

## Residual Effect of Suggestions for Posthypnotic Amnesia: A Reexamination

John F. Kihlstrom  
Harvard University

Frederick J. Evans  
The Institute of Pennsylvania Hospital,  
Philadelphia  
and University of Pennsylvania

Despite the significant recovery of memory observed after suggestions for posthypnotic amnesia are canceled, there still remains an apparent deficit in total recall (after amnesia has been lifted) among subjects who show amnesia on initial testing. This effect, reported originally by Hilgard and Hommel in 1961, was confirmed in analyses of recall data from groups of 691 and 488 volunteer subjects who were administered a standardized, tape-recorded hypnotic procedure. Hypnotizable subjects who initially showed posthypnotic amnesia recalled significantly fewer items after amnesia was removed than did hypnotizable subjects who were initially nonamnesic. Further analysis showed that the residual amnesia effect was not an artifact of the very low level of posthypnotic recall performance shown by pseudoamnesic subjects, failure of memory storage due to such factors as inattention or sleep, or the differential time constraints on the memory reports of previously amnesic and nonamnesic subjects. Residual posthypnotic amnesia may reflect the fact that suggested posthypnotic amnesia, when lifted, takes time to fully dissipate.

Posthypnotic amnesia has been generally defined as a suggested, temporary inability of subjects to recall the events and experiences of hypnosis (Cooper, 1972; Hilgard, 1965). The ease with which posthypnotic amnesia can be reversed by means of a prearranged cue marks amnesia as a disorder of

memory retrieval, different in kind from other disruptions of memory which might be ascribed to the subject's failure to acquire or store the critical material (Evans & Kihlstrom, 1973; Hull, 1933; Orne, 1966).

Recent research (Kihlstrom & Evans, 1976; Nace, Orne, & Hammer, 1974) has clearly documented the reversible nature of posthypnotic amnesia, particularly in highly hypnotizable subjects. Despite the obvious effects of the reversibility cue, however, it is apparent that most subjects do not recall absolutely everything that happened during hypnosis even after the amnesia suggestion has been canceled. Thus, of the 691 subjects studied by Kihlstrom and Evans (1976), fewer than 3% of the sample recalled all nine of the relevant hypnotic suggestions that had been administered during the course of the experimental session, even after the amnesia suggestion was canceled. This finding indicates that while suggested posthypnotic amnesia does involve a relatively temporary disruption of memory, nonetheless, its effects are also confounded with those of other factors which seem to produce a more permanent recall failure.

---

This study was conducted at the Unit for Experimental Psychiatry, The Institute of Pennsylvania Hospital, Philadelphia, and was supported in part by Grant MH 19156 from the National Institute of Mental Health, U.S. Public Health Service, and in part by a grant from the Institute of Experimental Psychiatry, Boston, Massachusetts.

We would like to thank Harvey D. Cohen, Mary R. Cook, Charles Graham, A. Gordon Hammer, Betsy E. Lawrence, Pamela A. Markowsky, Emily Carota Orne, Martin T. Orne, Helen M. Pettinati, Anthony Van Campen, William M. Waid, and Stuart K. Wilson for their comments during the preparation of this report.

Requests for reprints should be sent to John F. Kihlstrom, Department of Psychology and Social Relations, Harvard University, William James Hall, 33 Kirkland Street, Cambridge, Massachusetts 02138 or to Frederick J. Evans, Unit for Experimental Psychiatry, The Institute of Pennsylvania Hospital, 111 North 49th Street, Philadelphia, Pennsylvania 19139.

One factor which certainly impinges on posthypnotic recall, both during and after amnesia, is ordinary forgetting (Cooper, 1972). That is, most subjects will inadvertently omit a few items in the course of completing their memory reports. Nace et al. (1974) have shown that the extent of this ordinary forgetting (i.e., the number of suggestions which remain unrecalled after amnesia has been reversed) does not differ for subjects of high and low hypnotic susceptibility. There are other occasions, however, when the decrement in post-amnesia memory appears to go beyond the bounds of normal forgetfulness. E. R. Hilgard and Hommel (1961) observed that subjects who responded to suggestions for posthypnotic amnesia also showed relatively poor recall after amnesia was lifted, compared to subjects who were initially nonamnesic. This finding suggested a concept of "residual" posthypnotic amnesia: the persistence of the suggested amnesia despite its formal termination. Residual amnesia might be conceived as analogous to the hypersuggestibility commonly thought to follow hypnosis or the successful completion of a hypnotic suggestion (Field, Evans, & Orne, 1965; Hull, 1933; Weitzenhoffer, 1953).

Unfortunately, Hilgard and Hommel (1961) did not classify their subjects according to hypnotic susceptibility. Thus, it is possible that the residual amnesia which they commented on in their original report was contaminated by the poor memory reports of insusceptible *pseudoamnesic* subjects who, for whatever reasons, show an abnormally low level of recall both during the time that amnesia suggestions are in effect and after they have been canceled (Kihlstrom & Evans, 1976). Failure to exclude such subjects from their sample may have led to a spuriously low level of average recall within the group which seemed to "pass" the amnesia suggestion according to the usual objective criterion. The possibility of such an artifact was explicitly suggested by Nace et al. (1974), but their own sample was too small to permit the necessary statistical analysis. The purpose of the present study was to replicate and extend the previous research in a new and larger sample in order to clarify

the status of residual posthypnotic amnesia as a phenomenon of hypnosis.

## Experiment 1

### *Method*

*Subjects.* The sample employed in the main study described here is the same as that reported earlier by Kihlstrom and Evans (1976). Briefly, 691 male and female volunteer college students received Shor and Orne's (1962) Harvard Group Scale of Hypnotic Susceptibility, Form A (HGSHS:A). The subjects were classified as low (0-4), medium (5-7), or high (8-12) in response to hypnosis according to their scores on the HGSHS:A. In addition, the subjects were classified as initially amnesic or nonamnesic according to the standard criterion of the HGSHS:A.

*Procedure.* The HGSHS:A is a standardized, group-administered procedure consisting of 12 suggestions scored pass-fail according to objective behavioral criteria. Near the end of the scale, posthypnotic amnesia for these suggestions is suggested to the subject. After the trance has been terminated, the subject is administered two tests of posthypnotic recall. The first is the Initial Amnesia Test. Immediately after the termination of hypnosis, the subjects are asked to recall everything that occurred while they were hypnotized. This first test takes place while the suggestion for posthypnotic amnesia is still in effect. The subjects are given 3 minutes to write down a list of whatever events they can remember. The criterion of amnesia is passed if a subject recalls no more than three of the nine critical items on this test. The second is the Reversibility Test. A prearranged cue is given to lift the amnesia, and the subjects are given 2 minutes more to report, in writing, any new items that they now remember but did not remember previously. This test of the recovery of memory is not considered in the standardized procedure for rating the subject's response to the amnesia item.

In the present study, the memory reports given during the two posthypnotic memory tests (i.e., Initial Amnesia and Reversibility) were pooled to yield a total recall score. Total recall represents the total number of items from the HGSHS:A that the subject had reported by the time that memory testing was concluded. It is this final memory, shown at the conclusion of memory testing (and its converse—what remains unreported), that is the focus of the present report.

### *Results*

Basic information regarding mean scale score, initial amnesia response, and subsequent reversibility of the amnesia has been presented in the previous report (Kihlstrom

& Evans, 1976). The parameters of this sample were representative of similar volunteer samples (e.g., Shor & Orne, 1963).

*Replication of previous studies.* The total recall data were first analyzed in the same manner as in the previous studies by Hilgard and Hommel (1961), Cooper (1972), and Nace et al. (1974). In all respects, this analysis replicated the relevant findings of the earlier studies. Table 1 summarizes the differences in total recall obtained between the various groups included in this study. (a) Combining those items reported during the initial amnesia period with those additional items recalled on the Reversibility Test, the 691 subjects as a whole showed an average total recall of 5.53 of the nine critical items, leaving about 39% of the items unrecalled at the conclusion of memory testing. This figure is comparable to that obtained by Cooper (1972). (b) As Nace et al. (1974) also demonstrated, subjects classified as high, medium, and low in hypnotic susceptibility showed no appreciable differences in total recall. (c) However, when the levels of hypnotic susceptibility were collapsed and the subjects reclassified according to whether they met the standardized criterion for initial posthypnotic amnesia, it was found that even after the suggested amnesia was lifted, those subjects who successfully passed the amnesia item showed significantly less total recall than those who failed initial amnesia: Mean total recall = 3.73 versus 6.31, respectively,  $t(689) = 14.23$ ,  $p < .0001$ . This outcome is essentially the same as that reported by Hilgard and Hommel (1961) and which, in turn, suggests the operation of a residual amnesia in initially amnesic subjects that differs from ordinary forgetting.

*Total recall as a joint function of hypnotizability and initial amnesia.* The foregoing results were obtained when, following the methods of the earlier studies, subjects were either unselected or selected on the basis of only a single criterion (i.e., either hypnotizability or initial amnesia response). However, Figure 1 shows that when hypnotizability and initial amnesia were employed as *joint criteria* in the classification of subjects, a somewhat different pattern of total recall

Table 1  
*Extent of Total Recall After Hypnosis*

Group	n	Total recall		% items left unrecalled
		M	SD	
All subjects	691	5.53	1.98	38.8
Hypnotizability				
High	227	5.33	1.98	40.8
Medium	260	5.69	3.26	36.8
Low	204	5.49	2.13	39.0
Initial amnesia				
Pass	214	3.73	2.14	58.6
Fail	477	6.31	2.34	29.9

emerged. Figure 1 portrays memory recall data from those subjects who met the standardized criterion for initial posthypnotic amnesia on the right, and the same data from those who failed the amnesia criterion on the left. The shaded area portrays the mean recall for each group on the initial test of posthypnotic amnesia, while the unshaded area shows the average number of additional items recalled on the Reversibility Test. Thus, each bar as a whole represents the total number of items recalled by the time memory testing was concluded (i.e., pooling initial amnesia and reversibility recall). Except for the insusceptible and medium-hypnotizable subgroups in the pass-amnesia group ( $n_s = 29$  and 64, respectively), all subgroups contained at least 100 subjects.

A  $2 \times 3$  analysis of variance of total recall scores yielded a significant interaction between hypnotizability and degree of initial amnesia,  $F(2, 685) = 8.76$ ,  $p < .001$ . For those subjects who failed to meet the standardized criterion for initial amnesia, there were no appreciable differences among the hypnotizability groups in total recall. Within the group which initially passed the amnesia item, however, there were substantial differences in total recall among groups of hypnotizable, moderately susceptible, and insusceptible subjects,  $F(2, 211) = 11.91$ ,  $p < .001$ . Thus, when both hypnotic susceptibility and initial amnesia are considered, subjects who initially show posthypnotic amnesia are still found not to recall as many experiences as

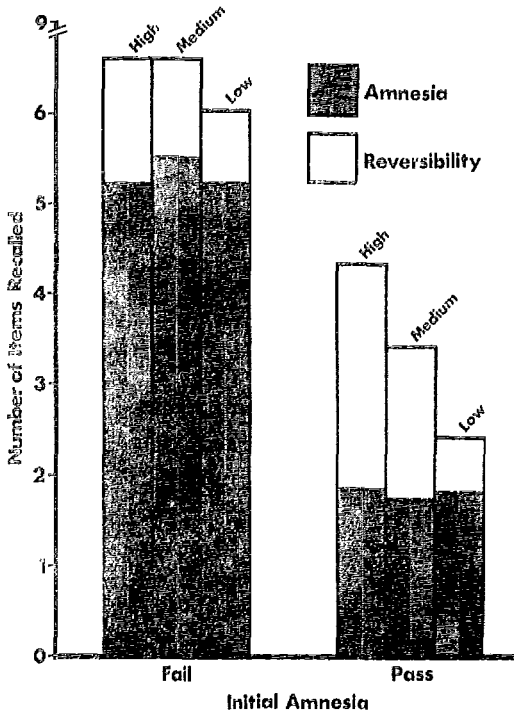


Figure 1. Posthypnotic recall for subjects classified according to whether they passed the standardized criterion for initial posthypnotic amnesia and, additionally, as high, medium, or low in susceptibility to hypnosis. (Shaded areas show mean recall on the initial test of posthypnotic amnesia, while the unshaded areas show the average number of additional items recalled on the Reversibility Test. The entire bar, then, represents total recall [i.e., initial amnesia plus reversibility] shown at the conclusion of memory testing.)

nonamnesic subjects after the amnesia has been lifted. There does seem to be a residual memory deficit that persists beyond the lifting of amnesia. However, the reasons for the lower level of total recall shown by those who pass initial amnesia may be quite different for hypnotizable and insusceptible subjects.

*Exclusion of pseudoamnesic subjects.* The very lowest level of total recall was displayed by a small group of 29 subjects who, although they managed to meet the criterion for initial amnesia as set by the HGSHS:A standardized scoring procedure, nevertheless seemed otherwise to be rather unresponsive to hypnosis. As noted elsewhere (Kihlstrom & Evans, 1976), these insusceptible subjects appeared to manifest initial amnesia; but it

is doubtful that this should be considered to represent suggested amnesia because they did not show subsequent recovery of memory after the amnesia suggestion was canceled. In fact, fully 35% of these subjects never recalled so much as a single item at any time during memory testing. However, they apparently remembered the critical items, as they had no trouble completing the self-scoring portions of the HGSHS:A response booklet, which required them to indicate how they responded to the various suggestions. These subjects might be called "pseudoamnesic": Their low level of performance during memory testing may reflect poor motivation for the recall task.

As Nace et al. (1974) suggested, insusceptible pseudoamnesic subjects did contribute heavily to the total recall difference that was obtained when the entire group of subjects was simply classified according to whether they passed the criterion for initial amnesia response. However, it is also apparent from Figure 1 that this small group of subjects did not wholly account for the observed differences in total recall. Thus, when only highly hypnotizable subjects were considered, there remained a significant difference in total recall between those 121 high subjects who passed initial amnesia (mean total recall = 4.27,  $SD = 1.93$ ) and those 106 high subjects who failed the amnesia item (mean total recall = 6.55,  $SD = 1.19$ ), as shown in Figure 1,  $t(225) = 10.83$ ,  $p < .001$ .

It is possible, of course, that there were pseudoamnesics even among the highly hypnotizable subjects. However, the vast majority of the 121 hypnotizable subjects who showed initial amnesia also showed reversibility. A total of 90 of the 121 hypnotizable, initially amnesic subjects (74%) passed the criterion for reversibility proposed by Kihlstrom and Evans (1976) by recalling at least two additional items on the recovery test; only 9 of the 29 insusceptible, pseudoamnesic subjects (31%), by contrast, met the criterion for reversibility,  $\chi^2(1) = 17.70$ ,  $p < .001$ . When the 31 subjects who did not show subsequent reversibility were removed from the group of hypnotizable, initially amnesic

subjects, the residual amnesia effect was still apparent. Total recall for the remaining 90 hypnotizable subjects who showed initial amnesia followed by reversibility ( $M = 5.08$ ,  $SD = 1.26$ ) was still less than that of the 106 hypnotizable, nonamnesic subjects ( $M = 6.55$ ,  $SD = 1.19$ ); the difference remains significant as well,  $t(194) = 8.35$ ,  $p < .001$ . After amnesia has been lifted, the total recall of hypnotizable subjects is simply less extensive than that of their counterparts who were initially not amnesic.

*Effect of time constraints on memory reporting.* At least one potential procedural artifact remains which may have contributed to the apparent residual amnesia effect observed here. Unfortunately, it cannot be resolved by appeal to the data just described. The procedure followed by Kihlstrom and Evans (1976), which was the standardized means of evaluating amnesia on the HGSHS:A, provided for two separate recall lists: a 3-minute test of initial amnesia and a 2-minute test of subsequent reversibility, in which the subjects were asked to list only those additional items that were not recalled on the previous test of initial amnesia. Total recall was defined in the present study as the sum of these two component parts. It follows from this procedure that amnesic subjects will have many more new memories to report during the Reversibility Test than will their nonamnesic counterparts. For example, in the study just described, the hypnotizable-amnesic subjects had an average of 7.2 of the total pool of nine HGSHS:A items to be recalled after the Initial Amnesia Test; by contrast, the hypnotizable-nonamnesic subjects had, on the average, only 3.8 items left in the recall pool. Nevertheless, the two groups were given the same amount of time to complete their memory reports on the Reversibility Test. Thus, the initially amnesic subjects may have simply run out of time before they could complete their memory reports.

This problem cannot be resolved by allowing subjects an indefinite period of time to complete their recall lists because of the possibility that residual amnesia itself may gradually remit over a period of minutes. A better method requires subjects to report *all* of the

items that they now recall, regardless of whether the memories have been reported before. This procedural variation effectively equalizes the pools of to-be-remembered material at nine items for both amnesic and nonamnesic subjects. While the data previously described cannot be used in such an analysis, incidental data from another recent study (Kihlstrom, Evans, Orne, & Orne, Note 1) allow the relevant comparisons.

## Experiment 2

### Method

Modified versions of the HGSHS:A were administered to four samples totaling 488 male and female college student volunteers. In most respects the procedure followed was the same as that in the study by Kihlstrom and Evans (1976). Following the standardized test of posthypnotic amnesia, the reversibility cue was given and the subjects were once again asked to report *everything* that they remembered.<sup>1</sup> Each written recall test lasted 3 minutes. The Reversibility Test administered to the subjects in this sample provides an estimate of total posthypnotic recall, after amnesia has been lifted, that is not contaminated by differences in available items or in reporting time.

### Results

The parameters of the HGSHS:A response, described in the fuller report (Kihlstrom et al., Note 1), again paralleled those obtained in similar volunteer samples. The comparison most relevant to the problem of residual amnesia concerns 80 hypnotizable subjects who showed virtually complete amnesia on the Initial Amnesia Test and the 78 hypnotizable subjects who failed to meet the criterion for amnesia. The hypnotizable-amnesic subjects showed a mean total recall of 4.89 items ( $SD = 1.84$ ), while their nonamnesic counterparts showed a mean total recall of 6.03

---

<sup>1</sup> In this study, the standardized test of initial amnesia was followed by a second test, also conducted during amnesia, in which the four subgroups were administered various instructions regarding the manner in which they were to try to recall the critical material. The treatment conditions had no differential impact on posthypnotic recall, allowing the different treatment groups to be combined into a single large sample for the present analysis (Kihlstrom et al., Note 1).

items ( $SD = 1.39$ ). This difference in total recall, after amnesia was lifted, was significant,  $t(156) = 4.39$ ,  $p < .001$ , again demonstrating the residual effect of posthypnotic amnesia. Thus, residual amnesia is apparently not an artifact of the particular procedure by which memory reports are collected.

### General Discussion

An examination of two separate sets of data on the recovery of memory after posthypnotic amnesia reveals a relative deficit in total recall, even after amnesia has been lifted, among hypnotizable subjects who successfully respond to amnesia suggestions. Further analysis indicates that this deficit is not a spurious effect of either the low level of recall performance shown by pseudoamnesic subjects or differences in temporal constraints on the reversibility recall of amnesic and nonamnesic subjects. In considering these findings, it is important to note that none of these subjects was observed to fall asleep during hypnosis and, furthermore, that none had any difficulty in recognizing the critical items after amnesia was lifted, when they were asked to rate their responses to the various suggestions according to standardized behavioral criteria. Thus, the memory deficit observed is not due to the subject's failure to attend to, or store memories of, some suggestions. The total recall deficit is found among subjects who respond well to hypnosis in general and particularly well to the specific suggestion for posthypnotic amnesia (as indicated by both their initial failure to remember and their subsequent recovery of additional memories). For this reason it seems compelling, as Hilgard and Hommel (1961) suggested, to attribute this relative memory deficit to the residual effects of the amnesia suggestion, which persist in spite of the reversibility cue.

Residual amnesia may, of course, be due to some hypnotic process which affects memory in addition to the amnesia which has been explicitly suggested to the subject. In other words, residual amnesia may represent a "spontaneous" or "state-dependent" effect on

memory, resulting from the induction and termination of hypnosis which is nevertheless functionally independent of the amnesia suggestion. Such a spontaneous amnesia would not necessarily be relieved when the reversibility cue is given. This notion seems unlikely, however, if only because spontaneous amnesia has proved difficult to document in the past (Hilgard & Cooper, 1965). Moreover, full memory is typically restored to the subjects in the course of their completing the behavioral self-ratings required by the HG-SHS:A procedure, without recourse to the reinduction of hypnosis. Therefore, it seems inappropriate to refer to residual amnesia as an instance of state-dependent memory.

It seems more likely that the residual memory deficit is specific to the amnesia suggestion and represents the persistence of the amnesic process, despite the immediate effects of the cue which is given to cancel the suggestion and lift the amnesia. Erickson and Erickson (1941) have suggested that the effects of posthypnotic amnesia take time to dissipate, in a manner analogous to the recovery of memory observed in retrograde amnesia following head trauma. In this case, we would expect that the extent of residual amnesia would decrease as the time interval between lifting amnesia and retesting memory is increased. Thus, a transient residual amnesia may be one of the sequelae of hypnosis noted by J. R. Hilgard, (1974; Hilgard, Hilgard, & Newman, 1961). These mild aftereffects occasionally mark the transition from hypnosis back to the normal waking state of consciousness. Similarly, residual amnesia may be a carry-over symptom from the posthypnotic period during which normal modes of memory retrieval and utilization have been disrupted (Evans & Kihlstrom, 1973). Whatever the case may be, observation of this residual effect piques our curiosity concerning the processes that underlie posthypnotic amnesia.

### Reference Note

1. Kihlstrom, J. F., Evans, F. J., Orne, E. C., & Orne, M. T. *Attempting to breach posthypnotic amnesia*. Manuscript in preparation, 1977.

## References

- Cooper, L. M. Hypnotic amnesia. In E. Fromm & R. E. Shor (Eds.), *Hypnosis: Research developments and perspectives*. Chicago: Aldine-Atherton, 1972.
- Erickson, M. H., & Erickson, E. H. Concerning the nature and character of post-hypnotic behavior. *Journal of General Psychology*, 1941, 24, 95-133.
- Evans, F. J., & Kihlstrom, J. F. Posthypnotic amnesia as disrupted retrieval. *Journal of Abnormal Psychology*, 1973, 82, 317-323.
- Field, P. B., Evans, F. J., & Orne, M. T. Order of difficulty of suggestions during hypnosis. *International Journal of Clinical and Experimental Hypnosis*, 1965, 13, 183-192.
- Hilgard, E. R. *Hypnotic susceptibility*. New York: Harcourt, Brace & World, 1965.
- Hilgard, E. R., & Cooper, L. M. Spontaneous and suggested posthypnotic amnesia. *International Journal of Clinical and Experimental Hypnosis*, 1965, 13, 261-273.
- Hilgard, E. R., & Hommel, L. S. Selective amnesia for events within hypnosis in relation to repression. *Journal of Personality*, 1961, 29, 205-216.
- Hilgard, J. R. Sequelae to hypnosis. *International Journal of Clinical and Experimental Hypnosis*, 1974, 22, 281-298.
- Hilgard, J. R., Hilgard, E. R., & Newman, M. R. Sequelae to hypnotic induction with special reference to earlier chemical anesthesia. *Journal of Nervous and Mental Disease*, 1961, 133, 461-478.
- Hull, C. L. *Hypnosis and suggestibility: An experimental approach*. New York: Appleton-Century-Crofts, 1933.
- Kihlstrom, J. F., & Evans, F. J. Recovery of memory after posthypnotic amnesia. *Journal of Abnormal Psychology*, 1976, 85, 564-569.
- Nace, E. P., Orne, M. T., & Hammer, A. G. Posthypnotic amnesia as an active psychic process: The reversibility of amnesia. *Archives of General Psychiatry*, 1974, 31, 257-260.
- Orne, M. T. On the mechanisms of posthypnotic amnesia. *International Journal of Clinical and Experimental Hypnosis*, 1966, 14, 121-134.
- 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.
- Weitzenhoffer, A. M. *Hypnotism: An objective study in suggestibility*. New York: Wiley, 1953.

Received January 27, 1977 ■