 (Shor & Orne, 1963).

In normative findings reported on the CURSS, in which amnesia is scored in terms of post-suggestion reversibility and all subjects are given a fixed interval of two minutes for recall during amnesia, the correlation between susceptibility (minus the amnesia item) and dichotomous amnesia scores was .57 (Spanos, Radtke et al., 1983b). A test-retest study on the CURSS yielded

a correlation of .42 on initial test and .47 on retest (Spanos, Cobb & Gwynn, 1984). In a recent study using the CURSS conducted on a sample of 500 subjects, the correlation between continuous amnesia scores (i.e., amnesia assessed as the actual number of items forgotten, as opposed to simply the presence versus absence of amnesia) was .32 (Bertrand, Spanos & McLean, 1985). However, the susceptibility scores of subjects in this sample were positively skewed, with 13.4% scoring in the high range of susceptibility versus 53.2% obtaining low susceptibility scores. This skewed distribution could have served to artifactually lower the resulting correlation. Nevertheless, in this sample 73.1% of the high susceptibles displayed some degree of amnesia, compared to 28.7% and 7.5% of the medium and low susceptibles, respectively. These results strongly support previous data suggesting that amnesia is related to subjects' level of susceptibility.

As is apparent from this discussion, the magnitude of the reported relationship between amnesia and susceptibility has varied greatly depending upon particular samples and the testing instrument used. The confounds between amnesia and other variables using the older scales probably were responsible for these discrepant results. Nevertheless, these studies all indicated that susceptibility and amnesia are related to some extent.

Hypotheses of Hypnotic Amnesia

Three major hypotheses have been proposed to account for hypnotic amnesia. These are the repression/enhancement, dissociation and social psychological formulations. The former two hypotheses are based on the assumption that amnesia reflects an involuntary process that operates without subjects' conscious control. These "special process" accounts of hypnotic amnesia imply that such responding shares certain similarities with other memory disturbances (e.g., organic amnesias) and thus may be explained by postulating similar processes. The social psychological hypothesis, on the other hand, argues that amnesia is a voluntary occurrence, and reflects subjects' attempts to fulfill the task demands they are given. This hypothesis does not presuppose that hypnotic amnesia represents a disruption in memory processes over which subjects exert no voluntary control. Each of these hypotheses will be dealt with below.

Repression/Enhancement Hypotheses

The notion that hypnotic amnesia represents a process of repression was initially proposed by Freud (1938). The original formulation of this hypothesis suggested that amnesia arises from the subject's transference relationship with the hypnotist. According to Schilder and Kauders (1956) "the hypnotized [subject] is ashamed of his infantile-masochistic adjustment and denies the hypnosis in order to conceal the adjustment" (p. 60). Recovery of these repressed memories supposedly occurs when the subject accepts his/her masochistic relationship, which is

brought about through suggestions by the hypnotist (Rapaport, 1950). Of course, this formulation is premised on the assumption that spontaneous amnesia for the entire hypnotic session is a frequent occurrence, a position that, as discussed above, has proved untenable.

However, more recent reformulations of the repression hypothesis have focused on the selective recall of certain events of a hypnotic session during suggested amnesia, and the purported amnesia for the remaining events. Some investigators have suggested that the material that is supposedly "forgotten" during amnesia is that associated with negative affect (Clemes, 1964; Hilgard & Hommel, 1961; O'Connell, 1966; Pettinati & Evans, 1978; Pettinati, Evans, Orne & Orne, 1981). Alternatively, others have proposed the enhancement hypothesis to account for amnesic responding (e.g., Hilgard & Hommel, 1961). This position suggests that the material recalled during amnesia is associated with positive affect. Thus, both of these hypotheses make the same predictions with respect to the material "forgotten" during amnesia; it is only the proposed underlying mechanism that varies.

Susceptibility scale paradigm

The initial experimental work conducted on the repression/enhancement hypotheses utilized the susceptibility scale paradigm. This research was premised on the assumption that scale items that were passed would be associated with positive affect, and the failed items would be associated with a negative

valence. Analyses based on these conditions necessitate discounting data generated from four distinct groups of subjects: (1) those who fail all items on the scale; (2) those passing all items; (3) subjects who exhibit no amnesia; and, (4) subjects exhibiting total amnesia (i.e., those who do not recall any items during amnesia). In other words, analyses based on selective recall of passed or failed scale items necessarily exclude extreme scorers on both susceptibility and amnesia. It is unclear how truncating both of these variables in such a fashion affects the interpretability of these data.

The first experimental investigation of the repression hypothesis was conducted by Hilgard and Hommel (1961). This study employed the items on the SHSS:A and B as critical material and compared the number of passed items recalled during amnesia with the number of failed items recalled as an index of selective recall. However, as discussed above, the SHSS does not provide an unconfounded index of amnesia, and consequently, these investigators used susceptibility level (high versus low) as their independent variable. This practice is problematic because, although susceptibility and amnesia are moderately correlated, the relationship is by no means a perfect one. In other words, while high susceptible subjects are more likely to exhibit some amnesia than low susceptibles, in any sample there are typically a substantial number of high susceptibles who do not exhibit amnesia and, conversely, a number of low susceptibles who do show this response. Thus, any analysis that employs susceptibility

level as the independent variable when, in fact, the presence or absence of amnesia is the variable of interest, confounds these two variables and calls the interpretability of results into question.

Nevertheless, even if one assumes that this type of analysis is appropriate to tap amnesic responding, Hilgard and Hommel's (1961) results failed to support a repression hypothesis. Their results indicated that there was a tendency for low susceptible subjects to favour the recall of passed items over failed items. However, a similar pattern of results did not emerge for high susceptibles. These subjects did not tend to favour the recall of either passed or failed items during amnesia. O'Connell (1966) also found that low susceptibles showed a tendency to recall more passed than failed items during amnesia, while no such pattern emerged for high susceptibles.

Pettinati and Evans (1978) argued that the index of selective recall used in the earlier studies was confounded with both the number of suggestions passed and the number of suggestions recalled. Accordingly, they devised a new index (the Recall Comparability Index; RCI) that controlled for these confounds. Using the RCI, these investigators reported a preference for both low and high susceptibles to recall passed items. Once again, however, an independent measure of amnesia was not obtained, thereby confounding amnesia with susceptibility.

The results of these studies did not provide support for a repression hypothesis of amnesia. Since high susceptible subjects

are more likely to exhibit amnesia than low susceptibles, the repression hypothesis would predict a pattern of results opposite to those obtained by Hilgard and Hommel (1961) and O'Connell (1966). From this position, one would expect that high susceptibles would tend to recall more passed than failed items, but that low susceptibles would not exhibit this pattern of recall.

In a replication and extension of the earlier studies, Coe, Baugher, Krimm and Smith (1976), suggested that the results of the Hilgard and Hommel (1961) and O'Connell (1966) experiments could be interpreted as resulting from a process of enhancement rather than repression. These authors suggested that since low susceptibles by definition pass few suggestions, those that are passed might be particularly salient, and hence more likely to be recalled. Since high susceptibles pass more suggestions, these "successful" events may not be particularly salient to these subjects and, consequently, their recall during amnesia may not be biased toward recalling passed items.

In an attempt to test the repression and enhancement hypotheses separately, Coe et al. (1976) obtained a subjective rating of each subject's affective response to each suggestion. They reasoned that the act of passing or failing an item might not be sufficient to incur a negative or positive attitude towards that suggestion. However, if a subject rated a particular item negatively, whether it was passed or failed, then that item should be a target for repression.

Results of this study supported, in part, the assumption made by previous investigators that failed items are more likely to be associated with negative affect than are passed suggestions. However, this effect attained significance only for the low susceptible subjects; high and medium susceptibles did not provide different emotional responses to passed and failed items. It should be noted that for all susceptibility levels the mean affect ratings were very close to the neutral point on the scale, indicating that passing or failing a suggestion was not a particularly emotionally charged event.

Subsequent analyses, however, indicated that subjects were not more likely to recall either negatively or positively toned experiences during amnesia, regardless of susceptibility level. Thus, the Coe et al. (1976) study failed to gain support for either the repression or enhancement hypotheses. However, as the authors pointed out, their experiment was based on a small sample of 29 subjects compared with the much larger samples used in the previous studies. The resulting decreased statistical power could have obscured the small effects found in the Hilgard and Hommel (1961) and O'Connell (1966) experiments.

Recently, Pettinati et al. (1981) proposed that successful hypnotic experiences serve as retrieval cues during recall and consequently are more likely to be recalled. These investigators hypothesized that if hypnotic amnesia is a result of a disruption in normal memory retrieval strategies as proposed by Evans and Kihlstrom (1973), amnesic subjects should not make use of these

success cues when recalling during amnesia. If this was the case, one would not expect a selective bias towards success events in the recall of partially amnesic subjects. The results of their study supported this contention: partially amnesic high susceptible subjects recalled passed and failed items with equal frequency. However, nonamnesic subjects and amnesic medium and low susceptible subjects exhibited a bias towards recalling passed items. On the basis of these findings, Pettinati et al. (1981) concluded that amnesia in highly susceptible subjects represents the outcome of a qualitatively different process than does amnesia in low and medium susceptibles.

If the effect reported by Pettinati et al. (1981) for high susceptibles was a function of amnesia, one would predict that these subjects would tend to recall more passed than failed suggestions before and after amnesia, but that this bias would not be present during amnesia. Unfortunately, because Pettinati et al. (1981) only assessed selective recall during amnesia, they were unable to examine any within subject differences across recall trials. Recently, Bertrand, Spanos and McLean (1985) assessed selective recall on the three recall trials before, during and after amnesia for amnesics and nonamnesics of low, medium and high susceptibility using the CURSS. Their results indicated no selective bias towards recalling passed suggestions for any group on any recall trial. These results were consistent with those of Coe et al. (1976), and constitute a failure to replicate the Pettinati et al. (1981) effect.

It is clear that the studies investigating the repression/enhancement hypotheses using the susceptibility scale paradigm have not yielded consistent data in support of either hypothesis. There are, however, certain biases in the susceptibility scales that could have seriously confounded the results. For example, the items on these scales are ordered from least difficult (i.e., those that are most frequently passed) to most difficult (i.e., those that are passed with the lowest frequency). Thus, serial position of the items is confounded with item difficulty, and consequently a bias towards recalling passed or failed items is confounded with a potential serial-position effect in recall. In addition, the less difficult items on these scales are quite similar in terms of required response. A number of these suggestions call for responses involving subjects' arms (e.g., arm rising, arm immobility, arms moving apart), whereas the more difficult items are typically more distinctive in nature (e.g., visual hallucination, age regression, anosmia to ammonia). It is plausible that the more distinctive items are also more salient to subjects, and hence are more likely to be recalled during amnesia. If any definitive statements are to be made regarding the repression/enhancement hypotheses, these confounding variables must be taken into account.

Word list paradigm

In an attempt to test the repression hypothesis independently of the enhancement hypothesis, Clames (1964) used a

word list as the target material, rather than susceptibility scale items. He constructed a list of 18 words for each subject composed of nine "neutral" words and nine "critical" words that he assumed to be representative of repressed conflict and hence targets for repression during amnesia. To derive the word list for each subject, he administered a word association test. He calculated the mean reaction time on this test for each subject, and assumed that any words with a latency to response 1.5 standard deviations above that subject's mean were "related to repressed conflictual material" (p. 63). Words with reaction times falling between the mean and one standard deviation below the mean were considered neutral. In a second session, hypnotized subjects learned their individualized lists of nine critical and nine neutral words and were given a posthypnotic partial amnesia suggestion informing them that they would only be able to recall 10 of the 18 words. Clemes (1964) hypothesized that subjects would be more likely to exhibit amnesia for the critical than the neutral words, which he believed would be indicative of repression. Consistent with this hypothesis, the results indicated that the medium-to-high susceptibles exhibited this recall pattern.

In a more recent study, Stam, Radtke-Bodorik and Spanos (1980) took issue with Clemes' (1964) results, and provided a replication and extension of the original experiment. These investigators criticized the Clemes (1964) study on a number of methodological points. For example, an appropriate control group

was not included in the original experiment. Since the target word lists were constructed individually for each subject and the critical and neutral words were thus subject-specific, a control group that had each subject yoked to an experimental subject and that received the target lists constructed for the experimental subjects was necessary. If a process of repression was operating in hypnotic amnesia, one would expect more neutral than critical words to be recalled by experimental subjects, in line with Clemes (1964) findings. However, such a pattern should not be found with the yoked controls, since the same words should not be positively and negatively toned for these subjects.

In addition, Stam et al. (1980) pointed out that the practice of assuming that words with longer latencies to response are critical (i.e., negatively toned) items is unfounded. Long reaction times on a word association test are known to be a function of word attributes such as meaningfulness, concreteness, imagery value and familiarity that have nothing to do with emotional tone (Erdelyi & Goldberg, 1979; Holmes, 1974; Kausler, 1974).

Stam et al. (1980) also noted that all of the subjects in the Clemes (1964) study received the same serial order of critical and neutral words, and more critical words fell in the middle and at the end of the list than at the beginning. Thus, serial position of the words was confounded with the status of the words as critical or neutral in the original study. In order to remove this confound, the sequence of critical and neutral

words should have been independently randomized for each subject.

These methodological problems with the original study were taken into account in the Stam et al. (1980) replication. These investigators employed a yoked control procedure and independently randomized the presentation order of the critical and neutral words for each subject. Their results indicated that the experimental and control subjects were likely to show amnesia for the same words and their patterns of recall were unrelated to the latency associated with the words. Instead, they found that word attributes such as imagery value and meaningfulness significantly predicted the likelihood that certain words would be recalled during amnesia. Stam et al. (1980) also reported a primacy effect in which words presented at the beginning of the list were less likely to be "forgotten" during amnesia than words in the middle and at the end of the list. Since most of the critical words in the Clemes (1964) study were in the middle and at the end of the list, this primacy effect could have accounted, at least in part, for the higher incidence of amnesia for critical words. Thus, it seems likely that the results reported by Clemes (1964) were not indicative of a repression phenomenon, but rather a function of word attributes and a serial position effect that he failed to examine.

In sum, the available evidence does not support the notion that repression is a viable explanation for hypnotic amnesia. This conclusion is consistent with a review of research conducted to investigate repression processes within experimental contexts

other than hypnosis (Holmes, 1974). This review suggested that research cited as supportive of a repression hypothesis can be accounted for with more parsimonious explanations such as item familiarity and increases and decreases in distraction.

Evaluation of the enhancement hypothesis is much less straightforward, however. If enhancement is loosely defined as simply a function of item salience, with more salient items more likely to be recalled during amnesia, then some support has accrued for this position. If, however, enhancement is defined solely in terms of passed items on a susceptibility scale, then this explanation is lacking support. However, it seems plausible to suggest that less distinctive items would be more likely targets for amnesia than items or experiences which stand out in memory for any of a number of reasons.

Dissociation Hypothesis

The notion of dissociation as an account for hypnotic amnesia was initially formulated by Janet (1925). Dissociation theory relied upon the notion popular at the time that behaviour was governed by constellations of ideas that normally functioned simultaneously or in sequence. In certain individuals, Janet (1925) proposed that a weakness in the nervous system resulted in a splitting or dissociation of these constellations of ideas from one another. Within these dissociated constellations, various behaviours that normally occurred with the subjects' awareness and voluntary control became functionally isolated from the constellation of ideas that constitute the "conscious self" and

from conscious control. This proposition was initially attractive because it appeared to account for both posthypnotic amnesia and the purported automaticity of behaviours that occurred during hypnosis. This original formulation of dissociation as it applied to amnesia was basically a state-dependency notion: the events of a hypnotic session would not be remembered posthypnotically because they occurred in a state that was fundamentally different from the normal, waking state.

The first experimental research that attempted to assess predictions derived from dissociation theory employed retroactive interference paradigms. Within the standard paradigm, subjects learn a list of words or nonsense syllables (List A). Following acquisition of List A, subjects learn a second list (List B), and subsequently are required to recall List A. Retroactive inhibition refers to the reliable finding that the interpolated learning of List B between learning and recall of List A interferes with the recall of List A and, hence, produces less efficient List A recall (Baddeley, 1976).

Within the context of hypnosis, subjects typically have been required to learn List A while "awake", and List B while "hypnotized". List A is then recalled after hypnosis has been cancelled. According to the original formulation of the dissociation hypothesis, since the events of the hypnotic session are functionally isolated from waking events, the usual retroactive interference effect of reduced List A recall due to the learning of List B should be eliminated. Thus, List A recall

following hypnosis should be at a level equivalent to that of subjects who never learned List B, but instead simply learned and then recalled List A. While some studies have assumed the presence of spontaneous amnesia following hypnosis, others have given subjects an explicit amnesia suggestion for List B.

Research employing this paradigm has consistently indicated the continued presence of retroactive interference effects in amnesic subjects, although the magnitude of these effects has varied somewhat across studies. The two studies that assumed spontaneous amnesia and did not administer an amnesia suggestion for List B reported a slight reduction in retroactive interference following hypnosis compared to a control group that was administered the standard nonhypnotic paradigm discussed above (Nagge, 1935; Takahashi, 1958). In both of these studies, however, substantial retroactive interference effects were still observed with the hypnotic groups, suggesting that a dissociation, if present, was partial at best.

Results even more damaging to the dissociation hypothesis were obtained by Mitchell (1932). She found no decrease in retroactive interference in the group that learned List B while hypnotized. The most carefully controlled study of this issue was reported by Graham and Patton (1968). These investigators employed four groups of subjects: (a) one group that learned both lists during waking; (b) a group that learned List A during waking and List B during hypnosis; (c) a group that learned List A during waking and List B during hypnosis and received an

amnesia suggestion for List B; and, (d) a control group that simply learned List A during waking and were then tested for savings on List A. Their results indicated that the three experimental groups all exhibited significantly lower savings for List A compared to the control group, indicating substantial levels of retroactive interference. However, contrary to the predictions of the dissociation hypothesis, none of the experimental groups differed from one another in terms of List A savings. More recent studies employing slight variations of this paradigm have yielded results consistent with those of Graham and Patton (1968; Coe, Basden, Basden & Graham, 1976; Coe, Taul, Basden & Basden, 1973).

All of the studies conducted using a retroactive inhibition paradigm have been premised on the implicit assumption that the interfering effects of List B on List A occur at the time of recall of List A. A number of studies (see Postman, 1971 for a review), however, now suggest that interference effects on List A may occur during encoding of List B. Thus, the amnesia suggestion that is given after List B learning may come too late to prevent List B from interfering with List A. In other words, the dissociation brought about by an amnesia suggestion may come too late to prevent interference effects.

The viability of this explanation was recently tested by Dillon and Spanos (1983) using a proactive interference paradigm. This paradigm is essentially the converse of the retroactive inhibition paradigm, and predicts that the act of learning List A

prior to List B will interfere with the successful recall of List B.

The proactive interference paradigm utilized in this study was a Brown-Peterson distractor task (e.g., Wickens & Gittis, 1974). This task involved presenting subjects with a series of learning trials consisting of three words each. Each trial was separated by an interpolated distractor task of adding numbers. Immediately after the distractor task, subjects recalled the preceding three words. A block of five such trials was presented to each subject using words from the same taxonomic category. When the words were highly related in this fashion, recall was high for the first trial, but then decreased monotonically with each subsequent trial. This deterioration in recall performance is due to proactive interference from previous trial items. However, if these subjects are presented with three words that are unrelated to those on previous trials (i.e., words from a different taxonomic category) recall for the new words increases substantially. This sudden enhancement in recall is referred to as a "release" from proactive interference (Wickens & Gittis, 1974).

Dillon and Spanos (1983) hypothesized that if hypnotic amnesia represents dissociation and results in a segregation of amnesic material, then recall on the trial following an amnesia cue should be high, even if the words on this trial are related to those that came before. In other words, the amnesia cue should produce a release from proactive interference. The results failed

to support this hypothesis. The amnesia suggestion did not produce a release from proactive interference, indicating that the words for which subjects were supposedly amnesic continued to affect subjects' task performance.

In summary, the results from retroactive and proactive interference studies have failed to support the contention that amnesia involves a functional segregation of amnesic material from ongoing conscious processing. Instead, the available data suggest that the amnesic material is still active in memory and influences subjects' performance on various memory tasks.

As a response to such results which cannot be integrated into the traditional dissociation framework, Hilgard (1974, 1979) has proposed the notion of neodissociation. According to this reformulation, multiple levels of cognitive processing exist (referred to as "cognitive subsystems"), some of which are available to conscious awareness and others which are unconscious. However, these various levels can still interact with one another, even though they may be separated by "amnesic barriers" and the subject may be unaware of this interaction. This hypothesis proposes that the dissociations engendered by hypnosis may convert some behavioural processes that normally are under voluntary control to involuntary happenings (Hilgard, 1979). Thus, from this perspective amnesia is viewed as an involuntary occurrence over which the subject exercises little or no voluntary control. Proponents of this position, however, admit that they are at a loss to explain how verbal suggestions can

lead to such profound behavioural effects (e.g., "...the real mystery concerns the procedures that are evoked by just a few simple words and that alter memory in such dramatic ways"; Kihlstrom, 1983, p. 79).

Episodic/semantic memory

The most recent application of dissociation theory to hypnotic amnesia has been formulated by Kihlstrom (1978, 1980). The basis of this formulation comes from Tulving's (1972) proposed distinction between episodic and semantic memories.

According to Tulving (1972), episodic memory is that aspect of memory which "...receives and stores information about temporally dated episodes or events, and temporal-spatial relations among these events" (p. 383). On the other hand, semantic memory consists of the "...organized knowledge a person possesses about words and other verbal symbols, their meaning and referents, [and] about the relations among them..." (p. 386). Rather than viewing these two memory types as independent systems, however, a number of investigators have argued that memories are organized with respect to both episodic and semantic components (Reed, 1979; Schank & Abelson, 1977; Schonfield & Stones, 1979). As a novel experience is encountered, it is initially encoded within a specific spatial and temporal context (episodic memory); however, as repeated similar experiences are encountered, they become absorbed into more generalized schemata (semantic memory) and no longer necessitate specific episodic tags (Kihlstrom, 1980).

As Kihlstrom (1980) argued, under normal circumstances either episodic or semantic memory can facilitate retrieval of information. To illustrate this point, he used an example of misplacing one's car keys. In an attempt to locate the keys, one can "try to reconstruct where they were last seen and what transpired between that time and the present" (episodic memory; p. 229); or one can "draw on one's knowledge that missing car keys are very often to be found in the trunk lock" (semantic memory, p. 229). He then goes on to propose that hypnotic amnesia engenders a dissociation between episodic and semantic components of memory. Thus, following an amnesia suggestion, subjects are no longer able to remember events in spatio-temporal context, but remain capable of utilizing semantic components of memory.

In support of his hypothesis, Kihlstrom (1980) drew on two areas of research within the context of posthypnotic amnesia. The first source he cites is the phenomenon of posthypnotic source amnesia.

Source amnesia. Source amnesia refers to a relatively rare finding that subjects will occasionally remember material that they learned during hypnosis following an amnesia suggestion, but appear not to remember where or when that material was learned. In terms of Kihlstrom's (1980) episodic/semantic distinction, these subjects are able to remember semantic components of the amnesic material, but are unable to place this material within a spatio-temporal context. To test this phenomenon subjects typically are taught the answers to rather obscure questions

during hypnosis (e.g., Q. "What colour does an amethyst turn when it is heated?" A. "Yellow."; Q. "What is the difference between the antennae of a moth and the antennae of a butterfly?" A. "The antennae of a moth have long, furry hairs."). Following presentation of these questions and their answers, subjects are given a posthypnotic amnesia suggestion for the events of the hypnotic session. They are then re-administered the questions. Most amnesic subjects state that they do not know the answers; occasionally, however, a subject will respond with the appropriate answer. When this response occurs, the experimenter asks "How do you know that?". The subjects may then respond that they learned the answer during the preceding session, in which case they are scored as nonamnesic. In a few instances, however, subjects will state that they do not remember where they learned the answer, in which case they are scored as exhibiting source amnesia.

The initial investigation of source amnesia examined this response among subjects who did not receive a posthypnotic amnesia suggestion (Evans & Thorn, 1966). These investigators reported the incidence of spontaneous source amnesia, and found that approximately 11% of their hypnotic subjects exhibited this response, compared to 2% of a waking control group. However, their criteria for scoring the presence of source amnesia were somewhat ambiguous (cf. Coe, 1978 for a detailed discussion of this issue) and this, coupled with the fact that amnesia was not explicitly suggested indicates that their results should be

interpreted with caution.

In a more carefully designed study, Cooper (1966) tested hypnotic subjects for both spontaneous and suggested source amnesia. One group received a test for spontaneous source amnesia on Day 1 and suggested source amnesia on Day 2. A second group received the opposite pattern of testing. The results indicated that if source amnesia was suggested on Day 1 and spontaneous source amnesia was assessed on Day 2, 17% of subjects showed source amnesia on Day 1 and only 2% showed this response on Day 2. When treatment order was reversed the incidence of spontaneous source amnesia was 15% compared to 11% for suggested amnesia. Thus, it appears that receiving a prior suggestion for source amnesia cues subjects to the idea that this type of responding is not expected automatically in the absence of an explicit suggestion.

In an extension of this previous research, Evans (1979) conducted a study in which source amnesia was assessed in highly susceptible hypnotic subjects administered an explicit amnesia suggestion. A second group was asked to fake hypnosis throughout the entire session, and behave as if they were deeply hypnotized (the "real-simulator" design; Orne, 1959, 1979). As prescribed by this paradigm, the experimenter who conducted the session was blind to subjects' treatment assignment. The results of this study indicated that while approximately 30% of the hypnotic subjects exhibited source amnesia, none of the simulating subjects showed this response. On this basis, Evans (1979)

concluded that source amnesia is a hypnosis-specific response that is never exhibited by nonhypnotic subjects.

Spanos, Gwynn, Della Malva and Bertrand (1985) took issue with this statement. It is well established that simulating subjects tend to overplay the hypnotic role (Barber & Calverley, 1966; Williamsen, Johnson & Eriksen, 1965). Within the context of amnesia, simulating subjects typically show total amnesia, while partial amnesia is the most common response obtained from hypnotic subjects. Simulating subjects who exhibit total amnesia when asked the critical questions during source amnesia testing state that they do not know the answers. Thus, these subjects are never asked "How do you know that?" by the experimenter, and consequently are never in a position to show source amnesia. It is hardly surprising, then, that Evans (1979) did not obtain source amnesia with any of his simulating subjects.

Spanos et al. (1985, Exp. 1) tested this position by using a slight modification of the simulating paradigm. During the initial instructions administered to the simulating subjects, they informed these subjects that, contrary to popular belief, partial amnesia was a more common response given by hypnotic subjects than total amnesia. No mention was made of source amnesia, however. With this slight modification, simulators sometimes exhibited partial rather than total amnesia and, therefore, were in a position to show source amnesia. With this modification, Spanos et al. (1985, Exp. 1) found that their simulating subjects were as likely to be classified as source

amnesic as highly hypnotizable subjects or as a group of subjects that received brief nonhypnotic instructions designed to enhance subjects' motivations and expectancies of success (task motivation instructions; Barber, 1969; Diamond, 1974). In addition, the task motivated subjects were as likely as hypnotic subjects to exhibit source amnesia.

One possible criticism of these findings is that administering information to simulating subjects, but not to the hypnotic subjects, regarding the expectation of partial amnesia exposed these subjects to different experimental demands, and that this resulted in the effect discussed above. To address this criticism, Spanos et al. (1985, Exp. 2) conducted a second study in which one group of hypnotic subjects received the same preliminary information regarding partial amnesia as a simulating group. A third group of hypnotic subjects received no information regarding expected amnesia responding. Results showed that subjects in all three groups exhibited equivalent levels of source amnesia, indicating that the preliminary information regarding amnesia did not affect subjects' source amnesia responding.

In a third experiment, Spanos et al. (1985, Exp. 3) gave one group of highly susceptible hypnotic subjects preliminary information that defined source amnesia as a role-appropriate response. A second group received information that presented source amnesia as one possible response to an amnesia suggestion without being informed that this was a desired response. A third

hypnotic group received no pre-experimental information. Results indicated that subjects who were told that source amnesia was role-appropriate were much more likely to exhibit this response than subjects in either of the other two groups. The other two groups did not differ in incidence of source amnesia.

Taken together, these findings argue against the notion that source amnesia is hypnosis-specific, and suggest that the incidence of this response can be modified by increasing its salience to subjects. Thus, these results fail to support Kihlstrom's (1980) contention that source amnesia represents a dissociation between episodic and semantic components of memory.

A more parsimonious explanation of source amnesia is to be found by analyzing the context of the testing situation (Spanos et al., 1985). When, during amnesia, some subjects correctly answer one of the obscure questions and are quickly asked "How do you know that?" they may interpret this question as implying that they should be amnesic and, hence, not know the answer to the question. In other words, they may interpret this question as an indication that they have failed in their task of being amnesic. Highly susceptible subjects are invested in a self-presentation as deeply hypnotized (Spanos, Radtke & Bertrand, 1984) and may see the question "How do you know that?" as a chance to recover from their previous "failure". Thus by responding with "I don't know where I learned the answer", subjects can maintain a presentation as amnesic despite their previous "slip".

Priming effects. The second line of research cited by

Kihlstrom (1980) in support of the hypothesis of a dissociation between episodic and semantic components of memory draws on the finding that different response patterns to amnesic material are obtained depending upon the particular memory task employed. For example, Williamsen et al., 1965) found that subjects who exhibited recall amnesia for critical words still generated these words as associates in a free association task. As Kihlstrom (1980) pointed out, asking subjects to recall previously learned material is an episodic task, but the generation of associates in a free association paradigm represents a semantic task. Thus, Kihlstrom (1980) cited these results as evidence for his episodic/semantic dissociation hypothesis, suggesting that amnesic material is inaccessible for episodic, but not semantic, tasks.

However, differences in performance on two other memory tasks also have been reported. A number of investigators have found that amnesic subjects' performance on a recognition task was consistently better than on a recall task (Barber & Calverley, 1966; Kihlstrom & Shor, 1978; St. Jean & Coe, 1981; Williamsen et al., 1965), a difference, in fact, noted by Kihlstrom (1977). However, recognition tasks during hypnotic amnesia are obviously episodic in nature because subjects are explicitly asked to recognize the material that they learned earlier in the experiment. These results clearly argue against Kihlstrom's (1980) notion that episodic memory tasks are disrupted during hypnotic amnesia.

In an extension of the Williamsen et al. (1965) study, Kihlstrom (1980) tested subjects on a word association task interpolated between two recall challenges during amnesia. The word association task was structured such that one-half of the stimulus words had the critical words (i.e., the previously learned words for which subjects were supposedly amnesic) as primary associates. The remaining stimulus words had primary associates that were neutral (i.e., not previously learned). Results of this study indicated that subjects exhibited high levels of amnesia for the critical words on both free recall trials. However, the fact that subjects were amnesic for the critical words during these trials did not prevent them from reporting these words as responses during the word association task. In fact, amnesic subjects exhibited a "priming" effect of original learning by generating the supposedly forgotten words on the word association test more often than did controls who originally learned a different list.

In a second study, Kihlstrom (1980) taught subjects a list of words drawn from several taxonomic categories. The procedure in this study followed that of the first, with the exception that the word association test was replaced by a category-instances task. During this test, subjects were presented with a category name (e.g., parts of the human body) and were asked to generate 15 instances of each category. One-half of the categories employed contained the critical words previously learned, while the remaining categories were comprised of neutral words. The

results paralleled those of Experiment 1. Subjects who exhibited substantial recall amnesia for the critical words did not hesitate to report these words during the category-instances task.

Kihlstrom (1980) interpreted these results as supportive of his episodic/semantic dissociation hypothesis. According to this formulation, both the word association and category-instances tasks drew upon semantic components of memory and thus were not affected by the amnesia suggestion. However, a more recent study by Spanos, Radtke and Dubreuil (1982) called this interpretation into question. These investigators proposed that the wording of a typical amnesia suggestion does not convey to subjects the expectation that amnesia for the critical material should generalize to types of memory tasks other than free recall. These suggestions explicitly state that subjects will be unable to recall the critical material. Spanos et al. (1982) tested this hypothesis by giving one group of subjects the standard amnesia suggestion used by Kihlstrom (1980). However, a second group was ~~given~~ a modified suggestion that subtly conveyed to subjects the expectation that amnesia should extend to tasks other than free recall, without explicitly mentioning the word association test. Both groups then underwent the testing sequence described by Kihlstrom (1980).

The results of this study were as predicted. When subjects were given the standard suggestion, they did not display an impairment in generation of the critical words on the word

association task. This replicates the results obtained by Kihlstrom (1980). However, highly susceptible subjects given the modified suggestion showed both reduced recall of the critical words on the recall task and impairments in the generation of the critical words on the word association task.

Recently, de Groh and Spanos (1985) tested Kihlstrom's (1980) hypothesis using a novel paradigm and obtained evidence that the critical material for which subjects were supposedly amnesic remained accessible, and that subjects strategically used this information when performing other tasks. These investigators taught subjects a set of traits for a hypothetical (target) person, and then gave them an amnesia suggestion for the target's traits. Amnesia was scored as present if subjects failed to recall these traits when challenged to describe the target (episodic task). During amnesia, subjects rated the target on related traits (semantic task). For example, when "sociable" was an original target trait learned by the subjects, "talkative" was one of its related traits. According to Kihlstrom (1980), subjects who exhibited impairment in recall on the episodic task should, nonetheless, continue to make use of the "amnesic" material on the semantic task. In other words, if subjects were amnesic for the trait "sociable" they should still have made use of this information during the semantic task, and rate the target as "talkative". Contrary to this hypothesis, amnesic subjects altered their performance on the semantic task, and rated the target's characteristics in the same way as subjects who never

learned the original traits. These subjects showed impairments on both the episodic and semantic tasks, / a finding clearly contradictory to the episodic/semantic dissociation hypothesis.

In a second study, de Groh and Spanos (1985) obtained clear evidence that "amnesic" subjects remain cognizant of the "forgotten" material, and use this information strategically in order to reinforce the impression that they are unable to remember. After receiving an amnesia suggestion for the target's trait "sociable", these subjects rated the target towards the opposite extreme on related traits. For example, these subjects rated the target as "not at all" talkative. On the other hand, control subjects who never learned the trait "sociable" and did not receive an amnesia suggestion rated the target in the mid-range of the "talkative" scale. These results suggest that the amnesic subjects utilized the information they had previously received regarding the target's "sociable" nature to rate the target as "not at all" talkative, and overcompensated in their responses to maintain an impression as amnesic.

The results discussed above suggest that a dissociation between episodic and semantic components of memory is not a viable explanation for hypnotic amnesia. Subjects will exhibit memory impairments on only episodic tasks or on both episodic and semantic tasks depending upon their interpretation of the task demands. In addition, these results extend the previous findings with respect to proactive and retroactive interference indicating that supposedly "amnesic" material remains active and accessible

in memory.

Breaching manipulations

Another line of research that initially arose out of the dissociation hypothesis of amnesia has dealt with attempts to induce subjects to breach (i.e., decrease) amnesia during the suggestion period. This research has addressed the notion that amnesia represents a process that operates without the subject's voluntary control, and that the amnesic material is, in fact, inaccessible to amnesic subjects. The major argument proposed in these studies is that if, using various manipulations, amnesic subjects cannot be induced to breach their amnesia, then they must be experiencing a retrieval deficit that is not under their voluntary control.

Most of the relevant studies on this topic have utilized a modified free recall amnesia testing paradigm in which two recall trials, instead of the usual one, are administered during the amnesia testing period. Interspersed between these two trials have been various types of breaching manipulations. For example, Kihlstrom, Evans, Orne and Orne (1980) interspersed either exhortations for complete honesty in responding between the two recalls or instructions for subjects to try their best to recall on the second trial. Both of these groups exhibited some additional recall on the second trial; however, these manipulations were no more successful in enhancing recall than simply two successive recall trials without intervening instructions. Similar results were obtained in a study by Ham,

Radtke and Spanos (1981).

Other studies have connected subjects to a supposed "lie detector" during the second recall trial in an attempt to induce breaching (Coe & Yashinski, 1985; Howard & Coe, 1980; Schuyler & Coe, 1981). Subjects in these studies breached amnesia to a greater degree than those in the Kihlstrom et al. (1980) and Ham et al. (1981) experiments; however, some highly susceptible subjects continued to display substantial levels of amnesia on the second recall. Still other experiments have exposed subjects to videotaped feedback of the events they failed to recall on the first trial (McConkey & Sheehan, 1981), and obtained similar results. While some breaching was induced, highly susceptible subjects continued to display amnesia.

Results of these studies have been consistent to the extent that while some degree of breaching was obtained with some subjects using each of these manipulations, highly susceptible subjects continued to maintain high levels of amnesia despite the instructions. This pattern of results has led some investigators to conclude that some subjects were unable to recall the material despite the breaching manipulations and that their amnesia was "relatively impervious to reminders, exhortations and demands intended to improve memory" (Kihlstrom et al., 1980, p. 614). Kihlstrom et al. (1980) used the term "pseudo-amnesia" to describe the amnesia exhibited by subjects who are later induced to breach, as compared to the presumably "real" amnesia that is not susceptible to breaching manipulations. It should be noted,

however, that in an earlier paper the term "pseudo-amnesia" was used in reference to subjects who exhibited low levels of recall during amnesia, but failed to show reversibility following amnesia cancellation (Kihlstrom & Evans, 1976). Obviously, Kihlstrom has used "pseudo-amnesia" to describe two quite different responses, and it is unclear what he, in fact, means by this term.

Another possible interpretation for these results is available, however (Spanos, Radtke & Bertrand, 1984). Subjects who obtain high scores on hypnotic susceptibility scales are invested in presenting themselves as being "deeply hypnotized" during a hypnotic session. As a result, they may ignore instructions that, if followed, would compromise this self-presentation (Spanos, 1982; Spanos, Cobb & Gorassini, 1985; Stam & Spanos, 1980). The obvious implication of instructions for complete honesty in responding given after the first recall trial is that subjects were not honest in their previous responses. Likewise, "try hard" instructions carry the implication that subjects were not "trying hard" on their first trial. If subjects responded to these demands, they would be tacitly admitting that they had been less than honest or had not "tried hard" on the first trial. Rather than call into question the legitimacy of their own previous responses, many amnesics may deemphasize breaching manipulations and continue to maintain their amnesia. The advantage of this explanation is that it does not propose that subjects have lost control over their memories, nor does it

postulate an ill-defined dissociative mechanism that operates differentially for low and high susceptible subjects.

Support for this hypothesis was obtained in two recent experiments (Spanos, Radtke & Bertrand, 1984). In Experiment 1, highly susceptible subjects learned a word list and were subsequently administered an amnesia suggestion. All subjects showed high levels of recall amnesia initially, and were then administered the honesty instructions used by Kihlstrom et al. (1980). Despite these instructions, all subjects maintained high levels of amnesia. They were then administered a variation of Hilgard's (1974) hidden observer manipulation which informed them that a "hidden part" remained aware of material of which their "hypnotized part" was unaware. When contact was made with this "hidden part", all subjects breached amnesia completely.

Of course, one possible interpretation of these results is that hypnotic subjects do, in fact, possess hidden parts that can remember and recall amnesic material when their hypnotized parts cannot. This position was tested by Spanos, Radtke and Bertrand (1984) in a second experiment. Highly susceptible amnesic subjects were informed that they possessed two hidden parts, one for each cerebral hemisphere. One-half of the subjects were told that the human brain is specialized so that it stores material of a concrete nature in the right hemisphere, while abstract material is stored in the left hemisphere. The remaining subjects received opposite information concerning storage location. The material learned by these subjects consisted of three concrete

(i.e., high imagery value) words and three abstract (i.e., low imagery value) words. After receiving the honesty instructions used in Experiment 1, contact was made with each of the subjects' hidden parts. The results were straightforward. When contact was made with subjects' "concrete hidden part", all subjects recalled all of the concrete words but none of the abstract words. The opposite pattern of results emerged when subjects' "abstract hidden part" was contacted.

These studies hold implications for two controversial areas of research in hypnosis. First, they support the contention put forth in a number of previous studies that the hidden observer does not reflect the existence of a dissociated subsystem, as formulated by Hilgard (1974; Spanos, 1983; Spanos, Gwynn & Stam, 1983; Spanos & Hewitt, 1980). Instead they suggest that hidden observer responding is an experimental creation that arises out of subjects' attempts to meet task demands and maintain the role of a good hypnotic subject. In addition, these findings suggest that the failure to breach amnesia using the various manipulations discussed above is not a function of subjects' inability to recall the critical material during amnesia. Rather, these findings imply that subjects can be induced to breach amnesia completely when such behaviour is defined to them as consistent with a self-presentation as deeply hypnotized.

Dissipation of amnesia

On the basis of the consistent finding discussed above that subjects tend to recall more material on a second recall trial

during amnesia, Kihlstrom et al. (1980) hypothesized that amnesia tends to spontaneously "wear away" with time. This explanation is supportive of the idea that amnesic subjects have lost control over memory. Despite serious efforts they are unable to recall. With time, however, their "amnesic barrier" tends to "wear down" and dissociated memories are gradually released into consciousness (Kihlstrom, Easton & Shor, 1983). Two studies have directly tested this hypothesis, and the results of both failed to support it (Bertrand, Spanos & Parkinson, 1983; Spanos, Tkachyk, Bertrand & Weekes, 1984). In the first study (Bertrand, Spanos & Parkinson, 1983) subjects who exhibited partial or total amnesia on an initial recall trial were given a second trial either immediately, 60 sec or 120 sec after the initial recall. Subjects in all three groups recalled more target items on the second trial than on the first. However, the length of the delay between trials had no effect on the amount recalled on the second trial.

In the second experiment (Spanos, Tkachyk et al., 1984), amnesic subjects received either no delay or a 15 min delay between recall trials. Once again, recall increased significantly from the first trial to the second, but the magnitude of the increase was unrelated to the length of delay. In summary, the evidence from these studies indicates that subjects recall slightly, but significantly, more target material during a second recall trial. Contrary to the dissipation hypothesis, however, the length of delay between the two trials is unrelated to the

amount recalled on the second trial.

Dubreuil, Spanos and Bertrand (1983) suggested that people typically expect to improve at most things with repeated attempts and, therefore, a second challenge to try to recall might induce an expectancy for heightened recall. Such an expectancy would be strongest for those who initially showed relatively low levels of amnesia. Put differently, subjects most strongly invested in presenting themselves as amnesic would be least likely to show a lessening of amnesia on a second challenge trial. In support of these ideas, Dubreuil, Spanos & Bertrand (1983) found that the amount recalled on a second trial was influenced by simple expectancy information. Subjects who were informed that people usually remember more on a second trial were more likely to show a lessening of amnesia than were uninstructed controls. On the other hand, uninstructed controls recalled significantly more on a second trial than did subjects who were told that people usually recall less on a second trial. Among the uninstructed controls, the degree to which recall increased from the first to the second challenge trial was negatively correlated with degree of initial amnesia and with hypnotic susceptibility.

In summary, the available data fail to support the notion that hypnotic amnesia dissipates spontaneously with time. Instead, whether or not amnesia lessens from a first to a second trial, and the extent of any such lessening, appear to reflect subjects' expectancies and their investment in enacting the amnesic role.

Social Psychological Hypotheses

A number of authors have argued that hypnotic amnesia can best be understood as a strategic enactment carried out by subjects in response to the tasks presented, them in the experimental situation (e.g., Coe, 1978; Spanos, 1986, Spanos & Radtke, 1981, 1982; Wagstaff, 1981). Different responses to amnesia suggestions are seen in different subjects because of the interpretations made by them of the ambiguous demands present in the testing context. The main point of contention between this hypothesis and the dissociation position centers around the notion of voluntary control of response. As outlined above, a major premise of the dissociation hypothesis is that suggested amnesia somehow renders the target material inaccessible to subjects. No matter how hard these subjects try to recall the material, they are simply unable to do so. Conversely, social psychological accounts (variously called the inattention, strategic role enactment or compliance hypotheses) emphasize that during amnesia subjects have not lost the ability to recall, nor is the material somehow locked behind an "amnesic barrier". Instead, subjects are viewed as retaining control of their memorial processes, but as choosing to deploy their attention away from the task of target recall during amnesia. This attentional deployment involves disattending from the retrieval cues that were present during initial encoding of the material, resulting in less efficient recall, or amnesia (Spanos & Radtke, 1981). This hypothesis is based upon Tulving's (1972) model of

encoding specificity. According to this formulation, retrieval from memory is most efficient when the "cognitive environment" during recall matches that present during encoding. Because retrieval cues are present during encoding and serve to assist in tying the material to a specific episodic context, a lack of attention to these cues during retrieval will be detrimental to recall performance.

It is important to distinguish this position from one in which subjects are viewed as faking amnesia and subsequently rating their failure to recall as an involuntary occurrence in an attempt to please the experimenter (Coe, 1983; Sarbin & Allen, 1966). The social psychological perspective regards hypnotic amnesia as a strategic role enactment in which contextual factors guide actors to interpret their goal-directed actions as involuntary happenings (Sarbin, 1983, 1984; Spanos, 1982, in press). The elicitation of suggested amnesia that is rated as feeling nonvolitional can be understood in terms of modern causal attribution models (Bem, 1967, 1972; Bertrand & Spanos, in press). From this perspective, subjects regard their behaviour as involuntary because the context in which it occurs cues them to believe that the behaviour should occur involuntarily. The cultural myths surrounding the notion of hypnosis, coupled with the information conveyed by suggestions, certainly foster a view of hypnotic behaviour as an involuntary happening rather than as a self-generated action. Given these considerations, many subjects engage in the requested behaviour and then disavow

responsibility for this behaviour by focusing on the elements of the context that legitimate attributions of nonvolition. Thus, these subjects may come to interpret their behaviour as an automatic occurrence when, in fact, it was a strategic and purposive response to the demands of the situation (Spanos, Rivers & Ross, 1977).

This formulation has been supported by the results of two recent experiments (Bertrand & Spanos, 1985; Spanos & de Groh, 1984). In both of these studies, hypnotically amnesic subjects frequently reported engaging in some form of cognitive inattention strategy that led to failures in the recall of previously learned material. However, most of these subjects also reported that their amnesia had been an involuntary occurrence. Thus, although subjects were cognizant of the strategies they utilized during the hypnotic tasks, they frequently downplayed or ignored the importance of these strategies in bringing about their amnesia, and instead viewed these responses as involuntary happenings.

Studies that have attempted to provide support for a social psychological interpretation of amnesic responding can be placed within two general categories. On the one hand, some experiments have manipulated subjects' interpretations of the ambiguities in the testing situation, and have studied the resulting modifications in amnesia responses (e.g., Spanos & de Groh, 1984; Spanos, de Groh & de Groot, 1984; Spanos, Stam, D'Eon, Pavlak & Radtke-Bodorik, 1980). On the other hand, some studies have

utilized different pre-amnesia instructions (e.g., hypnosis versus nonhypnotic distraction) to assess directly the effects of inattention to the recall task on amnesia responding (Spanos & Hodorik, 1977; Spanos & D'Eon, 1980; Spanos, McLean & Bertrand, 1985; Tkachyk, Spanos & Bertrand, 1985).

There are two major sources of ambiguity contained in commonly used amnesia suggestions. The wording of the actual suggestion implies both that subjects are to actively do something in order to forget (e.g., "I want you to forget the words"), and that forgetting will occur automatically (e.g., "The words will be gone, gone completely from your memory"). Because of this ambiguous demand, some subjects will interpret the suggestion as a request to direct attention away from the material while others will expect amnesia to "happen" to them and will simply wait for the material to disappear from their memories (Spanos, Stam et al., 1980). The challenge to recall which precedes amnesia cancellation constitutes a second source of ambiguity. Subjects can interpret this challenge as a serious request to refocus attention on the target material during recall. Alternatively, they can deemphasize the challenge by interpreting it as a request to recall target material that happens to come to mind while attention is maintained elsewhere. If these ambiguities are clarified, the inattention hypothesis predicts that substantial modifications in amount of amnesia displayed by subjects will be apparent.

Spanos, Stam et al. (1980) tested this hypothesis in two

studies by manipulating subjects' interpretations of these ambiguities. In the first study, one group of subjects was told that the recall challenge during amnesia should be interpreted as a serious request to actively try to recall. A second group was told that they should view the recall challenge as simply a request to recall whatever words came to mind, but not to let this interfere with the forgetting process. A third group received no special instructions and were simply tested in the standard amnesia paradigm. Within each of these three groups, one-half of the subjects were assigned to a hypnosis condition, and the remaining subjects received nonhypnotic task-motivation instructions. Results of this study indicated that the active interpretation instructions virtually eliminated amnesia in both hypnotic and task-motivated subjects. Passive recall instructions, however, enhanced amnesia for the task-motivated group but not for the hypnotic group (this result will be discussed in greater detail below).

In a second experiment, Spanos, Stan et al. (1980) manipulated instructions concerning how subjects should interpret the amnesia suggestion. One-half of the subjects were told that the suggestion was a request to direct attention away from the list words and to maintain this attention diversion even when challenged to recall. The remaining subjects were not given any special interpretation of the suggestion. Results indicated that more than 75% of the informed subjects showed amnesia, compared to only 36% of uninformed subjects.

In a related study, Spanos, de Groh and de Groot (1984) exposed low susceptible subjects to a training procedure that used modeling and direct instruction to increase hypnotic susceptibility. These training procedures informed subjects that suggested effects are brought about through active participation, but can be made to feel involuntary through absorption in task-related imagining. In a final post-training session, subjects were tested for amnesia. Those who underwent training exhibited higher levels of amnesia than low susceptibles who did not undergo training, and as much amnesia as highly susceptible untrained subjects. In addition, the trained subjects were as likely as the untrained high susceptibles to describe their amnesia as feeling involuntary.

The results of these studies indicated that clarifying the ambiguities present in the amnesia testing situation and informing subjects that they must actively participate in bringing about their amnesia served to substantially modify their responses to the suggestion. These findings argue against dissociation explanations which view amnesia as something that passively "happens" to subjects.

Another line of research has compared amnesia responding under both hypnotic and nonhypnotic conditions. Barber (1969) reviewed a large number of studies which indicated that brief nonhypnotic preliminary instructions (task-motivation instructions) were as effective as a hypnotic induction in increasing responsiveness to most suggestions. In line with this

earlier research, Spanos and Bodorik (1977) assessed amnesia in both hypnotic and task-motivated subjects. The findings obtained in this study, however, were inconsistent with earlier work (Barber & Calverley, 1966; Norris, 1973; Spanos & Ham, 1973; Thorne & Hall, 1974). Spanos and Bodorik (1977) found that 37% of subjects administered a hypnotic induction exhibited some degree of amnesia, compared to only 16% of subjects given nonhypnotic task-motivation instructions. The two groups did not differ on pretested hypnotic susceptibility, indicating that the difference in amount of amnesia found in the two groups could not be attributed to a general lack of responsiveness to suggestion on the part of task-motivated subjects. At first glance, this result appears to support the contention that there is something "special" about a hypnotic induction that renders subjects more susceptible to amnesia. However, this result is equally amenable to an explanation in terms of inattention. As Spanos and Bodorik (1977) pointed out, hypnotic inductions, with their emphasis on decreased arousal (i.e., "sleepy-drowsy" suggestions) and focused attention on bodily sensations, cue subjects to attend to these internal sensations during hypnosis. Thus, attention to the critical material during amnesia will be decreased, resulting in less efficient recall. Task-motivation instructions, on the other hand, typically do not contain instructions to focus attention on bodily sensations. Instead, these instructions are alertness-enhancing and do not provide an alternative attentional focus for subjects during amnesia. This hypothesis was supported

in a study by Spanos, Radtke-Bodorik and Stam (1980; Expt. 2). These investigators found that when alertness-enhancing instructions which also focused on bodily sensations were used in place of standard hypnotic or task-motivation instructions, subjects exhibited levels of amnesia equivalent to those of hypnotic subjects. In addition, as discussed above, Spanos, Stam et al. (1980; Expt. 2) found that instructions for passive recall substantially enhanced amnesia in task-motivated subjects.

Taken together, these results indicate that there is nothing intrinsically "special" about hypnotic procedures in enhancing responsiveness to amnesia suggestions. Instead, they suggest that providing an alternative attentional focus for subjects during amnesia, whether or not the situation is defined as hypnosis, serves to enhance amnesia responding.

A number of studies has directly assessed the inattention hypothesis by comparing the recall of hypnotic subjects with that of subjects given an explicit distraction task to perform during recall (Spanos & D'Eon, 1980; Spanos, McLean & Bertrand, 1985; Tkachyk, Spanos & Bertrand, 1985). These studies employed a Brown-Peterson type distraction task of counting backwards in writing by threes from a three-digit number while recalling the words instead of the administration of an amnesia suggestion. Results of each of these studies indicated that subjects given the distraction task were as likely as subjects given the standard hypnosis-amnesia suggestion paradigm to display "amnesia".

The evidence discussed above suggests that accounts of amnesia which emphasize special psychological processes such as repression or dissociation that operate outside of subjects' volitional control are misleading and unnecessary to an understanding of this phenomenon. Instead, recent research suggests that an analysis of the contextual demands present in the testing situation can lead to a more parsimonious explanation of amnesia.

Hypnotic and Organic Amnesia

Kihlstrom (1980; Kihlstrom & Evans, 1979) has proposed that hypnotic amnesia shares certain "phenotypic" similarities with organically related memory impairments, and that these similarities suggest a "genotypic" similarity as well (Kihlstrom & Evans, 1979, p. 180). On this basis, it has been suggested that studies of hypnotic amnesia may serve as useful laboratory analogues for organic memory impairments. On examination of these phenomena, however, the phenotypic similarities are far from clear.

The most obvious difference between hypnotic amnesia and organic amnesia is the manner in which they are elicited. Organic amnesias are initiated by some central nervous system trauma, while hypnotic amnesia is elicited by simple verbal cues. In addition, hypnotic amnesia is easily and completely terminated by verbal cues. Clearly, this is not the case with organic amnesia, the reversal of which is typically a lengthy process (e.g., Moscovitch, 1982).

Hypnotic amnesia is invariably retrograde in nature. That is, subjects are amnesic for certain specifically suggested past events; their ability to learn new material is not affected. Conversely, organic amnesias often produce a combination of retrograde and anterograde deficits. These patients are often unable to learn new material that is presented after the trauma has occurred (e.g., Moscovitch, 1982).

Yet another obvious difference between these amnesias is that, in the hypnotic case, amnesia only covers that specific material or event for which it is explicitly suggested. Conversely, organic amnesias are more general and typically are not specifically focussed on certain delimited events (e.g., Wood, Ebert & Kinsbourne, 1982).

In support of the similarities between hypnotic and organic amnesia, Kihlstrom (1980) cites research evidence suggesting that hypnotically amnesic subjects, although purportedly unable to recall the critical material, continue to exhibit evidence of savings for this material when tested on other non-recall tasks. For example, Williamsen et al. (1965) found that subjects who were amnesic for a word list during recall were nevertheless able to decipher degraded forms of these words more quickly than nonamnesic subjects. As well, Kihlstrom (1980) suggested that the results he obtained on the word association task implied a similar type of unconscious influence of amnesic material. However, as discussed above, the results of the Spanos, Radtke, and Dubreuil (1982) experiment suggested that Kihlstrom's (1980)

effect was the result of subjects' interpretation of the amnesia suggestion.

Nevertheless, results similar to those reported by Kihlstrom (1980) have been reported in studies conducted with organically amnesic patients. Although these patients are frequently unable to recall new learning episodes, they will occasionally exhibit savings for new material on novel tasks such as assembling a jigsaw puzzle (Brooks & Baddeley, 1976), using a new mathematical rule (Kinsbourne & Wood, 1975), and spelling the low frequency forms of homophone pairs when these forms were heard earlier in conversation (Jacoby & Witherspoon, 1982). However, these patients typically exhibit almost total recognition as well as recall deficits (e.g., Jacoby & Witherspoon, 1982). On the other hand, hypnotic subjects who perform at a low level on recall tasks frequently perform better on recognition tasks (e.g., Barber & Calverley, 1966; Kihlstrom & Shor, 1978; St. Jean & Coe, 1981; Williamsen et al., 1965). This pattern of results once again argues against the similarity of hypnotic and organic amnesia.

The Present Investigation

The suggestion that hypnotic amnesia shares certain similarities with organic amnesias has been made by some investigators (e.g., Evans, 1979; Kihlstrom, 1985; Kihlstrom & Evans, 1979). This claim, however, has not been substantiated by empirical data, but rather has been based upon various perceived similarities between the two phenomena (see discussion above).

The present investigation contains two experiments which employed a modification of a paradigm that has been used to study memory impairment in patients suffering from Korsakoff's psychosis with hypnotic subjects in an attempt to assess similarities in the pattern of results obtained with the two phenomena.

Jacoby and Witherspoon (1982) exposed Korsakoff's patients to the low frequency forms of various homophone pairs (i.e., words that are phonetically identical but have different spellings and different meanings) in the context of asking the patients a series of questions (e.g., "Name a musical instrument that employs a reed."; low frequency form of the homophone pair read-reed). After presentation of these questions, the subjects were administered a spelling task that included the previously presented homophones as well as neutral words. Subsequent to the spelling task, a recognition task again including both homophone and neutral words was administered. Results indicated that these subjects tended to spell the low frequency forms of the homophone pairs, even though they failed to recognize these words on the recognition task. These findings suggest that these subjects experienced some degree of savings for the previously presented words, and these words affected their subsequent behaviour, even though they were unable to recognize the items.

Experiment 1 of the present investigation employed a modification of this paradigm with hypnotically amnesic and nonamnesic subjects. The homophone and neutral words were presented in a paired associate learning task rather than in the

context of questions to be answered. The target words were presented until subjects obtained a learning criterion of two successive correct recalls. This modification ensured that all subjects learned the critical material to the same degree initially, and thus provided high, stable baseline levels of initial learning against which subjects' subsequent behaviour could be compared.

Due to the structure of the learning situation in the Jacoby and Witherspoon (1982) study, as well as the nature of the memory impairment presented by their patients, the assessment of recall in addition to recognition was not possible. However, in the hypnotic amnesia literature recall typically has been the method used to assess memory savings. The modifications made to the learning task in the present studies enabled the unambiguous assessment of both recall and recognition.

In addition, an appropriate control group was not included in the Jacoby and Witherspoon (1982) experiment. These authors assumed that previously hearing the low frequency forms of the homophones within the questions primed the spelling of these forms on the subsequent task. However, this conclusion cannot be directly inferred on the basis of their data. In order to state unambiguously that previously hearing the low frequency words primed these words and led to their generation on the spelling task, subjects should have been exposed to both low and high frequency forms of different homophones. Only if they spelled the form of the homophones that they had heard previously could the

priming effect be assumed. The present experiments included a low/high frequency homophone manipulation as a within subjects variable.

It was predicted that the high susceptible/amnesia suggestion group would exhibit a considerable degree of amnesia for the previously learned words on the tests of recall, but that they would exhibit a priming effect of this material on the spelling task. This effect would result in subjects spelling the forms of the homophones that they had learned earlier. On the basis of previous research, it was expected that subjects who exhibited recall amnesia would perform better on the recognition task, but would still exhibit some degree of amnesia (e.g., Williamsen et al., 1965). Subjects in the low susceptible/amnesia suggestion, low susceptible/no amnesia suggestion, and high susceptible/ no amnesia suggestion groups were expected to show no impairments on the recall or recognition tasks, and to spell the forms of the homophones that they previously learned. This pattern of results would not be consistent with Jacoby and Witherspoon's (1982) reported findings with Korsakoff's patients. Although these patients did exhibit a priming effect on the spelling task, their recognition memory was virtually nonexistent. Thus, these results would argue against a common process underlying hypnotic amnesia and the memory impairment presented by organically amnesia patients.

According to Kihlstrom (1980) hypnotically amnesic subjects cannot recall the specific episode of learning the critical

material and thus cannot produce this material on a recall task. However, these items are supposedly primed in semantic memory, which leads to the higher frequency with which they are given as associates on the word association task. Experiment 2 of the present investigation varied the information given to hypnotic subjects regarding the influence of amnesic material on other non-recall memory tasks. This manipulation attempted to illustrate that the priming effect discussed by Kihlstrom (1980) could either be obtained or not obtained depending upon subjects' interpretation of the amnesia suggestion.

One group of subjects represented a replication of the high susceptible/amnesia suggestion group tested in Experiment 1. The "Modified Suggestion" group received a suggestion implying that amnesic material is so deeply hidden during hypnosis that it cannot influence performance on any other task. This manipulation was expected to eradicate the priming effect. Such a result would suggest that, contrary to the position supported by Kihlstrom (1977, 1980, 1985), hypnotic subjects do not lose control of their memory processes during amnesia, but rather moderate their performance strategically to meet the task they are given.

EXPERIMENT 1

MethodSubjects

Thirty-two Carleton University undergraduates (24 females, 8 males; mean age 22.3 years) who had previously been tested on the Carleton University Responsiveness to Suggestion Scale (CURSS; Spanos, Radtke, Hodgins, Stam, & Bertrand, 1983b; see Appendix A) were recruited to participate in a one-session experiment involving hypnosis and memory. One-half of the subjects ($n=16$) scored in the upper range (4-7) on the Objective dimension of this scale (CURSS:O) and passed the amnesia suggestion; the remaining subjects ($n=16$) scored in the low range (0-2) on CURSS:O and did not pass the amnesia suggestion. All subjects received credit towards the experimental participation requirement for their introductory psychology course or \$5.00.

Design

The study was designed as a 2X2X2 mixed factorial with two between subjects variables (high/low susceptibility X amnesia/no amnesia suggestion) and one within subjects variable (high/low frequency homophones). One-half of the subjects in each of the high and low susceptibility groups was randomly assigned to receive an amnesia suggestion and the remaining subjects did not receive a suggestion.

All subjects initially learned four high and four low frequency forms of eight homophones (see Appendix B). Within each

of the four groups discussed above, one-half of the subjects learned the high frequency forms of the first four homophones (e.g., fair instead of fare) and the low frequency forms of the second four homophones (e.g., soar instead of sore); the remaining subjects underwent the converse pattern of learning.

Stimulus Material

Eight homophone pairs were selected from the norms of Galbraith and Taschman (1969) based on the following criteria: (a) the probability of writing the low frequency form of the homophone on a spelling task was less than .25 in the normative sample, and the corresponding probability for the high frequency units was greater than .75; (b) none of the homophone pairs was a member of a larger homophone set (e.g., homophone triplet, etc.; as assessed by Whitford, 1966); (c) each of the pairs began with a different letter; and (d) all of the homophone units were monosyllabic. Each homophone pair had a different consonant associated with it for use in the paired associate learning task (see Appendix C).

Four nonhomophone monosyllabic words and four different consonants were selected for use as neutral items in the initial learning, spelling, and recognition tasks (see Appendix D). In addition, eight different homophone and four different nonhomophone words were selected as "filler" items for the spelling task (see Appendix E), and another (different) eight homophone pairs and four nonhomophone words were selected as "filler" items for the recognition task (see Appendix F).

Procedure

All subjects were tested in a one-hour session by the same male experimenter. Upon arrival at the experimental room, the high and low susceptible subjects were randomly assigned to either the amnesia or no amnesia group.

All subjects initially received a hypnotic induction procedure (see Appendix G). This 10 min procedure was administered live and contained information designed to (a) dispel myths and anxieties about hypnosis; (b) increase relaxation; and (c) define the situation as hypnosis. Following the induction, subjects received instructions explaining the paired associate learning procedure and the method of assessing recall (see Appendix H). The letter and word pairs were then projected on a screen one at a time for 5 sec each. The screen was located directly in front of the subject. Each subject was presented with twelve pairs; eight of these pairs contained a homophone unit as the associate (e.g., B - fair), and the remaining four pairs contained neutral, nonhomophone associates (e.g., J - sleep, C - star). Following each presentation of the twelve pairs, the projector was turned off and a sheet of paper containing only the stimulus letter to each pair was placed in front of the subject. Subjects were asked to write down the word that was presented with the letter written on the sheet. They were allowed 1 min for recall. This sequence continued until subjects correctly wrote down all of the response words on two successive trials. The last learning trial was treated as the

first recall trial (T1) for analysis purposes. The order of presentation of the pairs was independently randomized on each learning trial. The next phase of the experiment varied depending upon subjects' amnesia group assignment.

Amnesia groups. One group of low susceptible subjects and one group of high susceptibles received an amnesia suggestion based on one used by Spanos and Bodorik (1977). This suggestion informed them that they would be unable to remember any of the response words they had learned until the suggestion was later cancelled via a prearranged cue (see Appendix I). Following administration of the suggestion, subjects' recall was again tested in the same manner described above (T2).

Following T2, subjects received instructions regarding the spelling task (see Appendix J). They were informed that the experimenter would read a list of words that they were to spell on a sheet of blank paper located in front of them. The words consisted of the eight homophone and four nonhomophone words previously learned, as well as eight homophone and four nonhomophone neutral words that were not previously learned. A different random order of these words was determined for each subject. The experimenter then read the list of words, pausing after each to allow the subject to write it down. If the subject had not written a response after 15 sec the experimenter moved on to the next word. Upon completion of the spelling task, recall was once again assessed as described above (T3).

Subjects were then administered instructions informing them

that a list of words would be projected one at a time on the screen (recognition task; see Appendix K). They were asked to determine if the word on the screen had been learned earlier in the session. When they had made their decision they were asked to say "Old" for words they remembered learning earlier or "New" for words that they did not remember learning previously. When they had made their response, the experimenter advanced the projector to the next word. The order of word presentation was independently randomized for each subject. The word list consisted of the previously learned homophone and nonhomophone words, plus the unlearned alternate forms of the homophones, as well as eight new homophone pairs (e.g., gate - gait) and four new nonhomophone neutral words (different from those used in the spelling task) that were not previously learned. A final amnesia recall trial followed the recognition task (T4). Amnesia was then cancelled via the prearranged cue, and a post-amnesia recall trial followed (T5).

Upon completion of the final recall trial (T5), subjects were administered wake-up instructions (see Appendix L). They were then debriefed, provided their course credit, and dismissed.

No amnesia groups. The procedure for these groups paralleled that discussed above for the amnesia groups, with the exception that the amnesia suggestion and cancellation cue were omitted. All other procedures were replicated.

Results

Recall and Recognition Amnesia

Recall amnesia was defined in terms of reversibility. The number of words not recalled on a during amnesia recall trial that was recalled after amnesia cancellation (T5) was summed to yield a single amnesia score for each subject on each trial (T2,T3,T4). The number of subjects within each group displaying amnesia on at least one recall trial is presented in Table 1.

The primary index of recognition amnesia was the number of previously learned words to which subjects responded "New" (i.e., the number of "misses"). This index was chosen so that the range of recognition amnesia scores would parallel that of recall amnesia (0-12), thus rendering these two indexes commensurate for analysis purposes. The number of subjects within each group displaying recognition amnesia according to this criterion is presented in Table 2.

A 2X2 between subjects analysis of variance (ANOVA; low/high susceptibility X no amnesia/amnesia suggestion) conducted on number of words recalled following the suggestion period (T5) yielded no significant main effects or interaction (see Table 3). Thus, regardless of their recall performance during amnesia, subjects recalled at equivalent levels following cancellation.

In order to examine levels of recall and recognition amnesia across trials, a 2X2X4 mixed ANOVA with two between subjects variables (low/high susceptibility X no amnesia/amnesia

Table 1
Number of Subjects within Each Group
Displaying Recall Amnesia

	Low Susceptible		High Susceptible	
	No Amnesia Suggestion	Amnesia Suggestion	No Amnesia Suggestion	Amnesia Suggestion
Amnesia	2	2	2	8
No Amnesia	6	6	6	0

Table 2
Number of Subjects within Each Group
Displaying Recognition Amnesia

	Low Susceptible		High Susceptible	
	No Amnesia Suggestion	Amnesia Suggestion	No Amnesia Suggestion	Amnesia Suggestion
Amnesia	2	1	0	6
No Amnesia	6	7	8	2

Table 3

Summary Table for Susceptibility X Amnesia ANOVA
on Post-cancellation Recall Scores

Source	<u>df</u>	<u>MS</u>	<u>F</u>	
Susceptibility (A)	1	.000	<1	
Amnesia (B)	1	.500	<1	
A X B	1	2.000	2.67	
Subjects within groups	28	.750		

suggestion) and one within subjects variable (3 amnesia recall trials and 1 amnesia recognition trial) was conducted on amnesia scores. All of the main effects and two-way interactions were significant (see Table 4); however, these significant effects were not examined further because they were qualified by a significant three-way interaction, $F(3,84) = 3.57, p < .05$. The means for this interaction are presented in Table 5.

This interaction was further examined with a series of simple effects analyses. The simple interaction of Susceptibility X Trials for No amnesia suggestion subjects (AB at c1) was nonsignificant, $F(3,84) < 1$, indicating that amnesia levels did not differ on any trial for high and low susceptible subjects who did not receive an amnesia suggestion.

The simple interaction of Susceptibility X Trials for Amnesia suggestion subjects (AB at c2) did attain significance, $F(3,84) = 7.52, p < .001$, and was further explored with a series of simple simple main effects analyses. The within group simple simple main effect for Trials conducted on the low susceptible/amnesia suggestion group (B at a1c2) was not significant, $F(3,84) < 1$, indicating that these subjects did not differ on amount of amnesia across the recall and recognition trials. The simple simple main effect for Trials conducted on the high susceptible/amnesia suggestion group (B at a2c2) was significant, $F(3,84) = 15.95, p < .001$, indicating differences in amnesia scores across trials. These differences were examined with a Newman-Keuls post hoc analysis. Results indicated that

Table 4

Summary Table for Susceptibility X Amnesia X Trials

ANOVA on Amnesia Scores

Source	<u>df</u>	<u>MS</u>	<u>F</u>
Susceptibility (A)	1	247.530	12.79**
Amnesia (C)	1	253.130	13.08**
A X C	1	312.500	16.15**
Subjects within groups	28	19.350	
Trials (B)	3	8.135	5.07*
A X B	3	6.385	3.98*
C X B	3	5.688	3.55*
A X C X B	3	5.729	3.57*
AB at c1	3	.057	<1
AB at c2	3	12.057	7.52**
B at a1c2	3	.344	<1
B at a2c2	3	76.750	15.95**
B X Subjects within groups	84	1.603	
A at b1c2	1	256.000	42.38**
A at b2c2	1	144.000	23.84**
A at b3c2	1	138.060	22.86**
A at b4c2	1	56.250	9.31*
Pooled error	43	6.040	

* $p < .01$

** $p < .001$

Table 5
Mean Amnesia Scores for Susceptibility X
Amnesia X Trials Interaction

		No Amnesia			
Susceptibility		1	2	3	4
Low	<u>M</u>	.500	.500	.250	.375
	<u>sd</u>	.756	.756	.463	.744
High	<u>M</u>	.250	.000	.000	.000
	<u>sd</u>	.463	.000	.000	.000

		Amnesia			
Susceptibility		1	2	3	4
Low	<u>M</u>	.250	.000	.000	.125
	<u>sd</u>	.463	.000	.000	.354
High	<u>M</u>	8.250 _a	6.000 _{ab}	5.875 _{ab}	3.875 _b
	<u>sd</u>	3.536	5.581	5.436	4.581

Note. For all means, $n = 8$. Within the high susceptible/amnesia group, means sharing the same subscripts failed to differ significantly, $p = .05$. None of the other means differed significantly. (1 = Recall trial 1; 2 = Recall trial 2; 3 = Recall trial 3; 4 = Recognition trial).

amnesia scores on the recognition trial were significantly lower than amnesia scores on the first recall trial. No other pair-wise comparisons were significant.

Between groups simple main effects conducted on each trial indicated that high susceptible/amnesia suggestion subjects showed significantly more amnesia than low susceptible/amnesia suggestion subjects on T2 (A at b1c2), $F(1,43) = 42.38$, $p < .001$, T3 (A at b2c2), $F(1,43) = 23.84$, $p < .001$, T4 (A at b3c2), $F(1,43) = 22.86$, $p < .001$, and on the recognition task (A at b4c2), $F(1,43) = 9.31$, $p < .01$. In other words, high susceptible/amnesia suggestion subjects consistently exhibited higher levels of amnesia across trials and tasks than did low susceptible/amnesia suggestion subjects.

Supplementary recognition analysis. Due to the controversy surrounding the appropriate index of recognition amnesia, an additional measure was calculated and analyzed with a 2X2 (low/high susceptibility X no amnesia/amnesia suggestion) between subjects ANOVA.

This index reflected the total number of errors made on the recognition task and was calculated by summing the number of old words to which subjects responded "New" (i.e., "misses") and the number of new words to which subjects responded "Old" (i.e., "false alarms"). The ANOVA conducted on these scores resulted in a significant Susceptibility X Amnesia interaction, $F(1,28) = 11.03$, $p < .01$ (see Table 6). The means involved in this interaction were compared with a Newman-Keuls post hoc analysis

Table 6

Summary Table for Susceptibility X Amnesia ANOVA
on Supplementary Recognition Amnesia Scores

Source	<u>df</u>	<u>MS</u>	<u>F</u>
Susceptibility (A)	1	24.500	2.91
Amnesia (B)	1	24.125	2.86
A X B	1	91.125	11.03*
Subjects within groups	28	8.259	

* $p < .01$

which indicated that high susceptible/ amnesia suggestion subjects exhibited significantly more errors on the recognition task than any other group (see Table 7). None of the other groups differed on this measure. In short, the two recognition measures yielded the same results.

Spelling Task Results

Neutral items. For each subject, the number of high and low frequency forms of the neutral (i.e., not previously learned) homophones generated on the spelling task were summed. These scores were analyzed with a 2X2X2 mixed ANOVA with two between subjects variables (low/high susceptibility X no amnesia/amnesia suggestion) and one within subjects variable (high/low frequency forms of homophones; see Table 8). This analysis yielded a significant high/low homophone main effect, $F(1,28) = 173.02$, $p < .001$, indicating that, in the absence of previous exposure to either form of these words within the experimental context, subjects were more likely to generate the high frequency forms, $M = 6.34$, $sd = 1.15$, than the low frequency forms, $M = 1.41$, $sd = 1.16$. These results suggest that the priming effects discussed below reflect the prior learning of the homophones, and would not be expected in the absence of this learning.

Priming effects. For each subject, the number of low and high frequency homophones primed during the spelling task was summed. These scores were subjected to a 2X2X2 mixed ANOVA with two between subjects variables (low/high susceptibility X no amnesia/amnesia suggestion) and one within subjects variable (high/low frequency forms of homophones; see Table 8). This analysis yielded a significant high/low homophone main effect, $F(1,28) = 173.02$, $p < .001$, indicating that, in the absence of previous exposure to either form of these words within the experimental context, subjects were more likely to generate the high frequency forms, $M = 6.34$, $sd = 1.15$, than the low frequency forms, $M = 1.41$, $sd = 1.16$. These results suggest that the priming effects discussed below reflect the prior learning of the homophones, and would not be expected in the absence of this learning.

Table 7

Mean Supplementary Recognition Scores for
Susceptibility X Annesia Interaction

Susceptibility

Low

High

No Annesia

 $\frac{M}{sd}$

 2.000_a
0.742

 0.575_a
0.742

Annesia

 $\frac{M}{sd}$

 0.250_a
0.463

 0.575_b
0.270

Note. For all means, $n = 8$. Means sharing the same subscript fail to differ significantly, $p = .05$.

Table 8

Summary Table for Susceptibility X Amnesia X Homophone Form
ANOVA on Number of Neutral Words Generated on Spelling Task

Source	<u>df</u>	<u>MS</u>	<u>F</u>
Susceptibility (A)	1	.062	<1
Amnesia (C)	1	.062	<1
A X C	1	.250	2.67
Subjects' within groups	28	.094	
High/Low Homophone (B)	1	390.060	173.02*
A X B	1	.250	<1
C X B	1	9.000	3.99
A X C X B	1	7.562	3.35
B X subjects within groups	28	2.254	

* $p < .001$

(low/high homophones). This analysis yielded a significant low/high homophone effect, $F(1,28) = 11.71$, $p < .01$, indicating that high frequency words, $M = 4.00$, $sd = .000$, were more likely to be generated on the spelling task than were low frequency words, $M = 3.59$, $sd = .665$ (see Table 9). Importantly, neither the two-way interaction of no amnesia/amnesia X low/high homophones, nor the three-way interaction, approached significance. In short, high susceptibles who received the amnesia suggestion primed in the same manner as subjects in all other treatments.

To assess the priming of words for which recall amnesia had been previously shown, two proportion scores were calculated for each subject. For three groups (low susceptible/no amnesia; low susceptible/amnesia; high susceptible/no amnesia) these scores reflected the proportion of low and high spellings out of the total number of low and high words recalled on the first amnesia recall trial. For the high susceptible/amnesia group these proportions were calculated as the number of low and high frequency homophones primed out of the total number of these words for which recall amnesia was shown on the first amnesia recall trial. If the amnesic subjects primed words for which they had previously shown amnesia, one would expect no between group differences in this analysis. A 2X2X2 mixed ANOVA with two between subjects factors (low/high susceptibility X no amnesia/amnesia suggestion) and one within subjects factor (low/high homophones) was conducted on these proportion scores.

Table 9

Summary Table for Susceptibility X Amnesia x Low/High
Homophone ANOVA on Number of Homophones Primed

Source	<u>df</u>	<u>MS</u>	<u>F</u>
Susceptibility (A)	1	.141	<1
Amnesia (C)	1	.391	1.73
A X C	1	.016	<1
Subjects within groups	28	.225	
Low/High Homophone (B)	1	2.641	11.71*
A X B	1	.141	<1
C X B	1	.391	1.73
A X C X B	1	.225	<1
B X subjects within groups	28	.225	

*p < .01

The only significant effect was a main effect for the high/low homophone factor, $F(1,28) = 11.71$, $p < .01$ (see Table 10) which indicated that subjects were more likely to exhibit priming for previously learned high homophones, $M = 1.00$, $sd = .000$, than for low frequency homophones, $M = .898$, $sd = .166$. In fact, as can be seen by comparing Tables 9 and 10, this analysis yielded identical F ratios to the preceeding ANOVA. This finding indicates that all subjects exhibited priming for all of the words for which they had previously shown recall amnesia. The absence of any other significant effects in this analysis indicates that subjects' amnesia recall performance did not affect their subsequent priming of previously learned homophones on the spelling task.

Table 10

Summary Table for Susceptibility X Amnesia X Low/High

Homophone ANOVA on Proportion of Homophones Primed

Source	<u>df</u>	<u>MS</u>	<u>F</u>
Susceptibility (A)	1	.009	<1
Amnesia (C)	1	.024	1.73
A X C	1	.001	<1
Subjects within groups	28	.014	
Low/High Homophone (B)	1	.160	11.71*
A X B	1	.009	<1
C X B	1	.024	1.73
A X C X B	1	.001	<1
B X subjects within groups	28	.014	

* $p < .01$

Discussion

The results of this experiment support previous research (e.g., Kihlstrom, 1980; Spanos, Radtke & Dubreuil, 1982) which found that items for which subjects exhibited amnesia on an episodic task continued to be generated on a semantic task. We found no significant differences between the groups in priming of the previously learned homophones on the spelling task. Thus, neither subjects' susceptibility level nor the presence or absence of an amnesia suggestion affected priming. Also, the fact that subjects in the high susceptible/amnesia suggestion group exhibited significantly more amnesia across trials and tasks (i.e., recall and recognition) than subjects in the other groups indicates that their status as amnesic did not preclude the priming effects. The only difference observed in priming was between the low and high frequency forms of the homophones: if subjects made errors on the spelling task, these errors were invariably on the low frequency forms of the homophones. This result indicates that intrusions of the high frequency forms of the previously learned low frequency homophones occasionally occurred. However, these intrusions were unrelated to subjects' group assignment, and probably reflect the fact that the high frequency forms had been encountered more often in contexts other than the experimental session (hence their status as high frequency).

The results obtained on the recognition task also replicate previous findings (e.g., Barber & Calverley, 1966; Kihlstrom &

Shor, 1978; St. Jean & Coe, 1981). In all of these studies, some subjects exhibited recognition amnesia, although invariably not at the same level as that found with recall amnesia. As with recall amnesia, the presence or absence of recognition amnesia did not affect subjects' priming performance.

The findings on the priming task were not inconsistent with either the episodic/semantic dissociation hypothesis or the social psychological formulation. The spelling task was a semantic one, and therefore the dissociation position predicts that the amnesic words should be generated on this task. However, because the amnesia suggestion was worded in such a way as to imply that only recall deficits were expected, the social psychological hypothesis also predicts the obtained priming effect on the spelling task (cf., Spanos, Radtke & Dubreuil, 1982). If, however, changes are made in the wording of the amnesia suggestion to convey to subjects the expectation that amnesia should occur on other types of memory tasks, the social psychological position predicts that subjects should exhibit deficits on both episodic and semantic tasks. Conversely, the episodic/semantic dissociation hypothesis views amnesia as an automatic process, and thus predicts that manipulating subjects' interpretations of the task would not influence this dissociative process. Investigators arguing from this perspective do not acknowledge the role of social psychological factors in influencing hypnotic behaviour (e.g., Kihlstrom, 1985). However, such factors are viewed as operating in addition to the basic

dissociation that characterizes hypnosis. Thus, if the amnesia suggestion is modified in such a way as to imply to subjects that semantic as well as episodic deficits are expected, proponents of this position could argue that the critical material is primed in semantic memory, but that subjects may simply comply by withholding the primed words on the semantic task and replacing them with unprimed associates. If, however, the amnesia suggestion not only implies that episodic and semantic deficits are appropriate, but also that subjects will be amnesic for the suggestion itself, the dissociation position predicts no decrements on the semantic task. After all, subjects who are unaware of having received a suggestion must also be unaware of demands to modify their spelling performance. Consequently, from a dissociation perspective hypnotically amnesic subjects who receive the altered suggestion should continue to show priming effects on the spelling task.

Conversely, the social psychological position holds that amnesic subjects do not lose control over memory functions. These subjects retain their ability to access "forgotten" information, and therefore, when the situation calls for it, are able to modify their amnesic displays to meet contextual demands even when the information conveying the demands is supposedly "forgotten". Therefore, the social psychological position predicts that amnesic subjects will respond strategically to the demands contained in the altered suggestion, and hence will exhibit both episodic and semantic deficits.

To assess these two competing hypotheses within this novel amnesia testing paradigm, a second experiment was conducted. This study modified the information contained in the amnesia suggestion in an attempt to manipulate subjects' interpretations of the expected responses on the various tasks.

EXPERIMENT 2

MethodSubjects

Twenty Carleton University undergraduates (14 females, 6 males; mean age 19.2 years) were recruited to participate in a one-hour experiment on hypnosis and memory. All subjects scored in the upper range (4-7) in pretesting on CURSS:O, and passed the amnesia suggestion on this scale. None had previously participated in Experiment 1. All subjects received course credit or \$5.00 for their participation.

Stimulus Material

The words employed in Experiment 1 were also used as the stimulus material in Experiment 2.

Procedure

Upon arrival at the experimental room, subjects were randomly assigned to one of two experimental groups with the restriction of an equal number of subjects ($n=10$) per group. Group 1 represented a replication of the high susceptible/amnesia group tested in Experiment 1. The "Modified Suggestion" group also underwent the same procedure; the only difference was the wording of the amnesia suggestion. This group received a suggestion implying that, during amnesia, the words that they previously learned would be so deeply hidden that they would not influence subjects' performance on any other task, no matter what they would be asked to do. They were also informed that they

would be amnesic for the fact that they had received a suggestion (see Appendix M).

Following completion of the experimental procedure, subjects were debriefed, provided their course credit, and dismissed.

Results

Recall and recognition amnesia

As in the previous experiment, recall amnesia was defined as the number of words not recalled on a during amnesia recall trial that were recalled following amnesia cancellation. Thus, each subject received an amnesia score for each during amnesia trial (T2, T3, T4). The number of subjects in each group displaying recall amnesia on at least one recall trial is presented in Table 11.

The primary index of recognition amnesia was once again the number of old items to which subjects responded "New" (i.e., "misses"). The number of subjects within each group displaying recognition amnesia according to this criterion is presented in Table 12.

A one-way between subjects ANOVA with two levels (standard/modified suggestion) conducted on number of words recalled following amnesia cancellation was nonsignificant, $F(1,18) < 1$ (see Table 13). Thus, subjects in the two treatment conditions did not differ on reversibility following amnesia cancellation.

To examine levels of recall and recognition amnesia for the two groups across trials a 2 X 4 mixed ANOVA with one between subjects variable (standard/modified suggestion) and one within subjects variable (3 recall trials and 1 recognition trial) was conducted on amnesia scores. Both the main effects for suggestion

Table 11
Number of Subjects within Each Group
Displaying Recall Amnesia

	Standard Suggestion	Modified Suggestion
Amnesia	9	9
No Amnesia	1	1

Table 12

Number of Subjects within Each Group

Displaying Recognition Amnesia

Standard
SuggestionModified
Suggestion

Amnesia

3

9

No Amnesia

7

1

Table 13

Summary Table for Standard/Modified Suggestion

ANOVA on Post-cancellation Recall Scores

Source	<u>df</u>	<u>MS</u>	<u>F</u>
Suggestion	1	0.200	<1
Subjects within groups	18	0.444	

type and trials were significant; however, they were not further explored because of a significant Suggestion $\times$ Trials interaction, $F(3,54) = 7.69$, $p < .001$ (see Table 14). The means for this interaction are presented in Table 15.

This interaction was further explored with a series of simple main effects analyses. The within-group simple main effect of Trials for subjects in the Modified Suggestion group (B at a2) was not significant, $F(3,54) < 1$, indicating that these subjects did not differ on level of amnesia across trials or tasks.

The simple main effect of Trials for subjects in the Standard Suggestion treatment (B at a1) did attain significance, $F(3,54) = 112.77$, $p < .001$, and was further explored with a Newman-Keuls post hoc analysis. These pair-wise comparisons indicated that recall amnesia levels decreased from the first trial to the second, and remained at the same level on the third trial. In addition, levels of recognition amnesia were significantly lower than levels of recall amnesia on the first trial, and did not differ from levels of recall amnesia on the second or third trial.

Between-groups simple main effects indicated that the two treatments did not differ in amnesia levels on the first recall trial (A at b1), $F(1,36) < 1$. However, these groups did differ on amount of amnesia on T3 (A at b2), $F(1,36) = 10.20$, $p < .01$, T4 (A at b3), $F(1,36) = 16.20$, $p < .001$, and on the recognition task (A at b4), $F(1,36) = 17.78$, $p < .001$. In short, while subjects in both groups exhibited equivalent levels of amnesia initially,

Table 14

Summary Table for Suggestion X Trials

ANOVA on Amnesia Scores

Source	<u>df</u>	<u>MS</u>	<u>F</u>
Suggestion (A)	1	423.200	12.63*
Subjects within groups	18	33.506	
Trials (B)	3	73.367	14.19**
A X B	3	39.767	7.69*
B at a1	3	112.770	21.82**
B at a2	3	3.870	<1
B X subjects within groups	54	5.168	
A at b1	1	1.250	<1
A at b2	1	125.000	10.20*
A at b3	1	198.450	16.20**
A at b4	1	217.800	17.78**
Pooled error	36	12.253	

* $p < .01$ ** $p < .001$

Table 15

Mean Amnesia Scores for Suggestion X

Trials Interaction

		Trials			
		1	2	3	4
Standard Suggestion	<u>M</u>	7.800 ¹	2.300 ¹	1.600 ¹	0.300 ¹
	<u>sd</u>	3.553 ^a	3.743 ^b	3.062 ^b	0.483 ^b
Modified Suggestion	<u>M</u>	8.300 ¹	7.300 ²	7.900 ²	6.900 ²
	<u>sd</u>	3.713 ^a	4.138 ^a	4.202 ^a	3.635 ^a

Note. For all means, $n = 10$. Within a row, means sharing the same letter subscript fail to differ significantly; within a column, means sharing the same number superscript fail to differ significantly, $p = .05$. (1 = Recall trial 1; 2 = Recall trial 2; 3 = Recall trial 3; 4 = Recognition trial).

subjects in the Standard Suggestion condition showed a decrease in amnesia across trials, while subjects in the Modified Suggestion group maintained high and equivalent levels of amnesia across trials and tasks.

Supplementary recognition analysis

As in Experiment 1, an additional index of recognition amnesia was calculated as the sum of the old items to which subjects responded "New" ("misses") and the number of new items to which subjects responded "Old" ("false alarms"). The resulting scores were analyzed with a one-way between subjects ANOVA with two levels (standard/modified suggestion). A significant effect for suggestion type, $F(1,18) = 24.19, p < .001$ (see Table 16), indicated that subjects in the Standard Suggestion group exhibited less recognition amnesia, $M = 1.00, sd = 1.491$, than subjects in the Modified Suggestion condition, $M = 7.40, sd = 3.836$. Thus, the results with this index of recognition amnesia paralleled those obtained with the index discussed above.

Spelling task results

Neutral items. For each subject, the number of high and low frequency forms of the neutral (i.e., not previously learned) homophones generated on the spelling task was summed. These scores were analyzed with a 2 X 2 mixed ANOVA with one between subjects factor (standard/modified suggestion) and one within subjects variable (high/low homophones). This analysis yielded a significant high/low homophone main effect, $F(1,18) = 105.65, p < .001$ (see Table 17). This effect indicated that subjects were

Table 16
Summary Table for Standard/Modified Suggestion
ANOVA on Supplementary Recognition Scores

Source	<u>df</u>	<u>MS</u>	<u>F</u>
Suggestion	1	204.800	24.19*
Subjects within groups	18	8.467	

* $p < .001$

Table 17

Summary Table for Suggestion X High/Low Homophone ANOVA
on Number of Neutral Words Generated on Spelling Task

Source	<u>df</u>	<u>MS</u>	<u>F</u>
Suggestion (A)	1	1.225	< 1
Subjects within groups	18	1.625	
High/Low Homophone (B)	1	115.020	105.65*
A X B	1	3.025	1.25
B X subjects within groups	18	2.414	

* $p < .001$

more likely to spell the high frequency forms of the neutral homophones, $M = 6.25$, $sd = 1.773$, than the low frequency forms, $M = 1.20$, $sd = .951$. Neither the main effect for suggestion type nor the suggestion type $\times$ high/low homophone interaction approached significance.

Priming effects. The number of low and high frequency homophones primed during the spelling task was summed, yielding two priming scores for each subject. These scores were subjected to a 2×2 mixed ANOVA with one between subjects factor (standard/modified suggestion) and one within subjects variable (low/high homophones). This analysis resulted in a significant main effect for Suggestion type, $F(1,18) = 36.10$, $p < .001$ (see Table 18). Subjects in the Standard Suggestion group, $M = 3.90$, $sd = .308$, exhibited higher levels of priming than subjects in the Modified Suggestion group, $M = 1.75$, $sd = 1.372$. Neither the main effect for Homophone type nor the interaction of these variables was significant. In short, subjects who received the altered amnesia suggestion exhibited less priming than subjects in the Standard Suggestion condition.

To examine the priming of words for which recall amnesia had been shown, two proportion scores were calculated for each subject. These proportions reflected the number of low and high homophones for which subjects exhibited priming on the spelling task out of the total number of low and high homophones for which subjects exhibited amnesia. The two subjects who did not exhibit recall amnesia were dropped from this analysis. One subject in

Table 18

Summary Table for Suggestion X Low/High
Homophone ANOVA on Priming Scores

Source	<u>df</u>	<u>MS</u>	<u>F</u>
Suggestion (A)	1	46.225	36.10*
Subjects within groups	18	1.281	
Low/High Homophone (B)	1	2.025	3.08
A X B	1	.625	<1
B X subjects within groups	18	.658	

*p < .001

the Modified Suggestion group did not exhibit amnesia for any of the high frequency homophones and was also dropped from this analysis. A 2 X 2 mixed ANOVA with one between subjects factor (standard/modified suggestion) and one within subjects factor (low/high homophones) was conducted on these scores. This analysis resulted in a significant main effect for Suggestion type, $F(1,15) = 67.28$, $p < .001$ (see Table 19). Subjects in the Standard Suggestion group, $M = .972$, $sd = .081$, primed words for which they had shown amnesia with a higher frequency than subjects in the Modified Suggestion condition, $M = .333$, $sd = .318$. Neither the Homophone type main effect nor the Suggestion X Homophone interaction were significant. In short, subjects in the Standard Suggestion group were more likely to exhibit a priming effect for words for which they had previously shown amnesia than subjects who received the modified suggestion.

Table 19
Summary Table for Suggestion X Low/High
Homophone ANOVA on Proportion Scores

Source	<u>df</u>	<u>MS</u>	<u>F</u>
Suggestion (A)	1	3.460	67.28*
Subjects within groups	15	.051	
Low/High Homophone (B)	1	.171	4.06
A X B	1	.064	1.51
B X subjects within groups	15	.042	

*p < .001

OVERVIEW

When taken together, the results of the two experiments suggest that a dissociation between episodic and semantic components of memory is not an intrinsic aspect of hypnotic amnesia as suggested by Kihlstrom (1980, 1985). Instead, the present findings indicate that episodic but not semantic or both episodic and semantic deficits can be obtained simply by varying the wording of the amnesia suggestion.

In both experiments, high susceptible amnesic subjects who received the standard suggestion exhibited decrements on the episodic recall task, but continued to generate the "amnesic" material on the semantic spelling task. These results were not inconsistent with the predictions of the episodic/semantic dissociation hypothesis (Kihlstrom, 1980). However, the results obtained with the modified suggestion group on the spelling task are not consistent with this hypothesis and, in fact, cannot be accounted for by this position. Amnesic subjects given the modified suggestion showed significantly less priming on the spelling task than did amnesics who received the standard suggestion, and thus exhibited semantic as well as episodic decrements. The amnesia suggestion explicitly informed subjects that they would be amnesic for the suggestion itself. Consequently, proponents of the dissociation position cannot argue that amnesics in the modified suggestion group simply complied with suggestion-induced demands to spell the nonprimed forms of the homophones. Compliance with such demands would, of

course, imply that "amnesic" subjects, despite their reports to the contrary, access "forgotten" information and employ it strategically. The dissociation position predicts that amnesic subjects are unable to access and respond to demand information for which they are amnesic. The only recourse for dissociation theorists is to propose some sort of selective amnesia process whereby subjects are amnesic for the previously learned words but not for the suggestion itself. However, such an explanation would be clearly post hoc and unparsimonious.

Several alternative hypotheses can account for the priming results obtained in Experiment 2. The modified amnesia suggestion might have somehow "blocked" normally automatic priming processes so that the "previously learned forms of the homophones were not generated and thus subjects were never in a position where they could write these forms on the spelling task. However, it is not clear how the relatively minor modifications to the amnesia suggestion given to this group could have led to such a drastic suppression of the priming process.

Two more viable accounts for these results may be called the compliance and reinterpretation hypotheses. Neither of these hypotheses assumes that the priming process was affected by the modified amnesia suggestion. Instead, these accounts acknowledge that the previously learned forms of the critical homophones were primed when these words were administered to subjects during the spelling task. When subjects heard these words, however, they were confronted with a decision for which there were a number of

alternative response choices. They could simply write down the previously learned and primed forms of the homophones. However, this response would be clearly counter to the demands contained in the altered amnesia suggestion, and could be interpreted as an admission that they were not really experiencing "genuine" amnesia. As discussed in the introduction, highly susceptible subjects are those most strongly invested in enacting the hypnotic role, and would be least likely to behave in a manner contradictory to their interpretation of role-appropriate behaviour.)

According to the compliance account, these subjects simply withheld the primed homophones during the spelling task in order to meet experimental demands (Wagstaff, 1981). According to this perspective, subjects were well aware that they were replacing a primed homophone with some other response. Also, these subjects maintained this awareness throughout the experimental session, but hid this awareness from the experimenter when presenting themselves as amnesic. Compliant responding, however, also places subjects within a conflict situation.

Hypnotic suggestions not only call for an appropriate overt response, they also request that subjects have subjective experiences that are congruent with the overt response. Moreover, the experimental situation contains strong implicit demands for honest responding. Subjects who engage in this type of compliance are likely to have difficulty defining themselves as responding honestly, or as "good" hypnotic subjects. However, subjects who

both engage in the overt response and also generate the appropriate subjective experience do not compromise their self-conception as "good" or honest subjects.

The reinterpretation account suggests that subjects who received the altered suggestion experienced priming of the previously learned words, but may have attempted to convince themselves that these primed words were not, in fact, the first responses that came to mind. For subjects who are invested in presenting themselves as highly hypnotizable, such a strategy would enable them to convince both themselves and the experimenter that they could not generate the critical words on the priming task. This type of strategy would not only enable subjects to engage in role-appropriate behaviour, but also would allow them to maintain their self-conception as excellent hypnotic subjects (Spanos, 1986). In other words, these subjects may have retrospectively reinterpreted their experiences so as to legitimate, both to themselves and to observers, their self-presentation as deeply hypnotized.

The compliance and reinterpretation hypotheses are not mutually exclusive. Unlike positions that postulate dissociative mechanisms, both of these hypotheses hold that hypnotic behaviour is goal-directed and voluntary. Some subjects may be able to successfully reinterpret their responses, while other subjects may be unable to do so. In fact, the same subjects may be able to reinterpret their behaviour in some situations, and be unable to do so in others. Future research that attempts to differentiate

between these two responses, and to delineate the situations in which each occurs would provide valuable insight into hypnotic behaviour.

A composite of the recall and recognition results for subjects in the high susceptible/standard amnesia suggestion groups from both experiments also fails to provide support for the episodic/semantic dissociation hypothesis or for the notion that hypnotic and organic amnesias share important "phenotypic" similarities. Out of a total of seventeen subjects who displayed recall amnesia, only nine (52.9%) exhibited amnesia on the recognition task. As discussed in the introduction, patients suffering from organic memory impairments typically exhibit high levels of recognition as well as recall amnesia, and frequently show anterograde in addition to retrograde deficits (Jacoby & Witherspoon, 1982; Moscovitch, 1982). Both the recall and recognition tasks were clearly episodic in nature: subjects were explicitly asked to recall and recognize the words that they had learned earlier in the experimental session. Thus, according to the dissociation position, subjects should have shown deficits on both of these episodic tasks. However, almost half of these subjects displayed recall but not recognition deficits. It appears that not only "dissociations" between episodic and semantic tasks were apparent, but also "dissociations" between two episodic tasks were obtained, a finding not predicted by the dissociation hypothesis. However, when subjects in Experiment 2 were given a suggestion implying that memory deficits should

extend to tasks other than recall, the incidence of recognition amnesia was substantially increased, a finding consistent with a social psychological hypothesis. In fact, all subjects in this group who showed recall amnesia also exhibited amnesia on the recognition task. Future research should further explore the relationship between recall and recognition performance during amnesia and delineate the variables involved in producing decrements on these tasks.

In addition, subjects in the standard suggestion condition showed a significant lessening of amnesia across recall trials in Experiment 2, and exhibited a trend in this direction in Experiment 1. This decrease in amnesia across trials replicated a number of previous studies (Bertrand, Spanos & Parkinson, 1983; Dubreuil, Spanos & Bertrand, 1983; Kihlstrom et al., 1980; Spanos, Tkachyk et al., 1984). Interestingly the modified suggestion group did not show this effect. These subjects maintained high levels of amnesia across recall trials. It appears that the slight modifications to the amnesia suggestion administered to subjects in this group conveyed to them the expectation that amnesia should be particularly "dense" and should not change across trials. Thus, consistent with a social psychological position, subjects interpreted the modified suggestion as a request to exhibit high levels of amnesia across trials and tasks, and then responded in terms of this interpretation.

The results of this investigation indicate that the

dissociation between episodic and semantic memory tasks reported by Kihlstrom (1980) is a function of the interpretations subjects make of the tasks they are asked to perform. When subjects receive an amnesia suggestion which implies deficits in recalling the critical material, they exhibit only impairments in recall performance. When, however, a suggestion also implies that deficits on other types of tasks are appropriate, subjects respond in terms of this information and exhibit decrements across tasks. The most parsimonious explanation for these results is that the critical material for which amnesia is suggested remains accessible to subjects, and can be utilized when the situation requires its use. While subjects may shift their attention away from the critical material and convince themselves that it is "forgotten", they do not lose the ability to access this information and use it when such a response is defined as role-appropriate.

These results dovetail nicely with previous findings indicating that hypnotic amnesia represents strategic behaviour. For example, Spanos, Radtke and Bertrand (1984) found that very highly susceptible subjects could be induced to breach amnesia completely when led to believe that this behaviour was indicative of deep hypnosis. Relatedly, studies of hypnotic analgesia have indicated that subjects who are purportedly amnesic for "hidden observer" instructions nevertheless respond strategically to the demands contained in the instructions. For example, Spanos and Hewitt (1980) found that highly susceptible subjects reported

either higher or lower "hidden" than overt pain depending upon the information contained in the instructions for which they were supposedly "amnesic". Moreover, Spanos, Gwynn and Stam (1983) found that the same subjects would report first higher and then lower hidden pain depending upon the expectations conveyed by the suggestion. These findings strongly suggest that highly susceptible subjects continue to use instructions for which they are "amnesic" to fulfill the demands of the tasks they are given.

Taken together, these results, in combination with those of the present investigation, suggest that subjects do not lose the ability to access material covered by an amnesia suggestion. Instead, these subjects retain the ability to access this information, and utilize this information strategically according to their construals of role-appropriate behaviour.

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APPENDICES

Appendix A

The CURSS

The CURSS is a seven-item test of hypnotic susceptibility containing motor (e.g., arm levitation), challenge (e.g., arm rigidity), and cognitive (e.g., visual hallucination, amnesia) suggestions. The CURSS is a unidimensional scale that correlates substantially with both the Harvard Group Scale of Hypnotic Susceptibility: Form A (Shor & Orne, 1962) and the Stanford Hypnotic Susceptibility Scale (Weitzenhoffer & Hilgard, 1962; Spanos et al., 1983b; Spanos, Radtke, Hodgins, Bertrand, Stam, & Moretti, 1983a). Unlike these earlier scales, however, the CURSS allows assessment of not only an objective score, but also provides a subjective rating of subjects' responses (CURSS:S), and an objective-involuntary (CURSS:OI) rating that indicates the extent to which subjects perceived their responses as occurring without their voluntary control.

In addition, the CURSS allows for an unambiguous assessment of amnesia because, unlike the previous scales, it takes into account both pre-amnesia recall and post-amnesia reversibility.

Appendix B

Homophone Pairs

fair - fare

peer - pier

roll - role

waste - waist

sore - soar

earn - urn

bear - bare

team - teem

Note. For each of the above pairs, the first word represents the high frequency form of the homophone and the second word represents the low frequency form.

Appendix C

Homophone Units and Associated Consonants

B - fair (fare)

L - peer (pier)

N - roll (role)

Q - waste (waist)

P - sore (soar)

V - earn (urn)

Z - bear (bare)

X - team (teen)

Appendix D

Nonhomophone "Neutral" Words and Associated Consonants

C - home

D - key

G - star

J - sleep

Appendix E

"Filler" Items for Spelling Task

gate (gait)

beat (beet)

course (coarse)

great (grate)

male (mail)

pole (poll)

rap (wrap)

surf (serf)

dilute

fork

good

idea

Note. For the above homophones the spelling in parentheses represents the low frequency form of the pair.

Appendix F

"Filler" Items for Recognition Task

bore - boar

deer - dear

flower - flour

foul - fowl

hair - hare

some - sun

soul - sole

steak - stake

cork

frame

ledge

vault

Note. For the above homophones the second spelling represents the low frequency form of the pair.

Appendix G

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. On the other hand, if you pay close attention to what I say, and follow what I tell you, you can easily fall into a hypnotic sleep. 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, in 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 every muscle of your body. Relax the muscles in your legs. 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, heavy and limp. Your arms are heavy, 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 asleep...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 - deep asleep. You will not awaken until I tell you to. You will wish to sleep and have the experiences that I shall presently describe.

You are feeling comfortable and relaxed, comfortable and relaxed, and you are in a deep sound sleep - a deep sound sleep - fully prepared to respond to and experience what I will ask you to do. You are feeling comfortable, relaxed, 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, backward into the darkness and as you go backward into the darkness 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 tell you, listening only to my voice. You are feeling comfortable and relaxed, comfortable and relaxed, and you are in a deep sound sleep, a deep sound sleep, fully prepared to respond to and experience what I shall ask you to do.

Appendix H /

Recall Instructions

Please listen carefully to what I tell you next. In a moment I am going to ask you to open your eyes. You will remain hypnotized but will feel alert and will be able to accomplish the tasks that I give you, quickly and easily. A short list of pairs of letters and words will be projected on the screen that is located in front of you. Each pair consists of a letter and a word that is associated with that letter. No two letters or words are the same. The pairs will appear one at a time for three seconds. As each pair appears, pronounce each letter and word out loud. At the end of the list, I shall give you a sheet of paper with only the letter from each pair written on it, followed by a blank line. In this blank, I would like you to write down the word that was projected with the letter on the screen. We shall continue with this procedure until you are able to remember and write down all of the words on two successive trials. Although your eyes will be open and you will feel alert, you will remain hypnotized. Now open your eyes but remain hypnotized. Remember to pronounce each letter and word as it appears on the screen.

Appendix I

Amnesia Suggestion for Experiment 1

Please close your eyes and listen carefully to what I tell you next. You have just learned a list of paired letters and words. Each pair contained a letter and an associated response word. Now, I want you to forget all of the response words that you learned. Even when you see or hear the letters you will be completely unable to remember the response words that go with the letters no matter how hard you try. When I ask you to recall these words, you will be unable to remember them until I tap like this [experimenter taps] and say the words "Now you can remember everything". Until that time you will be completely unable to think of, recall, or remember the response words in any way. The response words will be gone, gone completely from your memory. You will be completely unable to think of, recall, or remember them in any way.

[10 sec pause]

Now, open your eyes. Try to remember the words that you learned earlier and write them down in the spaces provided on this sheet.

[1 min recall period]

Appendix J

Instructions for Spelling Task

Now, in a moment I am going to ask you to open your eyes. You will remain hypnotized and will have no difficulty completing the task I shall give you. I have placed a blank sheet of paper on the table in front of you. I shall read a list of words, one at a time, and as I say each word I would like you to write it down on this sheet. Now, let's begin. Please open your eyes and write down each word as I say it.

[Word presentation]

O.K., that's fine. Now please close your eyes once again and relax.

Appendix K

Instructions for Recognition Task

Now, in a moment I am going to ask you to open your eyes. Although your eyes will be open, you will remain deeply hypnotized. I am going to project a list of words on the screen, one at a time. Some of these words were associated with letters and were learned by you earlier in the experiment. What I would like you to do is look at each word and decide if you learned it earlier in the experiment. When you have made your decision I want you to say "Old" if you remember learning the word earlier or "New" if you did not learn the word earlier. After you have made your decision we shall move on to the next word. Now please open your eyes, but remain hypnotized. Look at each word and decide if you learned it earlier.

O.K., that's fine. Now close your eyes and relax.

Appendix L

Wake-Up Instructions

You are going to wake up in a few minutes. You will feel refreshed, wide awake, and in a good mood. I shall count from five to one and with each count you will be more fully awake - 5 - starting to wake, 4 - more and more awake, 3 - still more and more awake, 2 - becoming more and more awake, 1 - wide awake. Open your eyes. Wide awake.

Appendix M

Modified Amnesia Suggestion for Experiment 2

Please close your eyes and listen to what I tell you next. You have just learned a list of paired letters and words. Each pair contained a letter and an associated response word. Now I want you to forget all of the response words that you learned. You will be completely unable to remember the response words no matter how hard you try. No matter what you are asked to do, you will be completely unable to bring these words to mind. These words will be so deeply hidden that you will be unable to remember them no matter what tasks I ask you to do. You will be unable to remember them or generate them on any task until I tap like this [experimenter taps] and say the words "Now you can remember everything". Until that time, you will be completely unable to think of, recall, or remember the response words in any way. No matter what you are asked to do, these words will be gone, gone completely from your memory. You will be completely unable to think of, recall, or remember the response words in any way. In fact, you will even forget that I have given you a suggestion to forget the words and this suggestion will be gone completely from your mind until you hear me tap and say "Now you can remember everything". Until that time you will be completely unable to think of, recall, generate, or remember the words in any way or on any task I might give you.

[10 sec pause]

Now, open your eyes. Try to remember the words that you learned earlier and write them down in the spaces provided on this sheet.

[1 min recall period]

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