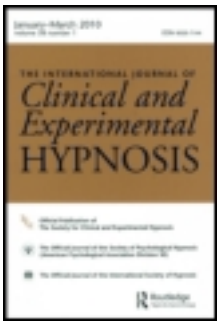

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Posthypnotic amnesia for material learned before hypnosis

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POSTHYPNOTIC AMNESIA FOR MATERIAL LEARNED BEFORE HYPNOSIS[1]

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Abstract: The impact of a suggestion for posthypnotic amnesia on material learned either before or during hypnosis was investigated across 2 experiments. In Experiment 1, very high, high, and low hypnotizable participants learned a word list either before or immediately after a hypnotic induction. During hypnosis, participants were given a suggestion for posthypnotic amnesia for the word list. After hypnosis, they were tested on recall, word-fragment, and word-recognition tasks. Experiment 2 replicated and extended Experiment 1 through application of the real-simulating paradigm. Across the 2 experiments, there was no difference in the performance of participants who learned the word list either before or during hypnosis. Although amnesia on direct memory measures was associated with high hypnotizability (Experiment 1), an explanation based on demand characteristics could not be excluded (Experiment 2). The implications of these findings for the use of posthypnotic amnesia as a laboratory analog of disorders of autobiographical memory are discussed.

Posthypnotic amnesia (PHA) is a classic phenomenon of hypnosis that involves the failure of a hypnotizable subject to recall, upon termination of hypnosis, material encoded during hypnosis (Kihlstrom, 1985; Kihlstrom & Evans, 1979; Williamsen, Johnson, & Eriksen, 1965). Kihlstrom's (1985) influential account proposes that PHA represents a temporary dissociation of episodic, but not semantic, expressions of memory (cf., Coe, 1978, 1996; Silva & Kirsch, 1987; Spanos, 1986). Consequently, although conscious retrieval of the information covered by amnesia is disrupted, this material continues to influence ongoing behavior. For example, Kihlstrom (1980) gave low, medium, high, and

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very high hypnotizable participants a suggestion for PHA of a word list learned during hypnosis. Following hypnosis, and an initial Recall Test of amnesia, participants were asked to give word associations (Experiment 1) or category instances (Experiment 2) to stimuli intended to elicit the words covered by the amnesia suggestion. Notably, the dense amnesia demonstrated by high and very high hypnotizable participants on the direct memory test did not impede their performance on the indirect memory tests. A substantial body of research has supported these essential findings and has highlighted the selective effects of PHA on memory (e.g., Davidson & Bowers, 1991; Kinnunen & Zamansky, 1996).

Impaired memory retrieval that involves a dissociation between explicit and implicit memory is also the major characteristic of many psychopathological disorders of autobiographical memory, including dissociative identity disorder (DID) (American Psychiatric Association, 1994; see also Bryant, 1995; Eich, Macaulay, Loewenstein, & Dihle, 1997; Kihlstrom & Schacter, 1995). For instance, Bryant (1995) investigated autobiographical memory in a patient diagnosed with DID using a cued-recall procedure and observed autobiographical amnesia between the "host" personality and a child personality. Similarly, Eich et al. (1997) investigated the explicit and implicit memory of nine DID patients and found that although patients showed poor explicit recall across personalities, they demonstrated significant priming effects of material both within and between personalities. Experimental investigations of functional amnesia are limited, however, by the rarity of these cases and the problems associated with the psychopathological characteristics of these individuals. The ability of PHA to divide episodic and semantic memories under experimental conditions in nonpathological subjects indicates that PHA is a viable strategy to study dissociative disorders (Kihlstrom, Glisky, & Angiulo, 1994; Kihlstrom & McGlynn, 1991).

The value of PHA as an analog for autobiographical amnesia depends on whether it can influence memories that subjects bring with them to the hypnotic setting, rather than material that subjects learn during hypnosis. Notably, research on PHA has focused almost exclusively on information learned during hypnosis (e.g., lists of words) or events experienced during hypnosis (e.g., hypnotic suggestions). Thus, it is unclear whether the effects of a suggestion for PHA are limited to material learned following a hypnotic induction procedure. To date, Silva and Kirsch (1987) offer the only relevant data. Prior to hypnosis, they gave 20 high hypnotizable participants one of two sets of expectancy instructions and asked them to learn a list of words. During subsequent hypnosis, participants were given an amnesia suggestion, a challenge to remember (Recall Test 1), a trance-deepening procedure, and a second challenge to remember (Recall Test 2). The majority of participants in a condition that encouraged maintenance of amnesia recalled very few of

the words. Although Silva and Kirsch (1987) administered a suggestion for hypnotic rather than posthypnotic amnesia, these findings suggest that the influence of hypnotically suggested amnesia may not be limited to material learned during hypnosis.

The aim of the present research was to extend previous findings on PHA (for a review, see Kihlstrom, 1985) by directly comparing the influence of PHA on material learned either before or during hypnosis. Following Kihlstrom's (1980) methodology, participants learned a list of 10 unrelated words, either before hypnosis (prehypnotic condition) or immediately after a hypnotic induction procedure (hypnotic condition). Prior to the termination of hypnosis, participants received a suggestion for PHA that encompassed the learned words. Following hypnosis, memory for the words was assessed on a range of direct and indirect measures (including free recall, word-fragment completion, and word recognition). Because previous research has indicated that dense PHA is limited to only the most capable hypnotic participants (Kihlstrom, 1980), Experiment 1 compared the performance of very high, high, and low hypnotizable participants. Furthermore, because alternative accounts of PHA have suggested that it may be due to hypnotizable participants not reporting what they do in fact remember, rather than to disrupted retrieval (Coe, 1978, 1996), Experiment 2 employed Orne's (1959, 1979) real-simulating paradigm to index the potential role of demand characteristics.

EXPERIMENT 1

Very high, high, and low hypnotizable participants learned a list of 10 words either before or during hypnosis. During hypnosis, all participants received a suggestion for posthypnotic amnesia. Following a deinduction procedure, participants' memory for the words was assessed on two free Recall Tests (during amnesia and after cancellation of the amnesia suggestion) as well as on word-fragment completion and word-recognition tasks. We expected that PHA would influence the material learned before hypnosis to the same extent as the material learned during hypnosis. Furthermore, we expected that PHA would impair participants' performance on the direct rather than indirect measures of memory.

METHOD

Participants

Sixty-one (17 male and 44 female) individuals of mean age 19.79 years ($SD = 4.90$), who were undergraduate students at the University of New South Wales, participated in this experiment in return for research credit. Participants were selected on the basis of their extreme scores on the 12-item Harvard Group Scale of Hypnotic Susceptibility, Form A

(HGSHS:A) (Shor & Orne, 1962) and were classified as very high, high, and low on the basis of their scores in the present experiment on a 10-item tailored version of the Stanford Hypnotic Susceptibility Scale, Form C (SHSS:C) (Weitzenhoffer & Hilgard, 1962).[3] On the HGSHS:A, very high (n = 22) and high (n = 20) hypnotizable participants scored in the range of 9 to 12 (M = 10.14, SD = 1.07); on the tailored SHSS:C, very high participants scored in the range of 9 to 10 (M = 9.18, SD = 0.39) and all high participants scored 8. Low hypnotizable participants (n = 19) scored in the range of 0 to 4 (M = 2.63, SD = 1.42) on the HGSHS:A and in the range of 0 to 3 (M = 2.16, SD = 0.76) on the tailored SHSS:C.

Materials

Two lists comprising 10 words each were used in the word-learning task (adapted from Bryant & McConkey, 1995). Half of the participants received List A and half received List B in a counterbalanced design. List A included: *anatomy, antique, clarinet, coconut, horizon, leprosy, lettuce, sheriff, universe,* and *yoghurt;* List B included: *antenna, assassin, bayonet, cavalry, gazelle, inferno, migraine, mystery, tricycle,* and *twilight.* The word-fragment completion task comprised a written list of fragments of the words in Lists A and B, such as *c_va_ _y* (*cavalry*), *_az_l_e* (*gazelle*), and *_ys_ _ry* (*mystery*). The recognition task comprised a written list of the words in Lists A and B. Participants were required to indicate whether each word was "old" (recognized from the word-learning task) or "new" (unrecognized) and to rate their confidence in each recognition decision (1 = *very unsure*, 8 = *very sure*).

Procedure

Following informed consent procedures, the experimenter (who was blind to participants' level of hypnotizability) told participants that they would be hypnotized and asked to experience a number of different suggestions. Half of the participants were administered the word-learning task followed by the standard SHSS:C induction procedure (prehypnotic condition), and half of the participants were administered the induction procedure followed by the word-learning task (hypnotic condition).

In the word-learning task, the experimenter told participants that he would read them some words and that their task was to remember as many as they could. He then read the words at a rate of one every 3 s. Following this, the experimenter asked participants to recall as many words as they could. If they failed to recall all of the words, he probed for further recall until participants indicated that they could not recall any

[3]The 10-item tailored Stanford Hypnotic Susceptibility Scale, Form C (SHSS:C) used in Experiments 1 and 2 included hand lowering, moving hands apart, mosquito hallucination, taste hallucination, arm rigidity, dream, age regression, arm immobilization, negative visual hallucination, and posthypnotic amnesia; anosmia and auditory hallucination were removed to allow time for the word-learning task.

more. The experimenter told participants the number of words they had correctly recalled, the number they had failed to recall, and the words they had forgotten. He then read the list of words again in a random order. This presentation-test cycle was repeated until participants either recalled all of the words on two consecutive trials or until the word list had been presented eight times. The final word-learning trial represented Recall Test 1.

Following the administration of the word-learning task and the induction procedure (or the induction followed by the word-learning task), the experimenter tested participants on the 10 items of the tailored SHSS:C, including PHA. Following Kihlstrom (1980), the PHA suggestion was modified to include the words learned either prior to or during hypnosis.

Following this suggestion, the experimenter allowed 10 s to elapse and then administered the standard SHSS:C deinduction procedure.

Postexperimental inquiry. Immediately after the deinduction, the experimenter administered the SHSS:C test for PHA. He asked participants to tell him everything they could remember since the experiment began. If participants did not mention the word-learning task during the amnesia test, the experimenter asked them whether they could remember learning any words before (or during) hypnosis. Individuals who had no memory of the word-learning task were told that they had in fact learned some words. The experimenter then asked participants to recall all of the words they could remember learning during the experiment (Recall Test 2). If they failed to recall all of the words, he probed for further recall until participants indicated that they could not recall any more.

Following this, the experimenter administered a filler task intended to separate the Recall Test from the subsequent memory tests. He asked participants to rate how deeply hypnotized and how relaxed they had felt on four occasions throughout the hypnosis session. The experimenter then asked participants to complete the word-fragment completion task. After 3 minutes on this task, he asked participants to complete the recognition task.

The experimenter then administered the reversibility cue for the PHA suggestion and asked participants if there was anything else they could remember. Following this, he asked them to again recall all of the words they could remember learning during the experiment (Recall Test 3). If they failed to recall all of the words, he probed for further recall until participants indicated that they could not recall any more. Finally, the experimenter answered any questions, thanked participants for their involvement, and ended the session.

Table 1
Experiment 1: Mean Number of Words Recalled on the Last Word-Learning Trial and Mean Number of Word-Learning Trials

Hypnotizability and Word Learning	Learning Trials	
	Final Number of Words Recalled	Number of Trials
Very high		
Prehypnotic (n = 13)	9.69 (0.63)	6.38 (1.39)
Hypnotic (n = 9)	9.78 (0.44)	6.33 (1.58)
High		
Prehypnotic (n = 8)	10.00 (—)	6.13 (1.46)
Hypnotic (n = 12)	10.00 (—)	5.83 (1.59)
Low		
Prehypnotic (n = 10)	9.90 (0.32)	5.70 (2.16)
Hypnotic (n = 9)	9.89 (0.33)	5.33 (1.94)

Note. For number of words recalled, maximum = 10. For number of word-learning trials, maximum = 8. Standard deviations appear in parentheses.

Results and Discussion

Performance on Word-Learning Task

Table 1 presents the mean number of words recalled on the last word-learning trial and the mean number of word-learning trials. Separate 3 (Hypnotizability) × 2 (Word-Learning Condition) analyses of variance (ANOVA) of these data yielded no significant main or interaction effects. Furthermore, 77% (77% prehypnotic, 78% hypnotic) of very high, 100% (100% prehypnotic, 100% hypnotic) of high, and 89% (90% prehypnotic, 89% hypnotic) of low hypnotizable participants learned all 10 words within eight learning trials. There was no difference in this pattern. Thus, the results presented below cannot be explained in terms of differences in the rate or degree of word learning.

Performance on Recall Tests

Figure 1 presents the results of the final word-learning trial (Recall Test 1), the test during the amnesia suggestion (Recall Test 2), and the test following cancellation of the amnesia suggestion (Recall Test 3). A 3 (Hypnotizability) × 2 (Word-Learning Condition) × 3 (Recall Test) mixed model ANOVA yielded significant main effects for hypnotizability, $F(2, 55) = 20.27$, $p < .001$, and Recall Test, $F(2, 110) = 59.18$, $p < .001$, as well as a significant interaction between hypnotizability and Recall Test, $F(4, 110) = 14.89$, $p < .001$. Scheffe post hoc comparisons indicated that very high ($M = 3.82$, $SD = 3.35$) hypnotizable participants differed from both high ($M = 7.55$, $SD = 3.02$) and low ($M = 9.00$, $SD = 0.94$) hypnotizable participants

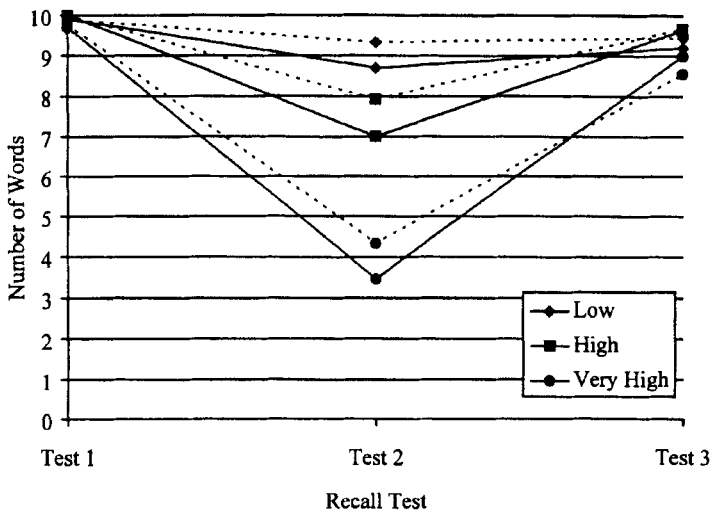

Figure 1. **Experiment 1: Mean number of words recalled on the final test of learning, during amnesia, and following cancellation of the amnesia suggestion.**

Note. The solid and broken lines represent participants in the prehypnotic and hypnotic word-learning conditions, respectively. Recall Test 1 refers to the final word-learning trial, Recall Test 2 refers to the test during the amnesia suggestion (after hypnosis), and Recall Test 3 refers to the test following cancellation of the amnesia suggestion.

on Recall Test 2. That is, very high hypnotizable participants performed as well as high and low hypnotizable participants during the word-learning phase and following cancellation of the amnesia suggestion but recalled fewer words than high and low hypnotizable participants during amnesia. Notably, word-learning condition had no impact on participants' performance on any of the recall tests. That is, participants who learned the words before hypnosis showed the same level of amnesia as those who learned the words during hypnosis.

Performance on Word-Fragment and Recognition Tasks

Table 2 presents the mean number of word fragments successfully completed, the mean number of words correctly identified as old or new during the recognition task, and participants' mean ratings of confidence in their recognition decisions (for words correctly identified). In terms of the word-fragment completion task, a 3 (Hypnotizability) × 2 (Word-Learning Condition) × 2 (Fragment Type) mixed model ANOVA of the number of word fragments successfully completed yielded a significant main effect for word-learning condition, $F(1, 55) = 4.22$, $p < .05$, and a significant main effect for fragment type, $F(1, 55) = 195.91$, $p < .001$. Participants who learned the words during hypnosis ($M = 9.60$, $SD =$

Table 2
Experiment 1: Mean Number of Word Fragments Successfully Completed, Mean Number of Words Correctly Identified During Recognition Task, and Mean Ratings of Confidence in Recognition Decisions (for words correctly identified)

	Task and Word Type					
	Word Fragment		Correct Identification		Confidence Ratings	
Hypnotizability and Word Learning	Old	New	Old	New	Old	New
Very high						
Prehypnotic	6.38 (3.01)	1.54 (1.39)	9.54 (1.39)	9.54 (1.39)	7.13 (1.11)	7.04 (1.06)
Hypnotic	6.11 (2.26)	1.56 (1.13)	8.56 (3.36)	9.89 (0.33)	7.52 (1.31)	7.22 (1.30)
High						
Prehypnotic	7.63 (2.07)	0.63 (1.41)	10.00 (—)	9.88 (0.35)	7.91 (0.12)	7.45 (1.14)
Hypnotic	8.75 (2.26)	1.92 (1.62)	10.00 (—)	9.92 (0.29)	7.77 (0.81)	7.66 (1.00)
Low						
Prehypnotic	6.90 (1.65)	1.20 (1.48)	9.80 (0.42)	10.00 (—)	7.85 (0.38)	7.95 (0.09)
Hypnotic	7.44 (2.24)	2.67 (2.40)	9.89 (0.33)	10.00 (—)	8.00 (—)	7.99 (0.03)

Note. For word-fragment and word-recognition tasks, maximum = 10. For confidence ratings, 1 = *not at all sure*, 8 = *very sure*. Standard deviations appear in parentheses.

2.97) completed more word fragments than those who learned the words before hypnosis (M = 8.06, SD = 2.37); also, participants completed more fragments of old words (M = 7.21, SD = 2.44) than new words (M = 1.61, SD = 1.65).

In terms of the recognition task, a 3 (Hypnotizability) × 2 (Word-Learning Condition) × 2 (Word Type) mixed model ANOVA of the number of words correctly identified as old or new yielded no significant main or interaction effects. Participants in all conditions recognized words at a near perfect level of performance; on average, participants correctly identified 19.49 (SD = 1.83) of the 20 words presented in the recognition test. In terms of participants' ratings of confidence in the accuracy of their recognition decisions during this task, a 3 (Hypnotizability) × 2 (Word-Learning Condition) × 2 (Word Type) mixed model ANOVA of the ratings for the words that participants correctly categorized yielded a significant main effect for hypnotizability, $F(2, 55) = 3.97$, $p < .025$. Lows were more confident (M = 7.94, SD = 0.16) in the accuracy of their recognition decisions than very highs (M = 7.20, SD = 1.11); the confidence ratings of highs (M = 7.70, SD = 0.78) did not differ from either of the other two groups. However, the average ratings for both groups were at the upper end of the 8-point scale.

Discussion

Participants who learned the word list before hypnosis performed similarly to those who learned the word list during hypnosis on the Recall Tests and the word-recognition task; subjects who learned the words during hypnosis showed a slight advantage on the word-fragment task. Thus, this experiment indicates that both the degree and nature of the impact of a suggestion for PHA is not dependent on the time at which the target material is encoded; in other words, PHA works equally well for material learned before hypnosis as it does for material learned during hypnosis. These findings extend previous research on PHA (Kihlstrom, 1985).

As expected, very high, rather than high or low, hypnotizable participants displayed a significant impairment in their memory performance following the amnesia suggestion (Recall Test 2). This finding is consistent with previous research and suggests that these effects may be limited to only the most talented hypnotic participants (Kihlstrom, 1980). Furthermore, despite the poor recall performance of very high hypnotizable participants during the amnesia suggestion, there was no difference between very high, high, and low hypnotizable participants' performance on the word-fragment completion and word-recognition tasks. This finding appears to confirm the selective effects of PHA on explicit, but not implicit, expressions of memory (see also Davidson & Bowers, 1991; Kihlstrom, 1980; Kinnunen & Zamansky, 1996).

Notably, however, because this experiment did not index the potential influence of demand characteristics, it is possible that the pattern of results reflects processes other than retrieval inhibition, as suggested by Kihlstrom (1985), including the failure of subjects to report what they do, in fact, remember (Coe, 1978, 1996). Experiment 2 was designed to address these possibilities.

EXPERIMENT 2

Experiment 2 was a replication and extension of Experiment 1 and used Orne's (1959, 1979) real-simulating paradigm to index the influence of demand characteristics on responding. High hypnotizable, hypnotized participants (reals) and low hypnotizable, unhypnotized participants (simulators) learned a list of 10 words either before or during hypnosis. During hypnosis, all participants received a suggestion for PHA. Following a deinduction procedure, participants' memory for the words was assessed on three free-recall tests (during amnesia, after the word-fragment task, and after cancellation of the amnesia suggestion) as well as on a word-fragment completion task. The additional free Recall Test after the word-fragment task was included to examine the possibility that the difference in the level of recall between the direct (Recall Test 2) and indirect (word-fragment and word-recognition tasks) measures in Experiment 1 reflected a "breaching" effect (Coe, 1996) rather than a dissociation between different expressions of memory. Although we expected that the performance of real and simulating participants would differ, we expected that, as in Experiment 1, PHA would influence the material learned before hypnosis to the same extent as the material learned during hypnosis. Furthermore, we expected that PHA would impair participants' performance on the direct rather than indirect measures of memory.

METHOD

Participants

Thirty-nine (17 male and 22 female) individuals of mean age 19.79 years ($SD = 4.90$), who were undergraduate students at the University of New South Wales, participated in this experiment in return for research credit. This experiment used Orne's (1959, 1979) real-simulating paradigm and involved high hypnotizable, real participants and low hypnotizable, simulating participants. Participants were selected on the basis of their extreme scores on the 12-item HGSHS:A, and they were classified as reals or simulators on the basis of their performance on a 10-item tailored version of the SHSS:C. Reals scored in the range of 9 to 12 ($M = 10.29$, $SD = 1.00$) on the HGSHS:A and 8 to 10 ($M = 8.96$, $SD = 0.88$) on the tailored SHSS:C. Simulators scored in the range of 0 to 4 on the

HGSHS:A (M = 3.19, SD = 1.17) and 0 to 3 on the tailored SHSS:C (M = 1.87, SD = 1.09).

Materials

The word lists and word-fragment task were identical to those used in Experiment 1.

Procedure

The procedure of this experiment was essentially identical to that of Experiment 1 with three exceptions. First, the real-simulating paradigm was used to index the role of demand characteristics in the performance of real participants. Second, the hypnosis session was based on the Diagnostic Rating Scale (Orne & O'Connell, 1967), rather than the modified SHSS:C, and involved five items: hand lowering, verbal inhibition, taste hallucination, hypnotic sex change, and PHA. Third, following the word-fragment task, participants were given an additional Recall Test rather than the word-recognition task.

During the preexperimental instruction phase, Experimenter 1 (E1) instructed participants according to the procedures of the real-simulating paradigm. Reals were told they would be taken to Experimenter 2 (E2) who would conduct an hypnosis session. Simulators were told that they would be taken to E2, and their task was to fool her into believing that they were excellent hypnotic participants. Simulators were told E2 knew some participants would be faking, but she did not know which participants they were, and she would stop the session if she discovered they were faking. They were told that their task was a difficult one, intelligent individuals could do it successfully, and they were not to reveal they were faking until they returned from their hypnosis session. Finally, all participants were told that they would be given the opportunity to discuss their experiences with E1 during the postexperimental inquiry. Following this, E1 introduced participants to E2, who was unaware of their real or simulating identity.[4]

E2 conducted the experimental phase, which included the word-learning task, the hypnosis session, and tests of amnesia (following the procedures of Experiment 1). As noted above, participants were given an additional Recall Test rather than the word-recognition task; note, this test was administered before the cancellation of the amnesia suggestion. Thus, in this experiment, Recall Test 1 refers to the final word-learning trial; Recall Test 2 refers to the first test during the amnesia suggestion (immediately after hypnosis); Recall Test 3 refers to the second test during the amnesia suggestion (after the word-fragment task); and

[4]Experimenter 2 (E2) was asked to rate participants' real or simulating status at both the beginning and the end of the experimental session. E2 correctly identified 44% (39% reals, 50% simulators) of participants at the beginning of the session and 54% (48% reals, 63% simulators) of participants at the end of the session.

Table 3
Experiment 2: Mean Number of Words Recalled on the Last Word-Learning Trial and Mean Number of Word-Learning Trials

Subject Status and Word Learning	Learning Trials	
	Final Number of Words Recalled	Number of Trials
Reals		
Prehypnotic (n = 12)	9.83 (0.58)	6.17 (1.75)
Hypnotic (n = 11)	9.18 (1.17)	7.64 (1.03)
Simulators		
Prehypnotic (n = 8)	9.88 (0.35)	6.38 (2.00)
Hypnotic (n = 8)	9.75 (0.46)	7.25 (1.28)

Note. For number of words recalled, maximum = 10. For number of word-learning trials, maximum = 8. Standard deviations appear in parentheses.

Recall Test 4 refers to the test following cancellation of the amnesia suggestion.

Finally, participants returned to E1 for a brief postexperimental inquiry. During this time, E2 inquired into participants' perceptions of the overall procedures, answered any questions, debriefed participants, and concluded the experiment.

Results and Discussion

Performance on Word-Learning Task

Table 3 presents the mean number of words recalled on the last word-learning trial and the mean number of word-learning trials. A 2 (Subject Status) × 2 (Word-Learning Condition) ANOVA of the number of words recalled yielded no significant main or interaction effects. A similar analysis of the number of word-learning trials yielded a significant main effect for word-learning condition, $F(1, 35) = 5.43$, $p < .05$. Participants who learned the words before hypnosis ($M = 6.25$, $SD = 1.80$) required slightly fewer learning trials than those who learned the words during hypnosis ($M = 7.47$, $SD = 1.12$). Furthermore, 74% (92% prehypnotic; 55% hypnotic) of reals and 82% (88% prehypnotic; 75% hypnotic) of simulators learned all 10 words within eight learning trials. There was no difference in this pattern. Accordingly, the results presented below cannot be explained in terms of differences in the degree (and possibly the rate) of learning.

Performance on Recall Tests

Figure 2 presents the results of the final word-learning trial (Recall Test 1), the first test during the amnesia suggestion (immediately after hypnosis; Recall Test 2), the second test during the amnesia suggestion

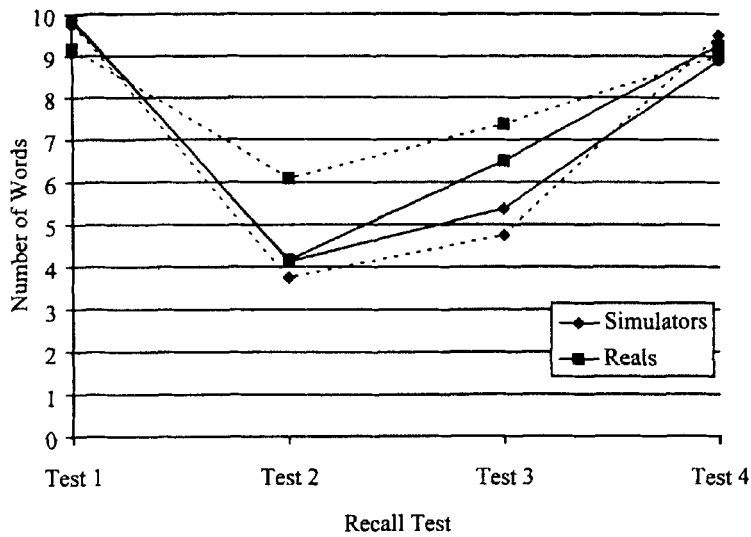

Figure 2. **Experiment 2: Mean number of words recalled on the final test of learning, during amnesia, and following cancellation of the amnesia suggestion.**
Note. The solid and broken lines represent participants in the prehypnotic and hypnotic word-learning conditions, respectively. Recall Test 1 refers to the final word-learning trial, Recall Test 2 refers to the first test during the amnesia suggestion (after hypnosis), Recall Test 3 refers to the second test during the amnesia suggestion (after the word-fragment task), and Recall Test 4 refers to the test following cancellation of the amnesia suggestion.

(after the word-fragment task; Recall Test 3), and the test following cancellation of the amnesia suggestion (Recall Test 4). Separate 2 (Subject Status) × 2 (Word-Learning Condition) × 2 (Recall Test) mixed model ANOVAs were conducted on changes in recall from Recall Test 1 to Test 2, Recall Test 2 to Test 3, and Recall Test 3 to Test 4. Each of these analyses yielded a significant main effect for recall test but no effect of subject status or word-learning condition. Specifically, participants recalled more words during Recall Test 1 (M = 9.64, SD = 0.78) than Test 2 (M = 4.62, SD = 4.05), $F(1, 35) = 60.54$, $p < .001$; participants recalled fewer words during Recall Test 2 ($M = 4.62$, $SD = 4.05$) than Test 3 ($M = 6.15$, SD = 3.52), $F(1, 35) = 14.26$, $p < .001$; and participants recalled fewer words during Recall Test 3 ($M = 6.15$, $SD = 3.52$) than Test 4 ($M = 9.15$, $SD = 1.06$), $F(1, 35) = 29.26$, $p < .001$. That is, consistent with the general pattern seen in Experiment 1, all participants recalled fewer words during amnesia than either during the last word-learning trial or after the cancellation of the suggestion; notable also, participants' recall increased from Test 2 to

Table 4
Experiment 2: Mean Number of Word Fragments Successfully Completed

Subject Status and Word Learning	Word Fragment	
	Old	New
Reals		
Prehypnotic (n = 12)	6.92 (2.81)	1.42 (0.99)
Hypnotic (n = 11)	7.27 (3.17)	2.45 (1.81)
Simulators		
Prehypnotic (n = 8)	5.75 (2.76)	2.88 (2.47)
Hypnotic (n = 8)	6.38 (3.89)	2.38 (1.77)

Note. For word-fragment task, maximum = 10. Standard deviations appear in parentheses.

Test 3, even though the amnesia suggestion had not been canceled. Furthermore, there were significant negative correlations for reals, but not simulators, between hypnotizability as measured by the SHSS:C and performance on Recall Test 2 ($r = -.51, p < .01$) and Recall Test 3 ($r = -.58$, $p < .005$). In other words, reals' level of recall on these tests decreased as their SHSS:C scores increased. Most important, as in Experiment 1, word-learning condition had no impact on participants' performance on any of the recall tests.

Performance on Word-Fragment Task

Table 4 presents the mean number of word fragments successfully completed. A 2 (Subject Status) × 2 (Word-Learning Condition) × 2 (Fragment Type) mixed model ANOVA of these data yielded a significant main effect for fragment type, $F(1, 35) = 54.25, p < .001$. Participants completed more fragments of old words ($M = 6.67$, $SD = 3.07$) than new words ($M = 2.21, SD = 1.78$). In contrast to Experiment 1, there was no difference between participants who learned the words before or during hypnosis.

During the postexperimental inquiry, participants were asked if they realized that the word-fragment task was related to the word list they were asked to learn either before or during hypnosis. Only four (17%) reals reported that they did not realize at the time they completed the word-fragment task that the two tasks were related. All other participants told E2 that they were aware that the word-fragment task was related to the word list.

DISCUSSION

As in Experiment 1, the time at which the word list was learned had no impact on participants' performance on the recall tests and the word-fragment task. These findings confirm that the impact of a suggestion is not dependent on the time at which the target material in encoded. Also,

consistent with Experiment 1, reals displayed a significant impairment in their recall performance during the amnesia suggestion (Recall Test 2), yet their performance on the word-fragment task remained unimpaired. However, across both the direct and indirect memory measures, there were no differences between reals and simulators. These findings suggest that participants' responses to the amnesia suggestion may be based on social cues and expectancies (Coe, 1978; Silva & Kirsch, 1987). The inclusion of an additional Recall Test during the amnesia suggestion (Recall Test 3) indicated that the word-fragment task (which the majority of participants knew was related to the word list) "breached" participants' experience of amnesia. Notably, however, correlations indicated that reals who maintained their amnesia across Recall Tests 2 and 3 had a higher level of hypnotizability. This finding is consistent with the results of Experiment 1 and suggests that the response of very high and high hypnotizable participants to a suggestion for PHA may differ.

General Discussion

Most important, we found that the time at which participants learned the word list did not influence performance in either experiment. The slight superiority of participants in the hypnotic condition (Experiment 1) on the word-fragment completion task and the slightly quicker word learning demonstrated by participants in the prehypnotic condition (Experiment 2) suggests that there was some variability in performance; nevertheless, no reliable pattern of differences was found. These results point to the ability of PHA to impede recall of material that is encoded both prior to and during hypnosis. Furthermore, the finding that the very high, rather than high or low, hypnotizable participants displayed impairment in their explicit memory performance (in Experiment 1) reinforces the importance of hypnotizability in PHA. Consistent with PHA for events occurring in hypnosis (Kihlstrom, 1980), only the highly skilled hypnotizable participants appear capable of PHA for material prior to hypnosis.

The finding of an increase in participants' recall from Test 2 to Test 3 (in Experiment 2) raises the possibility that intact performance on tests subsequent to the initial Recall Test may be attributed to factors other than dissociation. Specifically, the improved performance on Recall Test 3 indicates either that the word-fragment task "breached" amnesia, amnesia dissipated over time, or memory improved over time due to repeated recall tests. The latter explanation may be attributed to hypermnesia effects that may not involve hypnotic influences (Erdelyi, 1994). The possibility that the word-recognition task breached PHA is consistent with reports that cues for enhanced reporting can result in a proportion of participants increasing their recall (Basden, Basden, Coe, Decker, & Crutcher, 1994; Coe, 1996). This interpretation is supported by the comparable responses of our reals and simulators. Previous studies have

found, however, that breaching is negatively associated with hypnotizability (Kihlstrom, Evans, Orne, & Orne, 1980). The finding that reals who maintained their amnesia across Recall Tests 2 and 3 were more hypnotizable suggests that the robustness of the PHA suggestion following the word-fragment task may depend, in part, on very high levels of hypnotizability.

The failure to find any differences in the responding of reals and simulators in Experiment 2 suggests that an explanation in terms of demand characteristics cannot be ruled out. As argued by Coe (1978, 1996), participants may simply be responding to available social cues by withholding what they could actually remember. This interpretation accords with their low level of free recall. It is possible that the experimental cues communicated to participants that the PHA suggestion was equally applicable to material learned before and during hypnosis. The postexperimental finding that most participants perceived the connection between the word lists and the word-fragment completion task further indicates that expectancies may have played a role in indirect memory performances. The comparability of reals and simulators notwithstanding, it needs to be recognized that the interplay between social and cognitive processes in PHA is complex (see Bowers & Davidson, 1991). Future investigations will need to disentangle the relative contributions of dissociative and contextual factors in reported PHA for material learned before hypnosis. We recognize that both learning conditions took place in an overtly "hypnotic" context. It would be useful in future research to separate more obviously the learning episode from the hypnotic procedure to explore whether material learned outside the hypnotic context is equally susceptible to PHA.

We recognize a number of methodological issues that need to be considered in further research. In the present experiments, the informational value of the implicit and explicit memory tests was not matched. To obtain an accurate comparison between explicit and implicit expressions of memory, replication of these studies should ensure that the direct and indirect measures contain equivalent information and cues to recall. Furthermore, whereas we orally presented the words but visually tested them, future studies should match the presentation and test modalities. Finally, whereas our use of stem-completion provided findings that may be attributed to structural dissociation that results from repetition priming, Kihlstrom's (1980) use of word-association tests reflected a semantic dissociation in PHA. The strength of dissociation in PHA for material learned prior to hypnosis could be more stringently tested by using measures that index both structural (i.e., stem-completion) and semantic (i.e., word-association) dissociations.

The major finding of this research is that a suggestion for PHA works equally well for information learned before or during hypnosis. This demonstration suggests that PHA may be able to disrupt retrieval to

personally meaningful memories as well as to material generated within the hypnotic setting. This possibility is consistent with the use of PHA as a laboratory-based analog for the investigation of disorders of autobiographical memory (Kihlstrom et al., 1994; Kihlstrom & McGlynn, 1991). The capacity for PHA to encompass the recall of distant personal events may permit experimental investigation of processes involved in dissociative memory disorders. We recognize the distinction between the current findings and amnesia for personally meaningful autobiographical events. Also, we acknowledge that further research is required to delineate the influence of a suggestion for PHA on distant personal memories before such a laboratory paradigm can be used. Nevertheless, refining this paradigm to more accurately define the parameters of PHA for material learned prior to hypnosis may provide a useful tool for more rigorous investigation of psychopathologically dissociated memories.

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Posthypnotische Amnesie von vor der Hypnose gelerntem Material

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Zusammenfassung: Der Impact einer Suggestion, vor oder während der Hypnose gelerntes Material posthypnotisch zu vergessen, wurde über zwei Experimente hin untersucht. In Experiment 1 lernten sehr hoch-suggestible, hoch-suggestible und niedrig-suggestible Teilnehmer eine Wortliste entweder vor oder unmittelbar nach einer hypnotischen Induktion. Während der Hypnose wurde den Teilnehmern die posthypnotische Amnesie der Wortliste suggeriert. Nach der Hypnose wurden sie auf Erinnerung, Wortfragmente und Worterkennung getestet. Experiment 2 wiederholte und erweiterte Experiment 1 durch Anwendung des 'real-simulating paradigm.' Bei beiden Experimenten gab es keine Unterschiede in der Ausführung für Probanden, die die Wortliste entweder vor oder während der Hypnose lernten. Obwohl Amnesie auf direkten Erinnerungsmaßen mit hoher Suggestibilität assoziiert war (Experiment 1), konnte eine Erklärung die auf 'demand characteristics' beruhte, nicht ausgeschlossen werden (Experiment 2). Die Implikationen dieser Resultate für die Anwendung von posthypnotischer Amnesie als Laboratoiumsanalogon von Störungen der autobiographischen Erinnerung werden diskutiert.

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L'amnésie post-hypnotique comme apprentissage avant hypnose

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Résumé: L'impact d'une suggestion d'amnésie post-hypnotique en tant qu'apprentissage avant ou après hypnose a été étudiée au cours de deux études. Dans l'étude N°1, les sujets très fortement hypnotisables, de niveau élévé ou faiblement hypnotisables avaient appris une liste de mots soit avant soit immédiatement après une induction hypnotique. Pendant l'hypnose, les participants ont reçu une suggestion d'amnésie post-hypnotique pour la liste de mots. Après hypnose, ils ont été évalués sur le rappel, des fragments de mots, et des tâches de reconnaissance de mots. L'étude N°2 reprenait la N°1 de façon plus étendue, par l'application du paradigme sumulant le réel. Au travers de ces études, il n'y a eu aucune différence dans la performance des participants qui avaient appris la liste de mots, avant ou pendant hypnose. Bien que les mesures d'amnésie sur la mémoire directe soit associée à un haut degré d'hypnotisabilité (Etdue N°1), une explication basée sur les caractéristiques demandées ne peut être exclue. Les implications de ces résultats dans l'utilisation de l'amnésie post-hypnotique comme un laboratoire analogue de mémoire autobiographique sont dicutées.

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Amnesia posthipnótica para la información aprendida antes de la hipnosis

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Resumen: Investigamos en dos experimentos el impacto de una sugestión de amnesia posthipnótica de información aprendida antes o durante la hipnosis. En el experimento 1, participantes con hipnotizabilidad elevada o baja aprendieron una lista de palabras antes o inmediatamente después de una inducción hipnótica. Durante la hipnosis, se dió a los participantes una sugestión de amnesia posthipnótica para la lista de palabra. Después de la hipnosis, se les dieron pruebas de recuerdo, reconocimiento de la palabra, y de completar fragmentos de palabras. El experimento 2 duplicó y extendió el experimento 1 mediante la aplicación del paradimga de participante real o simulado. En ninguno de los experimentos encontramos diferencia en el desempeño de los participantes que aprendieron la lista de palabras antes de o durante la hipnosis. Aunque las medidas directas de la memoria estuvieron asociadas con una hipnotizabilidad elevada (Experimento 1), no podemos excluir una explicación basada en las características de demanda (Experimento 2). Discutimos también las implicaciones de estos hallazgos en el uso de la amnesia posthipnótica como un análogo experimental de trastornos de la memoria autobiográfica.

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