

## Attempting to Breach Posthypnotic Amnesia

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Traditionally, posthypnotic amnesia has been construed as a subjectively compelling deficit in memory retrieval. Alternatively, it may represent a motivated failure to utilize appropriate retrieval cues, lack of effort in recall, active suppression of memory, or unwillingness to verbalize the critical material. In an effort to test the alternative hypothesis of amnesia, 488 subjects were presented with four kinds of instructions designed to overcome the effects of suggested posthypnotic amnesia. The instructions particularly affected subjects of low and moderate hypnotizability who failed the criterion for amnesia. For those of moderate and high hypnotizability who met the criterion for amnesia, however, explicit requests for temporal organization, exhortations to maximize recall, and demands for honesty in reporting produced no greater effect on memory than did a simple retest. These results place some boundaries on both the traditional and alternative views of posthypnotic amnesia and invite further exploration of both cognitive and contextual models of the phenomenon.

Following suggestions of amnesia and the termination of hypnosis, many subjects appear unable to remember some or all of the events that transpired while they were hypnotized. Later, after the experimenter has administered a prearranged cue, these

memories seem to flood back into awareness, and the subjects who showed such difficulty in remembering just a few moments before now remember the events of hypnosis vividly and clearly. The reversibility of amnesia indicates that this apparent difficulty in remembering does not stem from a loss of memories from storage. Although there is general agreement that the memories covered by the amnesia remain available in the cognitive system, controversy persists concerning the mechanisms involved in the subject's failure to report them to the experimenter.

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Posthypnotic amnesia has usually been conceptualized as a subjectively compelling, temporary inability of the subject to remember certain events and experiences (Bowers, 1966; Cooper, 1979; Hilgard, 1965, 1966; Kihlstrom, 1977, 1978; Orne, 1966; Weitzenhoffer, 1953). This conceptual approach

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had led to experiments designed to explore the processes underlying the disruption in memory function: repression (Clemes, 1964), selective recall (Coe, Baugher, Krimm, & Smith, 1976; Hilgard & Hommel, 1961; O'Connell, 1966; Pettinati & Evans, 1978), disorganized retrieval (Evans & Kihlstrom, 1973; Kihlstrom & Evans, 1979; Spanos & Bodorik, 1977), and the like. Those theorists who view hypnosis from a social-psychological perspective, however, although agreeing that an occasional subject may experience an actual disruption in memory, emphasize the motivated subject's neglect of organizational strategies that would be helpful in retrieving the material, active suppression of memories, willful lack of effort in recall, or unwillingness to verbalize material that is already remembered (Barber, 1969; Barber, Spanos, & Chaves, 1974; Coe, 1978; Sarbin & Coe, 1972, 1979). This position has led to experiments comparing the effects of hypnotic and task-motivation conditions on amnesia (Barber & Calverley, 1966), analyses of subjects' strategies in producing amnesia (Spanos & Bodorik, 1977; Spanos & Ham, 1973), demonstrations that memory traces are not abolished in posthypnotic amnesia (Coe, Basden, Basden, & Graham, 1976), and the like.

There is already a fair amount of evidence available that pertains indirectly to the contextual hypothesis (see more complete reviews by Coe, 1978; Kihlstrom, 1977, 1978; Sarbin & Coe, 1979). For example, hypnotized subjects responding to amnesia suggestions show different patterns of performance on memory tests compared to those who have been instructed to simulate hypnosis and amnesia (Barber & Calverley, 1966; Evans, 1979; Johnson, Maher, & Barber, 1972; Spanos, Radtke-Bodorik, & Stam, 1980; Williamsen, Johnson, & Eriksen, 1965). In a similar vein, task-motivational instructions sometimes (Barber & Calverley, 1966) but not always (Spanos, Radtke-Bodorik, & Shabinsky, 1980; Bodorik & Spanos, Note 1) produce levels of amnesia equivalent to those observed in hypnotized subjects. Furthermore, the pre-existing expectations of subjects concerning their posthypnotic memory are uncorrelated

with their actual response to amnesia suggestions (Ashford & Hammer, 1978; Shor, 1971), although there may be some small relation to outcome when these expectations are manipulated by the investigator (Young & Cooper, 1972).

More direct evidence on the compliance hypothesis is provided by studies that explore the strategies subjects use to produce amnesia or assess the effects of changing the context in which amnesia is evaluated. In an experiment by Spanos and Bodorik (1977), slightly more than half of the unselected subjects tested reported that they actively tried to forget the critical material after receiving amnesia suggestions—typically by means of suppression of recall and response withholding. These strategies were successful for a minority of the subjects involved, in that they led to an apparent partial or complete recall failure. However, the vast majority showed unimpaired recall despite their use of strategies. Significantly, an equivalent proportion of the remaining subjects met the criterion for partial or full amnesia despite the fact that they reported that they had not actively tried to forget the material. In addition, a study by Bowers (1966) examined the effects of changing context on reports of amnesia. Hypnotized and simulating subjects were given an amnesia suggestion, interviewed, and then dismissed without cancelling the amnesia. When seen by another experimenter under conditions of a strong honesty demand, all of the simulators but only half of the hypnotized subjects showed a release of the amnesia.

The hypothesis-testing framework that dominates modern experimental psychology unfortunately compels investigators to discuss competing approaches to a phenomenon in "either-or" terms. Nevertheless, it seems likely that both the traditional and alternative viewpoints on posthypnotic amnesia are partly correct, in that each applies to a subset of amnesic subjects. Certainly some subjects, complying with the demands implicit or explicit in the social context in which the hypnotic interaction takes place, behave in accordance with amnesia suggestions even though they do not experience any actual disruption in

memory. Other subjects, however, appear to be surprised by their inability to recall, find their amnesia subjectively compelling, and continue to manifest amnesia despite changing conditions. Because two very different mechanisms appear to be implicated, the principal problem for research at this stage is to identify the boundary conditions for each hypothesis. The present experiment sought to provide some information along these lines by presenting amnesic subjects with various special instructions concerning the manner in which they should recall the events and experiences of hypnosis. The instructions were of three types, each reflecting a different strategy by which a subject might actively comply with amnesia suggestions: neglecting to organize retrieval, failing to exert enough effort during the memory tests, or deliberately withholding information from the experimenter. In brief, for three groups explicit instructions designed to counteract these strategies were inserted between an initial test of posthypnotic amnesia and a retest; the effects of these instructions were compared to those observed in a fourth group of subjects, for whom the original recall test was simply repeated without any embellishment. Because some improvement in recall might be expected on a retest under any circumstances, this last group represented a control against which any changes in recall due to the specific instructions in the other conditions could be compared.

### Method

This experiment was conducted in the context of an administration to naive subjects of a standardized, tape-recorded hypnotic procedure, the *Harvard Group Scale of Hypnotic Susceptibility, Form A* (HGSHS:A; Shor & Orne, 1962, 1963). Although HGSHS:A is more suitable as a preliminary screening device than as a vehicle for formal experiments, it was employed for two reasons. First, the proportion of unselected subjects meeting the standardized criterion for posthypnotic amnesia is somewhat higher, and the correlation between amnesia and general hypnotic susceptibility is somewhat lower, than is the case in the individual standardized procedures such as the *Stanford Hypnotic Susceptibility Scale, Forms A, B, and C* (Weitzenhoffer & Hilgard, 1959, 1962). This suggests that the response to the amnesia suggestion may be inflated by factors such as compliance and lack of effort that are central to the social-psychological account of posthypnotic amnesia. Moreover, massive normative data is available con-

cerning the amnesia item of this scale. Second, the use of a tape-recorded procedure permitted the subjects in all conditions to be treated alike before and after the interpolated amnesia test, and group testing ensured that hypnotizable and insusceptible subjects would be treated similarly in all phases of the experiment. Recruitment of subjects with no prior experience of hypnosis reduced the possibility of artifacts stemming from self-selection and the inadvertent shaping of behavior and experience by previous hypnotists.

### Subjects

A total of 488 male and female college students recruited from the Philadelphia area volunteered for a psychological experiment involving the assessment of susceptibility to hypnosis. The subjects were run in groups ranging in size from 9 to 33 persons and were paid \$7 for a single experimental session lasting approximately 3 hours. Following completion of a number of questionnaires, the subjects received one of four modified versions of the HGSHS:A.

### Procedure

The HGSHS:A is a standardized procedure consisting of an induction of hypnosis accompanied by suggestions for 12 discrete representative hypnotic experiences. The final item in the scale is a suggestion of posthypnotic amnesia for the experiences that occurred during hypnosis (a total of 9 out of the 12 items)<sup>1</sup> and the establishment of a cue to reverse the amnesia:

You probably will have the impression that you have slept because you will have difficulty in remembering all the things I have told you and all the things you did or felt. In fact, you will find it to be so much of an effort to recall any of these things that you will have no wish to do so. It will be much easier simply to forget everything until I tell you that you can remember. You will remember nothing of what has happened until I say to you: "Now you can remember everything!" You will not remember *anything* until then. (from Shor & Orne, 1962, p. 11)

Amnesia is objectively defined by the number of scale items recalled posthypnotically. According to the standardized scoring criterion, those subjects who recall no more than three of the nine critical items on the initial test of posthypnotic memory are counted as passing the criterion for amnesia. No modifications were made to the conventional, standardized HGSHS:A procedure until *after* the usual test for posthypnotic amnesia was carried out.

Written reports of posthypnotic memory were collected in a series of three recall tests. The first of these was the conventional test of initial amnesia. For this study, HGSHS:A was then extended by the addition of a second recall test, which was preceded by one of four

<sup>1</sup> Three items are not counted in the standard scoring of amnesia: a test of waking suggestibility, eye closure during the induction of hypnosis, and the amnesia suggestion itself.

kinds of special instructions.<sup>2</sup> This second test was administered during amnesia, before the reversibility cue was given. The special instructions constituted the experimental manipulation and were designed to test the integrity of the verbal report of memory recall. Finally, the cue was given to reverse the amnesia, and recall was tested again.

Following the three tests of posthypnotic memory, the subjects rated their behavioral responses to the remaining 11 items of HGSHS:A according to objective behavioral criteria. These retrospective self-ratings have been shown to correlate highly with those made by external observers (Bentler & Hilgard, 1963; Shor & Orne, 1963; see also O'Connell, 1964). The experimenter who introduced the HGSHS:A tape to the subjects was blind to the particular version of the scale being administered in any given session.

### *Tests of Posthypnotic Recall*

The method of conducting each of the several tests of posthypnotic recall is described in the text that follows (italicized words and phrases received special emphasis in the recorded script). For all three memory tests, the subjects wrote out their memory reports in appropriately modified versions of the standard HGSHS:A response booklet. Each of the recall test pages was headed by a brief summary of the corresponding tape-recorded script. A period of 3 min was allotted for each of the three tests of posthypnotic memory.

*Test 1 (during amnesia).* After termination of hypnosis and testing of another posthypnotic suggestion, all 488 subjects were administered the same standardized test of posthypnotic amnesia:

Now . . . please write down briefly in your own words a list of the things that happened since you began looking at the target. You should not go into much detail here on the particular ways in which you responded, but please try to mention all of the different things that you were asked to do. (from Shor & Orne, 1962, p. 11)

The purpose of Test 1 was to establish each subject's initial level of response to the amnesia suggestion under standard conditions.

*Test 2 (also during amnesia).* Immediately following the completion of the initial assessment of amnesia, but before the amnesia suggestion was lifted by the prearranged reversibility cue, the second test of memory was inserted. The exact nature of this second test depended on the experimental condition to which each group of subjects had been randomly assigned.

1. Retest ( $n = 115$ ). In this condition subjects were administered a second memory test, but were given no additional instructions regarding the manner of recall: "We would like you to write down *again* a list of the things that happened while you were hypnotized." Data from this group provided an indication of any change in recall that might occur under ordinary retest conditions, thereby yielding a baseline against which the effects of the instructions given to the other groups could be compared.

2. Cue ( $n = 139$ ). In this group, subjects were administered the second recall test with accompanying instructions to list the items that they could remember in the exact order in which they occurred during the hypnotic procedure:

Usually when we try to remember things we have done, we can also remember the exact order in time in which they occurred. This time, it is *extremely important* that you list the things that happened while you were hypnotized in the *exact order* in which they occurred.

If the amnesic subject's memory failure reflects a neglect of temporal cues and related organizational strategies, the reminder concerning temporal sequence should facilitate recall (for a further discussion of this issue, see Kihlstrom & Evans, 1979).

3. Challenge ( $n = 118$ ). Subjects in this condition were instructed to exert extra effort in recalling material from memory:

Usually when we try to remember things we have done, if we make a *second* effort we can remember things that we could not remember before. This time, it is *extremely important* that you try *even harder than before* to list all of the things that happened while you were hypnotized.

If the memory impairment in amnesia results from the subject's neglect of memories that are actually accessible, these instructions should result in an improvement in recall.

4. Honesty ( $n = 116$ ). This group of subjects was urged not to voluntarily withhold any experiences that they actually remembered:

There is a tendency for subjects to try to be "helpful" by not writing down all of the things that they actually remember. However, this is a scientific experiment and it is *vital* that you really put down *everything that you can remember* about what has happened while you were hypnotized.

If the subject remembers the critical material during the amnesia test but deliberately withholds it from the experimenter, these instructions should yield a marked increment in recall (Bowers, 1967).

*Test 3 (after amnesia).* Finally, the suggestion for posthypnotic amnesia was cancelled by means of the prearranged reversibility cue, and all 488 subjects, regardless of previous experimental manipulation, were administered the same test of postamnesia recall:

All right, now listen carefully to my words. *Now you can remember everything.* Please . . . write down a list of everything you now remember that happened since you began looking at the target.

This provided a test of recovery of memory after posthypnotic amnesia. In the conventional HGSHS:A proce-

<sup>2</sup> The tape recording used in this study was the standard version recorded by L. Dumas under the supervision of D. N. O'Connell in 1962. The modified amnesia tests were recorded by T. Markus in 1974.

sure, reversibility is assessed by asking the subjects to report only those newly remembered items that they did not recall on the previous amnesia test. To ensure comparability of the various tests of posthypnotic recall employed in this study, however, the subjects were asked to report all of the suggestions that they could remember.

## Results

The mean total HGSHS:A scale score for the combined sample of 488 subjects was 7.09 ( $SD = 2.56$ ). The average number of items recalled on Test 1 (the initial amnesia test) was 3.53 ( $SD = 2.26$ ); a total of 216 subjects (44.3%) met the standardized criterion for amnesia by recalling three or fewer items on that test. Table 1 shows these parametric data separately for each of the four treatment groups. There were no significant group differences in either the mean HGSHS:A scale score,  $F(3, 484) = .67$ ; the number of items recalled on Test 1,  $F(3, 484) = 1.55$ , *ns*; or the proportion of subjects passing the amnesia item according to the standard criterion,  $\chi^2(3) = 4.08$ , *ns*. In general these figures are comparable to published norms (e.g., Shor & Orne, 1963, Coe, 1964). Thus the random assignment of subject groups to conditions was successful, in

terms of sample parameters. For all analyses reported in the remainder of this article, the HGSHS:A scores were corrected by eliminating the amnesia item itself from consideration, yielding an 11-point scale. On the basis of these corrected scores, the subjects were classified as low (0–4), medium (5–7), or high (8–11) in hypnotic susceptibility.

### Initial Amnesia Response

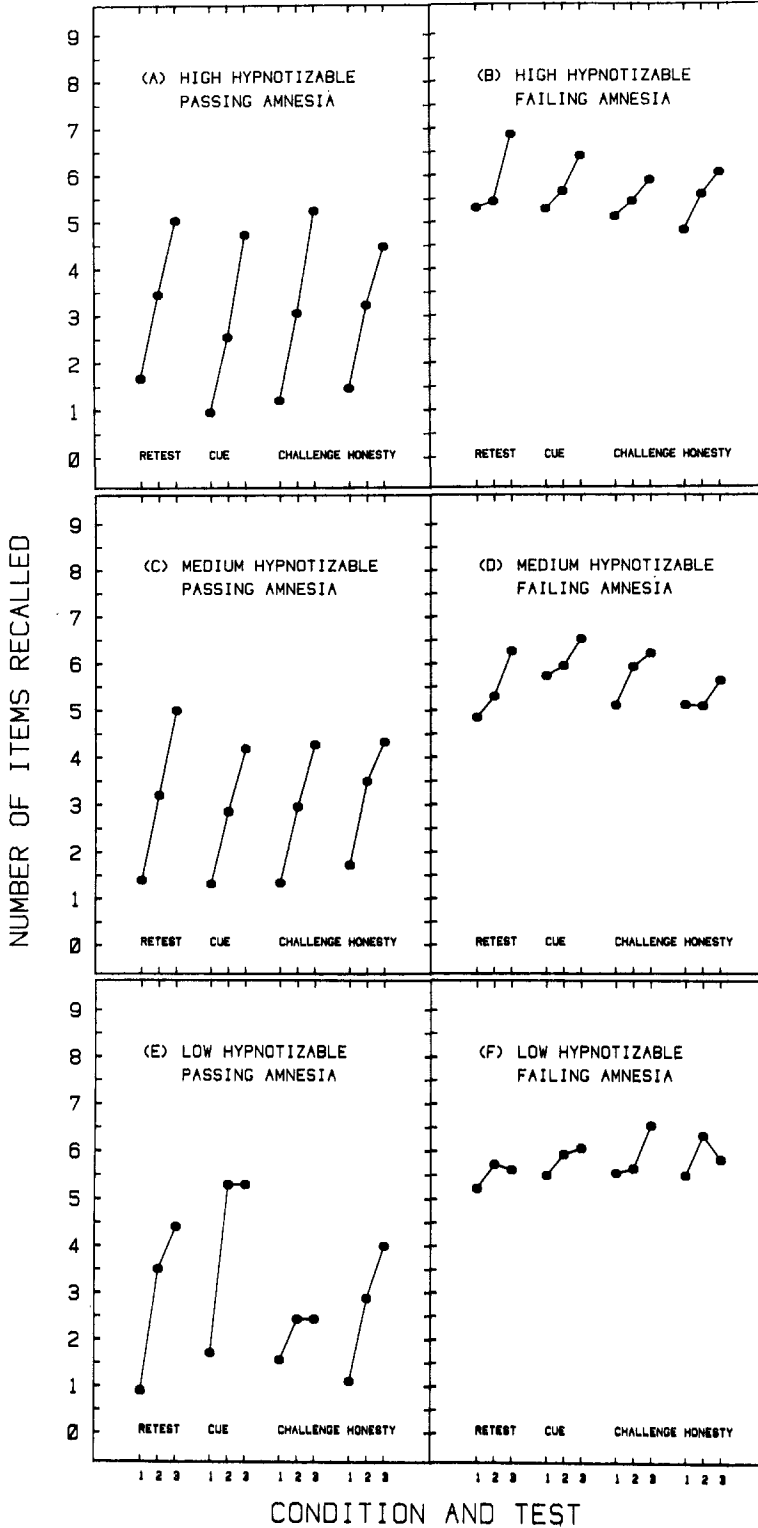
The experimental manipulation was not introduced into the procedure until after Test 1, when the initial assessment of amnesia had been completed. For this reason the various groups were combined for an analysis of data gathered from the initial recall test. The mean number of items recalled on Test 1 was 3.90 ( $SD = 2.33$ ) for the combined group of 90 insusceptible subjects, 3.77 ( $SD = 2.18$ ) for the 209 medium-hypnotizable subjects, and 3.08 ( $SD = 2.24$ ) for the 189 subjects of high hypnotizability. Analysis of variance revealed significant group differences,  $F(2, 485) = 6.16$ ,  $p < .005$ , indicating, as expected, that hypnotizable subjects were more responsive to the amnesia suggestion than were insusceptible subjects. The difference in initial recall

Table 1  
HGSHS:A Sample Parameters for Four Instructional Conditions

Variable	Instructions			
	Retest	Cue	Challenge	Honesty
Total <i>n</i>	115	139	118	116
HGSHS:A scale score <sup>a</sup>				
<i>M</i>	6.94	7.16	7.34	6.95
<i>SD</i>	2.73	2.42	2.54	2.55
Initial amnesia response <sup>b</sup>				
<i>M</i>	3.60	3.78	3.19	3.49
<i>SD</i>	2.16	2.43	2.45	2.13
Size of subgroups <sup>c</sup>				
High hypnotizability (amnesic, nonamnesic)	45 (22, 23)	56 (27, 29)	46 (28, 18)	42 (25, 17)
Medium hypnotizability (amnesic, nonamnesic)	42 (28, 15)	60 (22, 38)	54 (26, 28)	53 (18, 35)
Low hypnotizability (amnesic, nonamnesic)	28 (10, 18)	23 (7, 16)	18 (7, 11)	21 (9, 12)

Note. HGSHS:A = Harvard Group Scale of Hypnotic Susceptibility, Form A.

<sup>a</sup> Uncorrected HGSHS:A score. <sup>b</sup> On Test 1. <sup>c</sup> Corrected HGSHS:A score: low (0–4), medium (5–7), high (8–11); recall on Test 1: amnesic (0–3), nonamnesic (4–9).



between low- and medium-hypnotizable subjects was not significant,  $t(297) = .48$ , whereas the recall of the high-hypnotizable subjects differed significantly from that of both the mediums,  $t(396) = 3.04$ ,  $p < .005$ , and the lows,  $t(277) = 2.85$ ,  $p < .005$ .

### *Impact of Special Instructions on Posthypnotic Recall*

If the alternative contextual hypothesis of posthypnotic amnesia is generally correct, the various instructions employed in this experiment would be expected to differentially affect the memory reports of the subjects. Figure 1 presents the average recall on each of the three tests of posthypnotic memory for the subjects in this experiment classified by level of hypnotizability (low, medium, or high), level of initial amnesia (pass or fail the standard criterion on Test 1), and instructional condition (retest, cue, challenge, or honesty). To avoid confounding of the dependent variable of recall level with the independent variable of initial amnesia status, the data from the three recall tests were converted to change scores representing the difference between Test 1 and Test 2 (i.e., during amnesia) and between Test 2 and Test 3 (i.e., after amnesia was cancelled). A  $3 \times 2 \times 4 \times 2$  mixed-design analysis of variance (ANOVA) with three between-subjects factors (hypnotizability, initial amnesia, and instructional conditions) and one within-subjects factor (change scores) showed a nonsignificant main effect of instructional condition,  $F(3, 464) = 1.93$ ,  $p < .15$ , but the impact of the different instructions was more apparent in a significant interaction between instructions, level of hypnotizability, and level of initial amnesia,  $F(6, 464) = 2.24$ ,  $p < .05$ . Thus the instructions had different effects on the various subject groups.

To explore these effects further, the subjects were jointly classified in terms of hypnotizability and initial amnesia response, and separate  $4 \times 3$  mixed-design ANOVAs

with one between-subjects factor (instructional conditions) and one within-subjects factor (recall tests) were performed on each of the six subgroups so formed. Because the independent and dependent variables were no longer confounded, these ANOVAs were applied to recall level rather than change scores. In each of the six groups, the effect of repeated tests was significant ( $p < .005$ ), indicating that recall improved across the trials. There was a significant main effect of instructional condition in the case of the medium-hypnotizable, nonamnesic subjects,  $F(3, 124) = 3.12$ ,  $p < .05$ , and a similar trend among the low-hypnotizable amnesic subjects,  $F(3, 29) = 2.42$ ,  $p < .10$ . Finally, there was a trend toward an interaction between conditions and tests in the high-hypnotizable, nonamnesic subjects,  $F(6, 166) = 1.65$ ,  $p < .15$ , and substantially weaker trends ( $p < .30$ ) in the medium-hypnotizable, nonamnesic subjects and in the amnesic and nonamnesic subjects of low hypnotizability; in all other cases,  $p > .40$ .

In sum, there were no effects of instructional conditions observed in the subjects of high and medium hypnotizability who met the criterion for initial posthypnotic amnesia; such effects were observed to some degree in the other groups, however. All main effect and interaction trends involving the instructional conditions factor were pursued in detail, as were effects apparent to the naked eye that were not indicated statistically. In this way no such effect, however weak, would be obscured by the overall analysis of variance.

*Groups yielding no evidence of treatment effect.* A total of 102 of the 189 subjects (54.0%) scoring in the high range of hypnotizability passed the standardized criterion for initial posthypnotic amnesia, recalling no more than three items on Test 1 (Figure 1, Panel A). Separate one-way analyses of variance evaluated the changes in recall observed from Test 1 to Test 2 (during amnesia with the various interpolated instructions) and from Test 2 to Test 3 (after

Figure 1. Mean number of items recalled on three tests of posthypnotic recall. (Maximum recall is 9 items. Tests 1 and 2 occurred during suggested amnesia, Test 2 preceded by special instructions. Test 3 occurred after the reversibility cue was given to lift the amnesia. See Table 1 for subgroup *ns*.)

amnesia was cancelled by the prearranged reversibility cue). There was a substantial improvement in memory during posthypnotic amnesia but no effect of the instructional conditions,  $F(3, 98) = .10$ . A further substantial improvement was observed after amnesia was cancelled; thus, the significant increments in recall observed on Test 2 were *not* sufficient to abolish the effects of the amnesia suggestion. Although there was some trend toward an effect of instructional condition on the extent of recovery after amnesia,  $F(3, 98) = 1.59, p < .20$ , Scheffé's test revealed no significant group differences.

Compared to the high-scoring group, a somewhat smaller portion of the subjects showing HGSHS:A scores in the medium range passed the amnesia item, 81 out of 209 (38.8%). The results for this group are presented in Figure 1, Panel C. These subjects repeated the pattern found in the hypnotizable subjects who passed the amnesia item, showing a substantial improvement in recall during the time that the amnesia suggestion was in effect and a further improvement after it was lifted. The various instructional conditions, however, seemed to have no effect on these changes, both  $F_s(3, 77) < 1$ .

*Groups yielding evidence of treatment effect.* The remaining 87 hypnotizable subjects failed the criterion for amnesia (Figure 1, Panel B). Although the subjects in the retest condition showed by far the least increment in recall during amnesia, the effect of instructions did not prove significant,  $F(3, 83) = .92$ . The cue, challenge, and honesty groups showed the least recovery after amnesia; although the overall effect of instructions on recovery was not significant,  $F(3, 83) = 2.45, p < .10$ , Scheffé's test showed that the recovery observed in the challenge and honesty groups was significantly different from that observed in the retest controls ( $p < .05$ ). In contrast to their more amnesic counterparts, then, the posthypnotic recall of hypnotizable nonamnesic subjects seemed to be affected to some degree by the instructional context in which the tests took place.

The remaining 128 medium-hypnotizable subjects also failed amnesia (Figure 1, Panel

D). During amnesia there was a trend toward an effect of instructional condition,  $F(3, 124) = 1.67, p < .20$ , with the honesty group showing the least improvement, although Scheffé's test showed no significant group differences. There was, however, no effect of instructions on the recovery of memory after amnesia,  $F(3, 124) = .82$ .

A surprisingly large number of unsusceptible subjects (33 of 90, or 36.7%) met the standardized criterion for initial amnesia (Figure 1, Panel E). These subjects have been called pseudoamnesic by Kihlstrom and Evans (1977), because they typically show no evidence indicating recovery of memory after the amnesia suggestion has been cancelled. During amnesia there was a trend toward an effect of instructions,  $F(3, 29) = 1.99, p < .20$ , with the challenge group recalling the least, although no group comparison reached significance by Scheffé's test. Although the retest and honesty groups showed more recovery after amnesia than the cue and challenge groups, the effect was not significant,  $F(3, 29) = .42$ .

The remaining 57 unsusceptible subjects did not meet the standardized criterion for amnesia (Figure 1, Panel F). Nevertheless, given repeated tests, these subjects did typically show some improvement in recall. There were no group differences in the extent of improvement shown during amnesia,  $F(3, 53) = .87$ . There was such a trend after amnesia was cancelled, however,  $F(3, 53) = 2.23, p < .10$ , with the challenge group showing the largest increment and the honesty group actually showing a decrement (group comparison,  $p < .10$ , by Scheffé's test).

#### *Detailed Analysis of Amnesic Subjects*

Of particular interest in this experiment was the performance of those subjects of high and moderate hypnotizability who met the standardized criterion for posthypnotic amnesia. These are the subjects who are usually included in formal experiments on amnesia, whereas unsusceptible subjects who happen to meet the criterion for amnesia are usually considered pseudoamnesic. Because these hypnotized, am-



nesic subjects seemed to be unaffected by the different situational demands imposed in the experiment, a closer analysis of the results was indicated.

*High hypnotizability.* Slightly more than half of the highly hypnotizable subjects (55, or 53.9%) maintained amnesia on Test 2, continuing to recall no more than three items despite attempts to breach the amnesia by retesting and/or special instructions. An analysis of variance of the difference in recall between Test 2 (during amnesia) and Test 3 (after amnesia) showed a significant change across trials,  $F(1, 51) = 88.45, p < .001$ , but no effect of instructional condition,  $F(3, 51) = 1.16, ns$ . The significant recovery of memory after administration of the reversibility cue indicates that the apparent maintenance of the amnesia during the two tests of amnesia was not an artifact of ordinary forgetting.

The remaining 47 highly hypnotizable subjects, however, recalled enough new material on Test 2 that they no longer met the standardized criterion for amnesia. The proportion of subjects showing a breakdown of amnesia did not differ from one treatment condition to another—retest, 40.9%; cue, 40.7%; challenge, 50.0%; honesty, 52.0%;  $\chi^2(3) = 1.07, ns$ . Analysis of variance of the change scores again revealed a significant recovery of memory,  $F(1, 43) = 29.70, p < .001$ , but no effect of instructions,  $F(3, 43) = 1.20, ns$ . Thus the substantial gain in recall occurring across the two amnesia tests was not sufficient to abolish the amnesia entirely: The amnesia was completely relieved only after administration of the reversibility cue.

*Medium hypnotizability.* Similar analyses were performed for the 81 subjects of medium hypnotizability who passed the criterion for amnesia. Again, slightly more than half of these subjects (42, or 51.9%) continued to meet the criterion for amnesia on Test 2. Analysis of variance of recall on Test 2 and Test 3 showed, once more, significant recovery,  $F(1, 38) = 36.30, p < .001$ , but no effect of instructions ( $F = .63$ ). Again, the maintenance of amnesia was not an artifact of forgetting, since memory improved when the reversibility cue was given. Once again, the proportion of subjects

showing a breakdown of amnesia on Test 2 did not differ among the treatment conditions—retest, 46.7%; cue, 45.4%; challenge, 46.1%; honesty, 55.6%;  $\chi^2(3) = .51$ . In contrast to the results obtained with their highly hypnotizable counterparts, analysis of variance of reversibility showed a nonsignificant trend,  $F(1, 35) = 2.15, p < .20$ ; there was still no effect of instructions, however,  $F(3, 35) = .27$ . For the moderately hypnotizable subjects who passed the criterion for amnesia on Test 1 but failed it on Test 2, the increment in recall was sufficient to abolish the amnesia almost entirely.

*Low hypnotizability.* As noted earlier, 33 subjects of low hypnotizability nevertheless met the standard criterion for initial posthypnotic amnesia. In contrast to the other amnesic groups, somewhat less than half of these subjects (14, or 42.4%) continued to meet the criterion for amnesia on Test 2. More important, the proportions of subjects showing a breakdown of amnesia varied considerably from one treatment condition to another—retest, 40%; cue, 100%; challenge, 29%; honesty, 44%;  $\chi^2(3) = 8.23, p < .05$ . Within the subgroups maintaining or breaching amnesia, comparison of the recovery of memory after administration of the reversibility cue shown by the various treatment conditions was precluded by the extremely small cell frequencies involved. The significant effect of treatment condition on breaching amnesia confirms the trends observed in the earlier analysis and supports a pseudoamnesia interpretation of posthypnotic amnesia in these subjects.

*Differences in hypnotizability.* Considering only the amnesic subjects, regardless of level of hypnotizability, those who maintained amnesia on Test 2 were slightly more hypnotizable than those who breached amnesia (mean corrected HGSHS:A score: 7.22 vs. 6.92, respectively), but the trend did not approach statistical significance,  $t(214) = .89$ . This difference was expected, and the failure to find it may be due to the relatively poor ability of HGSHS:A to make fine discriminations among hypnotizable subjects. Alternatively, it may reflect the complexity of hypnotic responsiveness and the

possibility that special abilities or characteristics, only marginally related to general hypnotic susceptibility, are associated with the ability to produce and maintain posthypnotic amnesia (Evans, 1968; Hilgard, 1965).

### *Analysis of Residual Amnesia*

It may be seen in Figure 1 that overall, subjects who met the criterion for initial posthypnotic amnesia showed less recall on Test 3, after amnesia had been lifted ( $M = 4.57$ ,  $SD = 1.98$ ), compared to those who failed to pass the amnesia item ( $M = 6.18$ ,  $SD = 1.67$ ); the difference is significant,  $t(486) = 9.52$ ,  $p < .001$ . This difference persisted even when, following the procedure employed by Kihlstrom and Evans (1977), the analysis was restricted to subjects of high hypnotizability—amnesic,  $M = 4.88$ ,  $SD = 1.84$ ; nonamnesic,  $M = 6.36$ ,  $SD = 1.44$ ;  $t(187) = 6.07$ ,  $p < .001$ .<sup>3</sup> As has been argued elsewhere (Hilgard & Hommel, 1961; Kihlstrom & Evans, 1977), the discrepancy in final recall between amnesic and nonamnesic subjects may reflect the residual effect of the suggestion for posthypnotic amnesia, even though the suggestion has been formally cancelled. More important for present purposes, a  $3 \times 2 \times 4$  analysis of variance with three between-subjects factors (level of hypnotizability, level of initial amnesia, and instructional condition) revealed, in addition to the significant effect of level of initial amnesia just discussed, a significant effect of instructional condition,  $F(2, 464) = 3.09$ ,  $p < .05$ , and a significant three-way interaction,  $F(6, 464) = 2.44$ ,  $p < .05$ . Scheffé's test, however, did not reveal any significant differences among the treatment conditions. Accordingly, the overall analysis of variance was decomposed into three  $3 \times 2$  analyses—one for each hypnotizability subgroup—with two between-subjects factors (initial amnesia and treatment condition). There were no significant main effects of treatment condition in any group, but there was a significant Amnesia  $\times$  Treatment interaction in the low-hypnotizable subjects,  $F(3, 82) = 2.90$ ,  $p < .05$ . Insusceptible subjects in the challenge condition who met the criterion for initial amnesia showed by far the lowest

level of final recall, compared to their counterparts who failed the criterion for initial amnesia. Once again, the impact of the instructional conditions was apparent only for subjects who were relatively insusceptible to hypnosis.

### Discussion

This study sought to examine the effects of different instructional contexts on recall during and after posthypnotic amnesia. Subjects of high and moderate hypnotizability who met a criterion for initial posthypnotic amnesia seemed to be unaffected by variations in instructional demands, compared to a control group that received a simple retest with no instruction. Although approximately half of each treatment group showed a breach in amnesia on the second test, the highly hypnotizable subjects continued to manifest a partial amnesia, as evidenced by their recovery of even more memories after administration of the reversibility cue; the moderately hypnotizable subjects, however, manifested a more substantial breakdown of amnesia, failing to show any reversibility. Whereas the highly and moderately hypnotizable amnesics were relatively impervious to changes in testing context, their nonamnesic counterparts, and all insusceptible subjects, seemed to show the effects of changing situational demands. Their memory reports varied widely, depending on the specific instructions given.

### *Spontaneous Recovery From Amnesia*

A significant improvement in memory was observed even in the retest control condition, and it seems appropriate to consider first the findings in this baseline group. An increment in recall occurred in subjects of high and medium hypnotizability who initially met the criterion for posthypnotic amnesia. The group trends, however, obscure substantial individual differences: Slightly more than half the highs and mediums continued to pass the amnesia cri-

<sup>3</sup> Kihlstrom and Evans (1977, Experiment 2) report a preliminary analysis of the present data based on different criteria for high hypnotizability and initial amnesia.

terion on the retest. Because both groups showed a substantial improvement in memory after the amnesia suggestion was cancelled, this maintenance of amnesia was not an artifact of forgetting (Kihlstrom & Evans, 1976). For the remaining subjects, who met the criterion for amnesia on the first test but failed it on the second, the results were somewhat different. There was a further significant improvement in recall shown by the highly hypnotizable subjects, indicating that their improvement during amnesia was not generally sufficient to abolish the amnesia entirely. However, their counterparts of medium hypnotizability did not show such an improvement after the amnesia suggestion was cancelled.

The retest condition was conceived as a control group analogous to those employed in the study of reminiscence effects in waking memory (Ballard, 1913), and although some recovery was anticipated, this study was not specifically designed to explore the factors accounting for the apparently spontaneous recovery from amnesia observed in the retest subjects. In general terms, there are two possibilities: a remission or decay of amnesia due to the passage of time or a reminiscence effect stemming from the successful retrieval of some memories on the initial test of amnesia. A subsequent experiment, in which subjects tested under conditions identical to the present retest group were compared with another group who received a single amnesia test after an interval filled by distractor tasks, favors the former hypothesis (Kihlstrom, Easton, & Shor, Note 2).

#### *Response to Variations in Instructional Demands*

The focus of this study was on the impact of the various types of instructions on recall during posthypnotic amnesia, over and above whatever improvement in memory was observed in the retest group. The significant four-way interaction revealed by the analysis of variance indicated that their impact depended on the subjects' level of hypnotizability and degree of initial amnesia. There was no indication that the various instructional conditions influenced the

memory reports given by those subjects of high and medium hypnotizability who met the criterion for initial posthypnotic amnesia. For these subjects, the increments in the cue, challenge, and honesty conditions did not exceed those observed in the uninstructed retest baseline. The effect of the instructional conditions was greatest for the moderately hypnotizable subjects who failed to meet the criterion for initial amnesia. There was also some indication of similar effects in three other groups: highly hypnotizable subjects who failed amnesia, insusceptible subjects who passed amnesia, and insusceptible subjects who failed amnesia. Thus, contextual manipulations affected the memory reports of nonamnesic and pseudo-amnesic subjects, but not those of subjects showing the classical pattern of high hypnotic responsiveness coupled with initial posthypnotic amnesia.

Among the nonamnesic groups showing some sort of treatment effect, the pattern of results obtained does not implicate any specific factor—retrieval cues, extra effort, or honesty—responsible for the changes. It is perhaps best at this point to attribute these changes to the nonspecific effects of the interpolated amnesia test; any indication from the experimenter that underscores the importance of the recall test may be expected to yield some increment in the amount of material recalled. Alternatively, different subjects—engaging in different strategies—may have responded positively to each type of instruction.

With respect to the amnesic subjects of high and medium hypnotizability, even detailed analysis failed to reveal a differential effect of the various instructional conditions employed in this experiment. This is not to say that insertion of the second test had no effect on recall: As would be expected from the literature on reminiscence in memory, some recovery of memory was observed. However, this improvement was obtained regardless of the nature of any special instructions preceding the second amnesia test. There were also substantial individual differences in the amount of recovery shown on the second amnesia test. It is possible that other individual differences in addition to the ones considered

in this experiment were important in determining who, among hypnotizable subjects, did and did not breach amnesia. More recent research by Coe and his colleagues (Howard & Coe, in press; Schuyler & Coe, in press), for example, has found an effect of changing context (insertion of a "lie detector" test or strong honesty demands) on those hypnotizable subjects who reported that their memory failure was under voluntary control, but not on those whose amnesia was experienced as involuntary.

The results of the present study appear to place some boundaries on both the traditional and alternative views of posthypnotic amnesia. It seems clear that many subjects, particularly those of low and medium hypnotizability, respond differently to amnesia suggestions depending on the context in which they are administered. These subjects may not possess the dissociative abilities necessary for a subjectively compelling amnesia, but when confronted with the amnesia suggestion may attempt to devise some means of complying with the experimenter's demands. Any change in these demands will likely result in a change in the subjects' memory reports. However, those subjects who are capable of experiencing a dissociation of memory, typically hypnotizable, may not be responsive to the same variations in instructional demands. Their amnesia seems relatively impervious to reminders, exhortations, and demands intended to improve memory. It may be that stronger experimental demands would have breached the amnesia of even these hypnotizable subjects. On the other hand, it should be noted that on the whole, the amnesia manifested by these inexperienced subjects is only a shadow of the profound disruption of memory observed in experienced subjects who are highly hypnotizable (e.g., Kihlstrom & Shor, 1978). In the final analysis it seems most likely that there are multiple paths, involving different psychological processes, to posthypnotic amnesia. Some subjects neglect to employ retrieval strategies, exert little effort in recall, or actively suppress memories; for these subjects, who retain volitional control over their memories, the effect of situational demands may be very powerful indeed. For other subjects,

hypnotic involvement may lead to a division in consciousness (Hilgard, 1977) that renders certain memories temporarily inaccessible; for these subjects, who temporarily lose control over their memories, a simple redirection of attention or effort will not suffice to produce recall.

One of the methodological implications of these findings for hypnosis research in general is that it is important to avoid experimental contexts that contain either substantial ambiguities concerning the experimenter's expectations or excessive demands for compliance; it is also important to consider the social pressures inherent in group testing procedures. The findings also call for a stance of theoretical pluralism. While many investigators will prefer to focus their attention on the cognitive processes underlying the dissociative behaviors and experiences of deeply hypnotized subjects, others may wish to focus on the impact of social-psychological factors such as contextual demands and individual expectations. With this dual point of view in mind, investigators can move beyond the polemics involved in the clash of paradigms and begin to uncover the psychological processes underlying the phenomena of interest.

#### Reference Notes

1. Bodorik, H. L., & Spanos, N. P. *The effects of several antecedent variables on suggested amnesia and disorganization of recall*. Manuscript in preparation, 1979.
2. Kihlstrom, J. F., Easton, R. D., & Shor, R. E. *Spontaneous recovery of memory during posthypnotic amnesia*. Manuscript in preparation, 1980.

#### References

- Ashford, B., & Hammer, A. G. The role of expectancies in the occurrence of posthypnotic amnesia. *International Journal of Clinical and Experimental Hypnosis*, 1978, 26, 281-290.
- Ballard, P. B. Oblivescence and reminiscence. *British Journal of Psychology Monograph Supplements*, 1913, 1, (Whole No. 2).
- Barber, T. X. *Hypnosis: A scientific approach*. New York: Van Nostrand Reinhold, 1969.
- Barber, T. X., & Calverley, D. S. Toward a theory of "hypnotic" behavior: Experimental analyses of suggested amnesia. *Journal of Abnormal Psychology*, 1966, 71, 97-107.
- Barber, T. X., Spanos, N. P., & Chaves, J. F. *Hypnotism, imagination, and human potentialities*. New York: Pergamon Press, 1974.

- Bentler, P. M., & Hilgard, E. R. A comparison of group and individual induction of hypnosis with self-scoring and observer-scoring. *International Journal of Clinical and Experimental Hypnosis*, 1963, 11, 49-54.
- Bowers, K. S. Hypnotic behavior: The differentiation of trance and demand characteristic variables. *Journal of Abnormal Psychology*, 1966, 71, 42-51.
- Bowers, K. S. The effect of demands for honesty on reports of visual and auditory hallucinations. *International Journal of Clinical and Experimental Hypnosis*, 1967, 15, 31-36.
- Clemes, S. R. Repression and hypnotic amnesia. *Journal of Abnormal and Social Psychology*, 1964, 69, 62-69.
- Coe, W. C. Further norms on the Harvard Group Scale of Hypnotic Susceptibility, Form A. *International Journal of Clinical and Experimental Hypnosis*, 1964, 12, 184-190.
- Coe, W. C. The credibility of posthypnotic amnesia: A contextualists's view. *International Journal of Clinical and Experimental Hypnosis*, 1978, 26, 218-245.
- Coe, W. C., Basden, B., Basden, C., & Graham, C. Posthypnotic amnesia: Suggestions of an active process in dissociative phenomena. *Journal of Abnormal Psychology*, 1976, 85, 455-458.
- Coe, W. C., Baugher, R. J., Krimm, W. R., & Smith, J. A. A further examination of selective recall following hypnosis. *International Journal of Clinical and Experimental Hypnosis*, 1976, 24, 13-21.
- Cooper, L. M. Hypnotic amnesia. In E. Fromm & R. E. Shor (Eds.), *Hypnosis: Developments in research and new perspectives*. New York: Aldine, 1979.
- Evans, F. J. Recent trends in experimental hypnosis. *Behavioral Science*, 1968, 13, 477-487.
- Evans, F. J. Contextual forgetting: Posthypnotic source amnesia. *Journal of Abnormal Psychology*, 1979, 88, 556-563.
- Evans, F. J., & Kihlstrom, J. F. Posthypnotic amnesia as disrupted retrieval. *Journal of Abnormal Psychology*, 1973, 82, 317-323.
- Hilgard, E. R. *Hypnotic susceptibility*. New York: Harcourt, Brace & World, 1965.
- Hilgard, E. R. Posthypnotic amnesia: Experiments and theory. *International Journal of Clinical and Experimental Hypnosis*, 1966, 14, 104-111.
- Hilgard, E. R. *Divided consciousness: Multiple controls in human thought and action*. New York: Wiley-Interscience, 1977.
- Hilgard, E. R., & Hommel, L. S. Selective amnesia for events within hypnosis in relation to repression. *Journal of Personality*, 1961, 29, 205-216.
- Howard, M. L., & Coe, W. C. The effect of contextual factors on posthypnotic amnesia. *Journal of Personality*, in press.
- Johnson, R. F. Q., Maher, B. A., & Barber, T. X. Artifact in the "essence of hypnosis": An evaluation of trance logic. *Journal of Abnormal Psychology*, 1972, 79, 212-220.
- Kihlstrom, J. F. The effects of organization and motivation on recall during posthypnotic amnesia. (Doctoral dissertation, University of Pennsylvania, 1975). *Dissertation Abstracts International*, 1975, 36, 2473B-2474B. (University Microfilms No. 75-24082)
- Kihlstrom, J. F. Models of posthypnotic amnesia. In W. E. Edmonston (Ed.), *Conceptual and investigative approaches to hypnosis and hypnotic phenomena*. *Annals of the New York Academy of Sciences*, 1977, 296, 284-301.
- Kihlstrom, J. F. Context and cognition in posthypnotic amnesia. *International Journal of Clinical and Experimental Hypnosis*, 1978, 26, 246-267.
- Kihlstrom, J. F., & Evans, F. J. Recovery of memory after posthypnotic amnesia. *Journal of Abnormal Psychology*, 1976, 85, 564-569.
- Kihlstrom, J. F., & Evans, F. J. Residual effect of suggestions for posthypnotic amnesia: A reexamination. *Journal of Abnormal Psychology*, 1977, 86, 327-333.
- Kihlstrom, J. F., & Evans, F. J. Memory retrieval processes during posthypnotic amnesia. In J. F. Kihlstrom & F. J. Evans (Eds.), *Functional disorders of memory*. Hillsdale, N.J.: Erlbaum, 1979.
- Kihlstrom, J. F., & Shor, R. E. Recall and recognition during posthypnotic amnesia. *International Journal of Clinical and Experimental Hypnosis*, 1978, 26, 330-349.
- O'Connell, D. N. An experimental comparison of hypnotic depth measured by self-ratings and by an objective scale. *International Journal of Clinical and Experimental Hypnosis*, 1964, 12, 34-46.
- O'Connell, D. N. Selective recall of hypnotic susceptibility items: Evidence for repression or enhancement? *International Journal of Clinical and Experimental Hypnosis*, 1966, 14, 150-161.
- Orne, M. T. On the mechanisms of posthypnotic amnesia. *International Journal of Clinical and Experimental Hypnosis*, 1966, 14, 121-134.
- Pettinati, H. M., & Evans, F. J. Posthypnotic amnesia: Evaluation of selective recall of successful experiences. *International Journal of Clinical and Experimental Hypnosis*, 1978, 26, 317-329.
- Sarbin, T. R., & Coe, W. C. *Hypnosis: A social-psychological analysis of influence communication*. New York: Holt, Rinehart & Winston, 1972.
- Sarbin, T. R., & Coe, W. C. Hypnosis and psychopathology: Replacing old myths with fresh metaphors. *Journal of Abnormal Psychology*, 1979, 88, 506-526.
- Schuyler, B. A., & Coe, W. C. A physiological investigation of volitional and nonvolitional experience during posthypnotic amnesia. *Journal of Personality and Social Psychology*, in press.
- Shor, R. E. Expectancies of being influenced and hypnotic performance. *International Journal of Clinical and Experimental Hypnosis*, 1971, 19, 154-166.
- Shor, R. E., & Orne, E. C. *Harvard Group Scale of Hypnotic Susceptibility, Form A*. Palo Alto, Calif.: Consulting Psychologists Press, 1962.
- Shor, R. E., & Orne, E. C. Norms on the Harvard Group Scale of Hypnotic Susceptibility, Form A. *International Journal of Clinical and Experimental Hypnosis*, 1963, 11, 39-47.
- Spanos, N. P., & Bodorik, H. L. Suggested amnesia and disorganized recall in hypnotic and task-

- motivated subjects. *Journal of Abnormal Psychology*, 1977, 86, 295-305.
- Spanos, N. P., & Ham, M. W. Cognitive activity in response to hypnotic suggestion: Goal-directed fantasy and selective amnesia. *American Journal of Clinical Hypnosis*, 1973, 15, 191-198.
- Spanos, N. P., Radtke-Bodorik, H. L., & Shabinsky, M. A. Amnesia, subjective organization, and learning of a list of unrelated words in hypnotic and task-motivated subjects. *International Journal of Clinical and Experimental Hypnosis*, 1980, 28, 126-139.
- Spanos, N. P., Radtke-Bodorik, H. L., & Stam, H. J. Disorganized recall during suggested amnesia: Fact not artifact. *Journal of Abnormal Psychology*, 1980, 89, 1-19.
- Weitzenhoffer, A. M. *Hypnotism: An objective study in suggestibility*. New York: Wiley, 1953.
- Weitzenhoffer, A. M., & Hilgard, E. R. *Stanford Hypnotic Susceptibility Scale: Forms A and B*. Palo Alto, Calif.: Consulting Psychologists Press, 1959.
- Weitzenhoffer, A. M., & Hilgard, E. R. *Stanford Hypnotic Susceptibility Scale, Form C*. Palo Alto, Calif.: Consulting Psychologists Press, 1962.
- Williamson, J. A., Johnson, H. J., & Eriksen, C. W. Some characteristics of posthypnotic amnesia. *Journal of Abnormal Psychology*, 1965, 70, 123-131.
- Young, J., & Cooper, L. M. Hypnotic recall amnesia as a function of manipulated expectancy. *Proceedings of the 80th Annual Convention of the American Psychological Association*, 1972, 7, 857-858. (Summary).

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