6 Memory Retrieval Processes During Posthypnotic Amnesia

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A person who has been deeply hypnotized is able to experience a wide variety of alterations in cognitive functioning in accordance with suggestions given by the hypnotist. The phenomena include subjectively compelling positive and negative hallucinations in all modalities, age regression and other changes in personality, and, perhaps, enhanced memory for past experiences (for comprehensive reviews of research on hypnosis, see Bowers, 1976; Evans, 1968; Hilgard, 1965a, 1965b, 1975, 1977; Orne, 1966a). After hypnosis has been terminated, moreover, the subject often awakens to find himself unable to remember the events and experiences that transpired while he was hypnotized. This difficulty in remembering, known as posthypnotic amnesia, is one of the hallmarks of the experience of hypnosis (for review see Cooper, 1972; Hilgard, 1966; Orne, 1966b).

Posthypnotic amnesia is particularly interesting, because it appears to be similar to other amnesias observed in the clinic, the laboratory, and the psychopathology of everyday life. The experience is rather like forgetting where one has laid down the car keys or blocking on an acquaintance's name at a cocktail party; it is also similar to the difficulty that people generally have in remembering their dreams and other events from the past night's sleep. In some respects, posthypnotic amnesia also parallels the "state-dependent" learning that can be induced in the laboratory by ingestion of alcohol, barbiturates, and other psychoactive substances. And historically posthypnotic amnesia has been viewed as similar to the memory disturbances observed in clinical cases of hysteria, fugue, and multiple personality. In all of these instances, there is a compelling disturbance of memory that particularly affects personal experiences and other material with a strong autobiographical component. However, there is no recognizable disturbance of central nervous system functioning. Furthermore, the essential intactness of the critical memories is evidenced by their eventual recovery, as well as by subtle hints of their presence and activity during the amnesic period itself.[1]

These phenotypic similarities seem strong enough to suggest genotypic similarities among these amnesias as well. Because posthypnotic amnesia can be easily and reliably induced and lifted in a substantial number of normal human subjects without any trauma or other hazard, it may serve as a convenient laboratory model for the study of other amnesic processes. By conducting research on posthypnotic amnesia, then, we hope to learn more about the processes underlying the other functional amnesias; this knowledge in turn may be expected to shed light on the processes underlying normal remembering and forgetting.

POSTHYPNOTIC AMNESIA IN STANDARDIZED HYPNOTIC PROCEDURES

We begin by describing posthypnotic amnesia as it occurs in a typical laboratory setting. Research in hypnosis has been aided enormously by the development, beginning in the late 1950s, of a set of standardized hypnotic procedures designed for laboratory use: the Stanford Hypnotic Susceptibility Scales, Forms A, B, and C (SHSS:A,B,C), and the Revised Stanford Profile Scales of Hypnotic Susceptibility, Forms I and II (SPSHS: I, II), developed by Weitzenhoffer and Hilgard (1959, 1962, 1967); and the Harvard Group Scale of Hypnotic Susceptibility, Form A (HGSHS:A), a self-scored adaptation of SHSS:A developed for group administration by Shor and E. Orne (1962). The exact content of each of these scales varies, but the general format remains the same. Table 6.1 lists the items contained in two representative scales, HGSHS:A and SHSS:C, along with the relative frequency with which each scale item was passed by the unselected subjects included in the standardization samples (Shor & Orne, 1963; Weitzenhoffer & Hilgard, 1962). For expository purposes, our discussion focuses on HGSHS:A.

The HGSHS:A begins with a test of waking "primary" suggestibility (Evans,

[1]This is not to say that there are no differences between posthypnotic amnesia and the other functional amnesias. Whereas many of the other amnesias occur more or less spontaneously, posthypnotic amnesia must be suggested to the subject (Hilgard & Cooper, 1965). Moreover, relief of posthypnotic amnesia does not require the reinduction of the hypnotic state.

TABLE 6.1
Items in Specimen Standardized Hypnotic Procedures

	Description	*Scoring Criterion*	*% Passing*
	A. Harvard Group Scale of Hypnotic Susceptibility, Form A (HGSHS:A)[a]		
1.	Head nodding	Head falls forward 2" before told to stop	86
2.	Eye closure	Eyelids close before told to deliberately close them	74
3.	Hand lowering	Extended arm falls 6" before told to drop it	89
4.	Arm immobilization	Hand lifts less than 1" from resting position before told to stop trying	48
5.	Finger lock	Hands clasped, fingers incompletely separated before told to stop trying	67
6.	Arm rigidity	Extended arm bends less than 2" before told to stop trying	57
7.	Hands moving together	Extended arms move to less than 6" apart before told to stop	86
8.	Communication inhibition	Does not shake head "no" before told to stop trying	50
9.	Fly hallucination	Outward acknowledgment of suggested effect	39
10.	Eye catalepsy	Eyes remain closed when asked to try to open them	56
11.	Posthypnotic suggestion	At least partial observable movement to touch ankle	36
12.	Posthypnotic amnesia	Lists $\leqslant$ 3 of Items #3–11 before amnesia canceled	48
	B. Stanford Hypnotic Susceptibility Scale, Form C (SHSS:C)[b]		
0.	Eye closure (not counted)	Eyelids close before told to deliberately close them	– –
1.	Hand lowering	Extended arm falls 6" before told to drop it	92
2.	Moving hands apart	Extended arms move more than 6" apart before told to stop	88
3.	Mosquito hallucination	Outward acknowledgment of suggested effect	48
4.	Taste hallucination	Experience both sweet and sour, either one strong or one with overt movements	46
5.	Arm rigidity	Extended arm bends less than 2" before told to stop trying	45
6.	Dream	Dreamlike imagery and action, not under volitional control	44
7.	Age regression	Clear change in handwriting between chronological age and one of two suggested ages	43

(Continued)

TABLE 6.1
(Continued)

Description		Scoring Criterion	% Passing
8.	Arm immobilization	Hand lifted less than 1" from resting position before told to stop trying	36
9.	Anosmia	Odor of ammonia denied and overt signs absent	19
10.	Hallucinated voice	Answers questions realistically at least once	9
11.	Negative visual hallucination	Reports seeing only two of three boxes	9
12.	Posthypnotic amnesia	Lists ≤ 3 of Items #1–11 before amnesia canceled	27

[a]Item pass percent from volunteer sample, N = 132 (Shor & Orne, 1963).
[b]Item pass percent from volunteer sample, N = 203 (Weitzenhoffer & Hilgard, 1962).

1967): The subject is asked to close his eyes and imagine his head falling forward (Item #1). Then the experimenter proceeds with the formal induction of hypnosis, which contains instructions for eye fixation, relaxation, focused attention, and finally eye closure (Item #2). After the subject has closed his eyes, the experimenter administers a series of suggestions (Items #3–11), each of which calls for an alteration in subjective experience that is not in accordance with objective reality. For example, in Item #7 the subject is asked to extend his arms and feel his hands being drawn together as if by magnets; in Item #9 he is asked to feel a fly buzzing around his head, darting annoyingly at his face. The entire procedure lasts about 45 minutes.

Each suggested alteration in inner, subjective experience is associated with some behavioral index by which an external observer can gauge the subject's response to the suggestion. Returning to the examples, in Item #7 the subject's extended hands must move so that they are no more than 6 inches apart by the end of 10 seconds; in Item #9 the subject must wave his hand, grimace, or make some other overt acknowledgment of the presence of the fly. As Table 6.1 indicates, the items of HGSHS:A and SHSS:C vary in difficulty level. On SHSS:A, B, and C and SPSHS: I and II, the behavioral ratings are made by the experimenter; on HGSHS:A, because of the group setting in which the scale is administered, the subjects make retrospective self-ratings after hypnosis (and posthypnotic amnesia) is terminated. These self-ratings are highly reliable (Bentler & Hilgard, 1963; O'Connell, 1964; Shor & Orne, 1963). The number of items "passed" yields a score ranging from 0 to 12 by which subjects may be classified as low (typically scoring 0 to 4), medium (5–7), or high (8–12) in hypnotic susceptibility (in ordinary discourse, highly hypnotizable subjects are often referred to as "deeply hypnotized"). These scales have been constructed with considerable care and have quite adequate psychometric properties (Hilgard, 1965b).

Toward the end of the standardized scale, the experimenter administers a suggestion for posthypnotic amnesia. He says to the subject (Shor & Orne, 1962):

> Remain deeply relaxed and pay close attention to what I tell you next. In a moment I shall begin counting backwards from twenty to one. You will gradually wake up, but for most of the count you will still remain in the state that you are now in. By the time I reach "five" you will open your eyes, but you will not be fully aroused. When I get to "one" you will be fully alert, in your normal state of wakefulness. You probably will have the impression that you have slept because you will have difficulty in remembering all the things I 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 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 . . . [p. 11].

After termination of hypnosis and testing of the prearranged posthypnotic suggestion (Item #11), the subject is asked to recount his experience of hypnosis. On HGSHS:A, the memory report is collected in written form in a specially provided response booklet, according to the following instructions (Shor & Orne, 1962):

> 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 . . . [p. 11].

After 3 minutes have passed, the amnesia suggestion is canceled by means of the prearranged reversibility cue, and the subjects are given 2 minutes more to report any additional memories that may occur to them:

> All right, now listen carefully to my words, *Now you can remember everything.* Please . . . write down a list of anything else that you remember now that you did not remember previously . . . (Shor & Orne, 1962, p. 11).

Similar wording occurs in SHSS:A, B, and C. In these individual procedures, memory reports are collected orally, and the testing continues until the subject reaches an impasse, at which point the reversibility cue is given.

Posthypnotic amnesia is assessed in terms of the number of items that the subject remembers after hypnosis, before the administration of the reversibility cue. Figure 6.1 shows the frequency distribution of recall during posthypnotic amnesia for the group of 691 subjects studied by Kihlstrom and Evans (1976, 1977). The subjects were all administered HGSHS:A in the standard manner; in addition, 391 of these subjects subsequently returned to the laboratory for an individual administration of SHSS:C. Although both HGSHS:A and SHSS:C contain 12 items, not all of these count in scoring the amnesia test; on HGSHS:A, Items #1 and #2, which occur before or during the induction of hypnosis, and #12, which is the amnesia suggestion itself, are not included. On SHSS:C, no suggestions are administered until the induction procedure is completed, so only #12, the amnesia suggestion, is not counted. Figure 6.1 shows the distribution of recall during both HGSHS:A (Panel A) and SHSS:C (Panel B).

On HGSHS:A, the distribution of recall during posthypnotic amnesia is

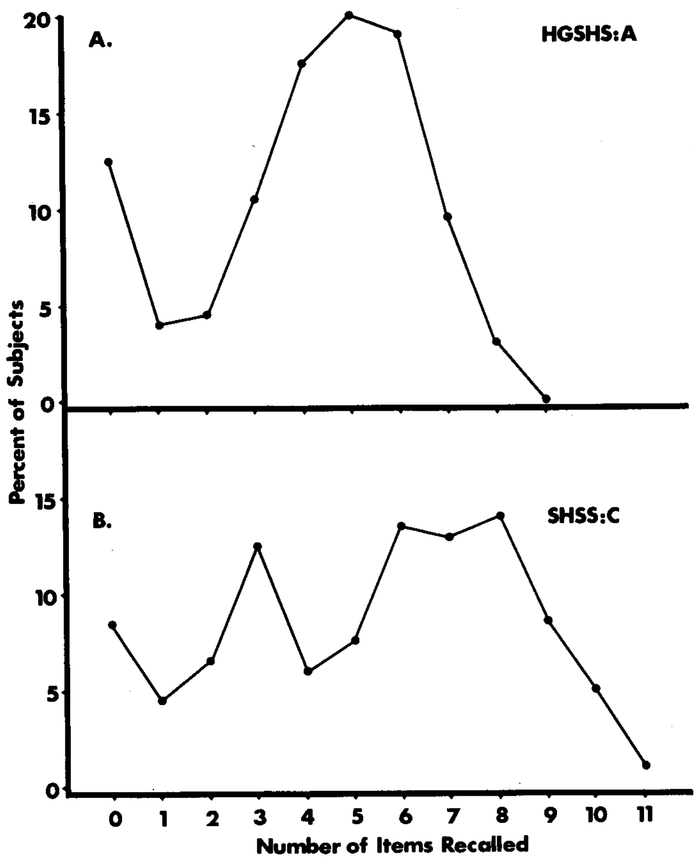

FIG. 6.1. Frequency distributions of recall on the initial amnesia test of HGSHS:A (top panel) and SHSS:C (bottom panel). Maximum number of items available for recall: HGSHS:A, 9; SHSS:C, 11. On both procedures, subjects recalling three or fewer items on this test are considered to meet the standardized criterion for posthypnotic amnesia.

bimodal, and most subjects recall a fair number of the suggestions that they received. Those subjects who recall no more than three critical items on the initial amnesia test are considered to pass amnesia according to the standard scoring criterion (reversibility is not counted in the standard procedure). This criterion is met by a minority of subjects: in the present sample, 31%. These amnesic subjects are typically the ones who have been most deeply hypnotized; in this sample, there was a significant point-biserial correlation of .35 between initial amnesia and corrected hypnotizability scale score. Similar results are apparent for SHSS:C; a total of 32% of the sample passed the amnesia suggestion according to the standard criterion, and the item-to-total correlation (point-biserial) for amnesia was .52.[2]

Inspection of the serial-position curves for either HGSHS:A or SHSS:C reveals three modes: Those items most frequently recalled are those at the very beginning and the very end (Items #3 and #11 on HGSHS:A, Items #1 and #11 on SHSS:C) and one approximately in the middle of the procedure (Item #7, hands moving together on HGSHS:A and age regression on SHSS:C). The curves themselves are reminiscent of others obtained for serially organized material retrieved from long-term memory (Roediger & Crowder, 1976). The serial-position curves for hypnotizable and insusceptible subjects are parallel, although of course the overall levels of recall are clearly diminished for the former group.

PHENOMENOLOGY OF POSTHYPNOTIC AMNESIA

Frequency distributions, item pass percents, and item-to-total correlations are helpful in understanding a phenomenon, but they can also be misleading in that they may obscure a great deal of interindividual variation in its manifestation. Posthypnotic amnesia is no exception. Some subjects, for example, awaken from hypnosis and seem blithely unaware that anything at all transpired while they were hypnotized. For them, hypnosis was induced and terminated, and that was all that seemed to happen. Much more typically, however, the amnesic subject recognizes a gap in his memory that corresponds to a discontinuity in his subjective experience, much like the experience following sleep. Such subjects are often chagrined and sometimes mildly distressed at their inability to remember what they were doing a few moments before. Hilgard (1965b) cites an

[2]At least two factors combine to diminish the item-to-total correlation for amnesia on HGSHS:A. First, the amnesia item is confounded by the "pseudoamnesic" performance of some subjects who for apparently motivational reasons fail to report items that they actually remember (Kihlstrom & Evans, 1976; Kihlstrom, Evans, Orne, & Orne, in preparation). Moreover, subjects' performance on HGSHS:A as a whole is somewhat contaminated by social contagion and other effects inherent in the group setting in which the procedure is administered (Evans & Mitchell, 1977).

excellent example of a subjective report of the experience of posthypnotic amnesia:

> "It was just like being on a merry-go-round and reaching for a ring. It's gone before you get a chance to grab it, and on the next time around, you almost get it, but not quite. It's always just out of reach [p. 181]."

In the face of this subjective failure of memory, some subjects will simply make up experiences: They will report "events" that bear no resemblance to what actually occurred. Other subjects, if they have had some previous experience with hypnosis, may report some of these past experiences as if they had just taken place. Still others will report only incidental events (e.g., a door slamming in the outside corridor) or particularly salient perceptual-cognitive changes associated with the induction or termination of hypnosis. These behaviors all appear to reflect a confabulatory tendency on the part of the amnesic subject. He has been asked to recall things that he does not remember but that he knows he should recall, and it is as if he is attempting to fill an awkward "silence" in his memory with something meaningful.

Even when the subject recalls a fair amount of his hypnotic experience, it is still possible to observe subtle effects of posthypnotic amnesia. In a study by Evans, Kihlstrom, and E. C. Orne (1973), typescripts of handwritten HGSHS:A memory reports taken from 167 subjects were prepared and submitted to blind raters for examination. The following two transcripts are representative of what subjects actually do on the amnesia test (numbers in brackets refer to the items of HGSHS:A, as listed in Table 6.1). The first report was written by a subject who scored in the range of high hypnotizability, 8 out of 12 points, on HGSHS:A:

> Became very tired. Eyes shut soon afterward [2]. Feel like I was floating. I made my arm stiff [6] and tried to hold out my left arm [4]. I felt a fly on my head [9]. I remember counting 1 to 20. Also holding out both of my arms [7].

The second report was written by a subject who achieved only a low score (3 out of 12) on HGSHS:A:

> We were told we were getting tired and drowsy. Our eyelids were heavy [2]. Then we were told to raise our left arm palm downward [3], then to interlock our hands [5], then to hold them straight in front of us palms toward each other, twelve inches apart [7]. Then we were told to touch our left ankle when we heard a tapping sound [11].

Note that in simple quantitative terms, the two subjects recalled precisely the same amount of critical material—four items, thus objectively failing the amnesia item. Nonetheless, it is also apparent that there are qualitative differences between the two reports. Aside from the interesting use of the first-person singular and active voice by the hypnotizable subject and the first-person plural and passive voice by the insusceptible subject (a difference frequently encountered), several of these qualities seem directly related to the effects of the amnesia suggestion on memory. In the first place, the insusceptible subject is proceeding systematically through the items in memory, recalling the suggestions in the same order in which they actually occurred. By contrast, the report of the hypnotizable subject seems rather more haphazard, with a kind of "afterthought" quality. We have more to say about this aspect of posthypnotic amnesia later. Second, the report of the insusceptible subject is clearly detailed, whereas that of the hypnotizable subject is more vague and fragmentary. For the sample as a whole, for example, Evans et al. (1973) found that hypnotizable subjects employed only an average of 5.1 words to describe each remembered suggestion, whereas insusceptible subjects used a significantly higher average of 7.7 words.

The vagueness in memory apparent during posthypnotic amnesia has been further studied by Kihlstrom and Evans (1978) in a different sample of subjects. In scoring amnesia protocols, we had noticed that occasionally a subject would remember some portion of one or more of the relevant suggestions without remembering the remainder. Sometimes the particular referent experience was fairly clear in that it was the only scale item related to the memory report (e.g., "Something about a fly"); but at other times this was not the case. In the latter instance, for example, a subject might report merely, "I did something with my hand," referring to any one of several separate and distinct suggestions concerned with movements of the hands and/or arms. Following the usage established by Brown and McNeil (1966), we have come to think of this phenomenon as a kind of *generic recall*: The subject seemed to have the general idea of the to-be-remembered material—that is, that it involved hands or arms or feelings of heaviness—but did not seem to have successfully completed the act of recall in the sense of being clear about details. In an analysis of two samples totaling 725 subjects, generic recall was found to occur significantly more often in the memory reports of the hypnotizable subjects than in those of insusceptible subjects (23% vs. 6%, respectively). Within the group of hypnotizable subjects, generic recall was most often found in those who were most completely amnesic. Moreover, there was a marked shift from generic to particular (or detailed) recall following cancellation of the amnesia suggestion. The relative poverty of the memory reports of hypnotizable subjects, including their vague, fragmentary, and generic qualities, appears to mark the partial influence of suggestions for posthypnotic amnesia, in spite of the occurrence of some recall.

REVERSIBILITY OF POSTHYPNOTIC AMNESIA

The hypnotized subject's memory does not remain incomplete, however. When the experimenter administers a prearranged cue, the critical memories appear to flood back into awareness, and the hitherto amnesic subject is now able to remember the events and experiences of hypnosis clearly and without difficulty. Figure 6.2, which presents data from the subjects studied by Kihlstrom and Evans (1976, 1977), illustrates the recovery of memory that takes place after the amnesia suggestion has been canceled. Here the 691 subjects have been classified as high, medium, or low in hypnotic susceptibility according to their scores on HGSHS:A. The shaded area of each bar shows the average number of items recalled on the test of initial amnesia (this is a recasting of the data of Fig. 6.1); clearly, on this test the hypnotizable subjects recall significantly fewer critical memories than do the insusceptible subjects. The white area shows the average number of new items recalled on the subsequent reversibility test, after the amnesia suggestion has been canceled; on this test the hypnotizable subjects recover significantly more new memories than do the insusceptible subjects, so that by the time the memory tests have been concluded, the hypnotizable and

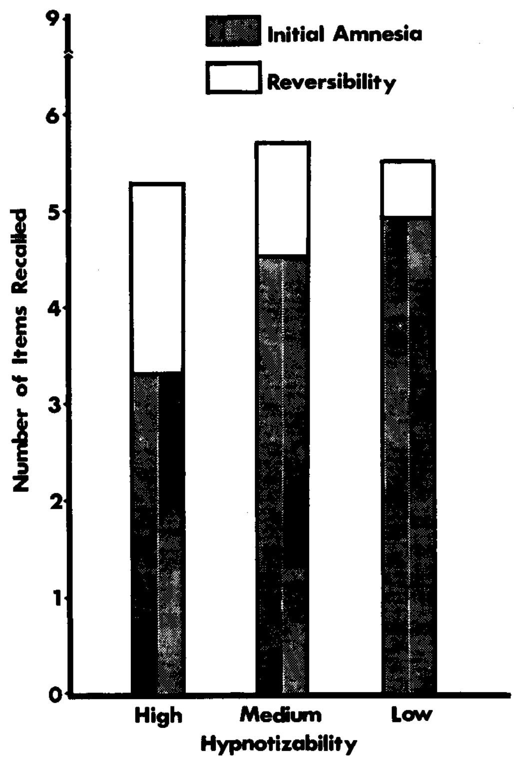

FIG. 6.2. Mean recall on the initial amnesia test (shaded area) and mean number of new items subsequently recovered on the reversibility test (unshaded area) of HGSHS:A. Subjects have been classified as low, medium, or high in hypnotizability.

insusceptible subjects have recalled, on the average, about the same total amount of critical material.

The foregoing demonstration of the reversibility of posthypnotic amnesia is not unambiguous, however. Obviously, the correlation between initial amnesia and hypnotizability introduces the possibility of artifact in the correlation between subsequent recovery of memory and hypnotizability (Nace, Orne, & Hammer, 1974). Put simply, the hypnotizable subjects may recover more new items on the later test, simply because they have a larger pool of items left for recall after the first test is over and not because of any effects of the reversibility cue as such. Kihlstrom and Evans (1976) were able to obviate the ceiling effect problem by taking advantage of the less-than-perfect correlation between hypnotic susceptibility and initial amnesia obtained with HGSHS:A. In general, hypnotizable subjects recall less material during initial amnesia than do the insusceptible subjects; but some insusceptible subjects actually recall very little of their experience, and some hypnotizable subjects recall a fair number of the relevant memories. Given a large number of subjects, groups of hypnotizable and insusceptible subjects can be matched for level of recall during initial amnesia testing. If reversibility is independently correlated with hypnotic susceptibility, hypnotizable subjects should be observed to recover more new memories than their insusceptible counterparts after amnesia is lifted. We found this to be the case: At virtually all levels of initial amnesia recall, hypnotizable subjects recovered significantly more new items during reversibility than did the matched groups of insusceptible subjects. In fact, the insusceptible subjects typically recalled no more than a single additional item, no matter what their initial recall; we assume this to reflect normal reminiscence effects. Evidently, however, for the hypnotizable subjects the administration of the reversibility cue results in a substantial improvement in recall.

A closer inspection of the results, however, made it clear that although the recovery of memory after amnesia is lifted is quite substantial, it is still somewhat less than complete. When a measure of total recall was derived by summing the number of memories reported on the initial amnesia test with the number of additional memories recovered on the subsequent reversibility test, it was found that the total recall for the 691 subjects averaged only about 5.5 of the 9 items, leaving about 40% of the critical material unrecalled at the conclusion of memory testing; in fact, only 3% of the sample recalled all 9 items even after posthypnotic amnesia had been lifted. One would expect a few items to be omitted from recall inadvertently by subjects (Cooper, 1972), but a further analysis of the total recall data (Kihlstrom & Evans, 1977) showed that the postamnesia deficit in recall sometimes appeared to go beyond the bounds of ordinary forgetfulness. Most important for the purposes of the present discussion was the finding that among the hypnotizable subjects, those who passed the test of initial amnesia showed significantly less total recall than those who failed the amnesia test (M = 4.27 and 6.55, respectively). The initially amnesic subjects showed significant reversibility, but even so, their total recall was less extensive than that of their counterparts who were not amnesic. The difference in total recall after amnesia seems to reflect the residual effects of the amnesia suggestion, which persist despite the reversibility cue. The nature of this residual amnesia is not clear at this point, but it is likely that posthypnotic amnesia simply takes time to dissipate fully, in a manner analogous to the retrograde amnesia observed following head trauma.

Despite the finding of a small residual amnesia, the fact remains that posthypnotic amnesia is reversible. Reversibility is the primary property of posthypnotic amnesia, as it allows the temporary effects of the amnesia suggestion to be distinguished from the more permanent effects of ordinary forgetting (Hull, 1933; Orne, 1966). Amnesia cannot be assessed solely on the basis of the subject's initial level of recall. In the sample we studied (Kihlstrom & Evans, 1976), for example, a small number of insusceptible subjects met the standardized criterion for initial posthypnotic amnesia, but they largely failed to show reversibility; we called them *pseudoamnesic*. Moreover, a fairly large number of hypnotizable subjects failed to pass the amnesia item on the basis of their initial recall but nonetheless showed a substantial further improvement in memory after the suggestion was canceled; this we considered to reflect a *partial amnesia*. Considering reversibility allows the investigator to distinguish more precisely between amnesia and pseudoamnesia, and between partial amnesia and nonamnesia. Elsewhere (Kihlstrom & Evans, 1973) we have shown that joint consideration of initial amnesia and reversibility increases the strength of the relationship between performance on the HGSHS:A suggestion and overall hypnotic susceptibility and also improves the capacity of the amnesia item on HGSHS:A to predict performance on the later, more demanding SHSS:C (especially with respect to response to suggestions for amnesia).[3] On a theoretical level, reversibility is of fundamental importance, because it shows clearly that the hypnotized subject has attended to the critical material during hypnosis and that the corresponding memories have been actually encoded. Thus, the process of posthypnotic amnesia appears to temporarily affect the retrieval of the critical memories but not their acquisition or storage.

PARADOXICAL FEATURES OF POSTHYPNOTIC AMNESIA

Posthypnotic amnesia is routinely assessed by means of a simple test of free recall, as in the standardized scales described earlier. Under these circumstances,

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[3]The concept of reversibility has been put to good use in resolving the puzzling discrepancy between the generally low hypnotizability of chronic schizophrenics and their relatively high level of response to suggestions for posthypnotic amnesia: The apparent amnesia is actually pseudoamnesia, an artifact of distraction (Lavoie, Sabourin, & Langlois, 1973; Lieberman, Brisson, & Lavoie, 1978).

where the task is to actively remember the critical material, deeply hypnotized subjects typically show a gross impairment of memory. Under other forms of testing, however, quite different results may be obtained. Thus, comparative analyses of recall and other measures of memory such as recognition, savings in relearning, retroactive inhibition effects, and psychophysiological response to critical items have shown that the various aspects of memory functioning are not all equally affected by suggestions for posthypnotic amnesia. Consideration of the details of the selectivity of amnesia will allow us to draw somewhat clearer conclusions concerning its nature (for a more complete listing of the relevant studies, see Kihlstrom, 1977).

The fact that an experience is not remembered does not mean that it cannot exert an influence on subsequent behavior and experience. This is true for posthypnotic amnesia as it is for the unconscious ideas dealt with in clinical situations, and the impression can be confirmed through studies that assess the effect of memories covered by amnesia on other aspects of learning or skilled performance. For example, studies from Hull's laboratory by Strickler and by Coors (Hull, 1933) showed that subjects who could not recall material learned during hypnosis (paired associates or a path through a stylus maze, respectively) nevertheless showed considerable savings in relearning the same material posthypnotically. A further experiment by Graham and Patton (1968) employed an ABA retroactive-inhibition paradigm. The subjects learned a list of adjectives in the normal waking state and another list during hypnosis. Amnesia was suggested for the learning of the interpolated list, and memory for the original list was then retested. A control group that did not receive the interpolated list showed 87.3% savings in relearning the original list. The amnesic group, however, showed a savings of only 54.8%, a figure that was not significantly different from that of 45.5% showed by a group that learned both lists in the waking state with no amnesia suggestions. Even though the subjects reported that they did not remember the items of List B, or even the fact that they had learned such a list, the amnesia did not reduce the retroactive inhibition produced by the interpolated learning.

In another experiment, Williamsen, Johnson, and Eriksen (1965) taught subjects a list of familiar words during hypnosis, followed by suggestions of amnesia for the learning. After awakening, the hypnotizable subjects showed very little memory for the words on an initial test of recall. Sometime later in the session, however, the subjects were shown a series of partial words and were asked to guess what they were. Half of the degraded items were the words that had been covered by the amnesia suggestion, whereas the other half were common words that had not just been learned. Despite their initial failure of recall, the amnesic subjects achieved significantly more solutions to the critical words than to the control words. In fact, their performance was no different than that of control subjects who simply learned the critical words in the normal waking state, with unimpaired memory on recall testing. Although the critical items were not remembered by the amnesic subjects, the material nevertheless remained "primed" somehow in memory, so that they could capitalize on their previous learning experience to achieve the required solutions.

The problem in amnesia, then, appears to reside in gaining direct access to memories that are available and active in memory storage. But even this is not strictly true, because it is sometimes possible to recall at least certain components of the critical material. In order to make this point most clearly, it is necessary to refer to the distinction between episodic and semantic components of long-term memory that has been articulated by Tulving (1972). The difference is similar to the distinction that Bergson (1896/1911) drew between remembrances and memoria. Episodic memories (remembrances) carry an essential component of autobiographical reference and are encoded in a specific, unique, spatiotemporal context; semantic memories (memoria) consist of knowledge—of the facts of the world, meanings of words, rules of mathematical and logical operations, and highly overlearned skills—that is stored independent of a particular experiential context. Of course, many memories have both an episodic and semantic component; when a person learns a new fact, he or she may remember both the experience of learning and how the new material fits into the storehouse of knowledge already possessed. When posthypnotic amnesia is suggested for such material, it is frequently found that the episodic component of memory, but not the semantic component, is affected.

Consider two further experiments from Hull's laboratory (reviewed in Hull, 1933). Patten gave hypnotized subjects practice in complex mental addition; Life gave subjects practice in learning nonsense syllables. On posthypnotic inquiry, the subjects in both studies denied memory for the trance events but showed substantial positive transfer when required to perform tasks similar, but not identical, to those that previously had been practiced. Evidently, the experience gained during the practice session was retained. Williamsen et al. (1965) provide a further example of this selectivity. After the initial recall test of posthypnotic memory, the subjects were asked to free associate to words that were close associates of the critical words. Those subjects who showed posthypnotic amnesia for the critical words nevertheless gave these same words as free associates to the appropriate stimulus items as often, and as quickly, as did waking control subjects. Amnesia affected the subjects' episodic memory for the recent learning experience but did not disrupt the network of associations in which those words were embedded in semantic memory.

Perhaps the most striking example of the dissociation between episodic and semantic memory in posthypnotic amnesia is provided by the phenomenon of posthypnotic source amnesia, named by Thorn (1960) and studied systematically by Evans and Thorn (1966) and Evans (1971). In a typical source-amnesia experiment, the experimenter teaches the hypnotized subject a set of obscure facts by administering a "test of general information" to the subject and informing him of the correct answers to those items that he misses. One question is: "An amethyst is a blue or purple gemstone; what color does it turn when it is exposed to heat?" The subject typically does not know the answer, and the experimenter says, in passing, "It turns yellow" and goes on to the next question. Near the end of the hypnosis session, the experimenter administers the usual suggestion for posthypnotic amnesia. Upon awakening, most deeply hypnotized subjects fail to remember the previous general knowledge test, in which case the test is readministered. On this second administration of the test, however, a significant proportion of otherwise completely amnesic subjects will be able to answer the critical questions correctly. If the experimenter goes on to ask the subject how he knows a particular answer, the subject will frequently draw a blank or rationalize his knowledge; for example, "Oh, I don't know, my girl friend is interested in gemstones, and she must have told me." In two studies reported by Evans (1971), source amnesia was shown by about one-third of deeply hypnotized, amnesic subjects but never by a group of insusceptible subjects who had been instructed to simulate hypnosis in accordance with the procedure described by Orne (1962, 1970, 1972). Source-amnesic subjects show effortless recall of facts learned during hypnosis but do not remember the circumstances under which the information was acquired. In short, retrieval from episodic memory is impaired, but retrieval from semantic memory is unencumbered.

With respect to the episodic component of memories covered by posthypnotic amnesia, it is often possible to produce the critical memories if the subject is not required to rely on active recall. One of the clearest indications of this comes from experiments that have compared recall and recognition measures of posthypnotic amnesia. Williamsen et al. (1965) gave amnesic subjects a list containing the six critical words and six new, unfamiliar words with instructions to pick out those items that had been learned during hypnosis. The amnesic subjects recognized substantially more critical words than they had earlier recalled, although recognition-test performance still did not match that of the waking control subjects. In a more recent experiment, Kihlstrom and Shor (1978) compared a recognition test of memory for the suggestions contained on HGSHS:A and SHSS:C, confirming the earlier finding.

These diverse findings point to what might be called the "paradox" of posthypnotic amnesia. This paradox resides in the apparent contradiction between the subject's assertion that he cannot remember something and the objective evidence of the dynamic presence of the "lost" memories in storage. Most of the major attempts to develop a comprehensive understanding of amnesia have taken this paradox as a starting point (for a review of these approaches, see Kihlstrom, 1977). For example, these facts have led some to dismiss posthypnotic amnesia as merely a phenomenon of motivated neglect, the subject playing the role of amnesic, but currently available evidence is largely inconsistent with this position (Ashford & Hammer, 1978; Kihlstrom, 1977, 1978; Kihlstrom, Evans, Orne, & Orne, in preparation). In the remainder of this chapter, we articulate an approach to posthypnotic amnesia that is rooted in contemporary cognitive psychology and present the results of some recent research intended to assess the adequacy of that point of view.

POSTHYPNOTIC AMNESIA AS DISRUPTED RETRIEVAL

In surveying the literature on posthypnotic amnesia that was available to him, Hull (1933) concluded that "the posthypnotic amnesia ordinarily met with, which appears superficially to be a complete wiping out of memory, is by no means complete [p. 138]." Of course, Hull based his conclusions on the trace-strength theory of memory that prevailed at that time. To the extent that posthypnotic amnesia was analogous to forgetting, the memory traces seemed to be weakened somewhat but not entirely ablated. In terms of contemporary theoretical approaches to cognition, however, one might wish to interpret this same evidence quite differently, in terms of the selectivity of the disruption of memory functions in amnesia. We know from the fact that posthypnotic amnesia is reversible that amnesia affects retrieval functions rather than acquisition or storage processes. In a similar manner, the phenomenon of source amnesia underscores the selective disruption of episodic, but not semantic, memory. Moreover, a number of experiments show that the memories temporarily blocked by amnesia still interact (if only indirectly) with other ongoing cognitive activities, as in the relearning and retroactive-inhibition studies. The problem in amnesia, then, appears to have to do with gaining direct access to the critical episodic memories.

Here the comparison of recall and recognition during amnesia takes on added importance, because many current theories of memory retrieval contend that retrieval involves two distinct processes: a search through memory storage that generates candidate items suitable to the recall task, followed by a decision as to which candidate item so generated is most appropriate (e.g., Anderson & Bower, 1972, 1974). Recall memory is generally held to involve both the search and the decision processes, whereas recognition memory is said to involve decision only, because the presentation of the target item obviates the need to activate a search (for a dissenting view, see Tulving & Thomson, 1973, and Watkins & Tulving, 1975). The studies of Williamsen et al. (1965) and Kihlstrom and Shor (1978) show that recognition memory is substantially less impaired during amnesia than recall memory, suggesting that posthypnotic amnesia may involve that component of the retrieval process by which memory storage is searched for the candidate item, rather than the process by which candidates are tested against relevant decision criteria.

The search process itself is guided by various sorts of organizational cues and strategies by which the retrieval mechanism can work through the array(s) of associated memories. Without a sufficiently rich associational network, and without an adequate plan for searching through memory and sufficient cues to guide retrieval, the person will not be able to gain access to material that is available in memory (Tulving & Pearlstone, 1966). In this instance, there will occur a complete failure of memory or, in a less severe case, incomplete or vague and fragmentary recall. In the final analysis, then, organizational cues make recall as easy, efficient, and productive as it is for most of us most of the time. It follows, then, that when recall is difficult, inefficient, and unproductive, the impairment in memory is likely to reflect the disorganization of the search process in retrieval. This is especially the case if the memory deficit proves to be reversible and recognition memory remains intact. Posthypnotic amnesia seems to fit this description nicely. Accordingly, we have proposed that posthypnotic amnesia reflects a disruption of memory retrieval stemming from a disorganization of the process of memory search (Evans & Kihlstrom, 1973).

This proposal represented a shift in emphasis in the study of posthypnotic amnesia. It is immensely beneficial, of course, to be able to ground research in a comprehensive and sophisticated body of theory and to take advantage of research techniques that have already been developed in other contexts. With the benefits, however, have come some problems. Specifically, it is difficult to study the retrieval process in subjects who have forgotten everything. Whereas earlier work routinely studied the extent of forgetting in subjects who showed a complete recall deficit (or nearly so), we were required to focus our attention on subjects who were able to remember at least some of the critical material. Fortunately, our studies of the recovery of memory after posthypnotic amnesia (Kihlstrom & Evans, 1976) and the qualities of memory reports taken during amnesia (Evans et al., 1973; Kihlstrom & Evans, 1978) have clearly documented the partial effects of suggestions for posthypnotic amnesia. Specifically, among those subjects who show some posthypnotic memory despite the suggestion for complete amnesia, hypnotizable subjects still appear to find remembering more difficult, inefficient, and unproductive than do their insusceptible counterparts. In the following reported studies, the general research strategy is as follows: Exclude from consideration those subjects who recall virtually nothing during the test for posthypnotic amnesia, and compare the remaining hypnotizable and insusceptible subjects in terms of the organization of recall and other aspects of retrieval. So far we have examined some general aspects of the organization of recall, as well as considered in some detail one particular principle of memory organization: temporal sequence.

SUBJECTIVE ORGANIZATION OF RECALL DURING AMNESIA: COMMONALITIES AMONG SUBJECTS

The organization of recall draws upon many features of memory, including visual, orthographic, acoustic, semantic, and syntactic cues for verbal material; and sensory modality, frequency, salience, familiarity, emotional valence, and spatiotemporal context for events and experiences with autobiographical reference (Bower, 1970, 1972; Tulving, 1972; Underwood, 1969). By focusing on one set of organizational cues to the exclusion of the others, an experimenter might lose sight of an important aspect of subjects' attempts at retrieval. Moreover, Tulving (1962) has noted that even in the absence of an explicit organizational principle by which a list of items might be organized for recall, subjects will tend to employ idiosyncratic organizational schemes in their attempts to remember the critical material. We wished initially to examine group differences in the organization of recall without imposing on the data any specific preconception of what shape that organization might take. Accordingly, we first performed an analysis of what Tulving (1962) has termed the subjective organization of recall.

This analysis employed two separate samples of subjects who had received a series of standardized hypnotic procedures as part of other research. Sample A consisted of 112 subjects, and Sample B contained 107 subjects; both received HGSHS:A followed by an individual administration of SHSS:C. The subjects were classified as low (0–4), medium (5–7), or high (8–12) in hypnotic susceptibility according to their scores on SHSS:C.[4] After excluding those subjects who showed complete posthypnotic amnesia (recall = 0 on the initial amnesia test), there remained 23 to 40 subjects in each hypnotizability subgroup in each sample. The analysis of subjective organization in recall for Sample A was originally reported by Evans and Kihlstrom (1973); Sample B constitutes a replication.

For each subject, a list was available showing each scale item that had been recalled during posthypnotic amnesia testing as well as the exact order in which the items had been recalled. Because recall data was gathered on the basis of only a single trial, subjective organization was indexed by the *SO* statistic proposed by Tulving (1962). In essence, *SO* is based on the frequency with which any item is recalled following any other item, as tabulated in a contingency matrix similar to that used in the calculation of χ^2 or the measurement of second-order behavioral stereotypy (Miller & Frick, 1949). *SO* is essentially the ratio of the actual organization observed in recall to the maximum organization possible. Typically, *SO* is calculated for a single subject and observed to increase as a function of repeated study-test trials. However, Tulving (1962) has also indicated that *SO* may be meaningfully calculated from test results taken from a single trial and pooled across several subjects. In this case, *SO* represents an index of group stereotypy in recall. A value close to 0 results when all the cells in the

[4]The parameters of hypnotic susceptibility were approximately the same in the two samples (HGSHS:A scale score: Sample A, $M = 6.49$, $SD = 2.78$ and in Sample B, $M = 5.93$, $SD = 2.98$; SHSS:C scale score: Sample A, $M = 6.25$, $SD = 3.11$ and in Sample B, $M = 6.12$, $SD = 3.29$. Subjects in Sample A also received SHSS:B intervening between HGSHS:A and SHSS:C ($M = 6.68$, $SD = 3.13$).

contingency matrix have approximately the same frequency—that is, all permutations of item pairs have the same probability of occurring in recall, and therefore the recall of each subject is idiosyncratic. A score close to 1, on the other hand, indicates that some permutations are very much more likely to be recalled than others—that is, that all the subjects in the group are recalling item pairs in approximately the same order.

Figure 6.3 shows the *SO* indices derived from HGSHS:A and SHSS:C for subjects of high, medium, and low hypnotic susceptibility. For both procedures

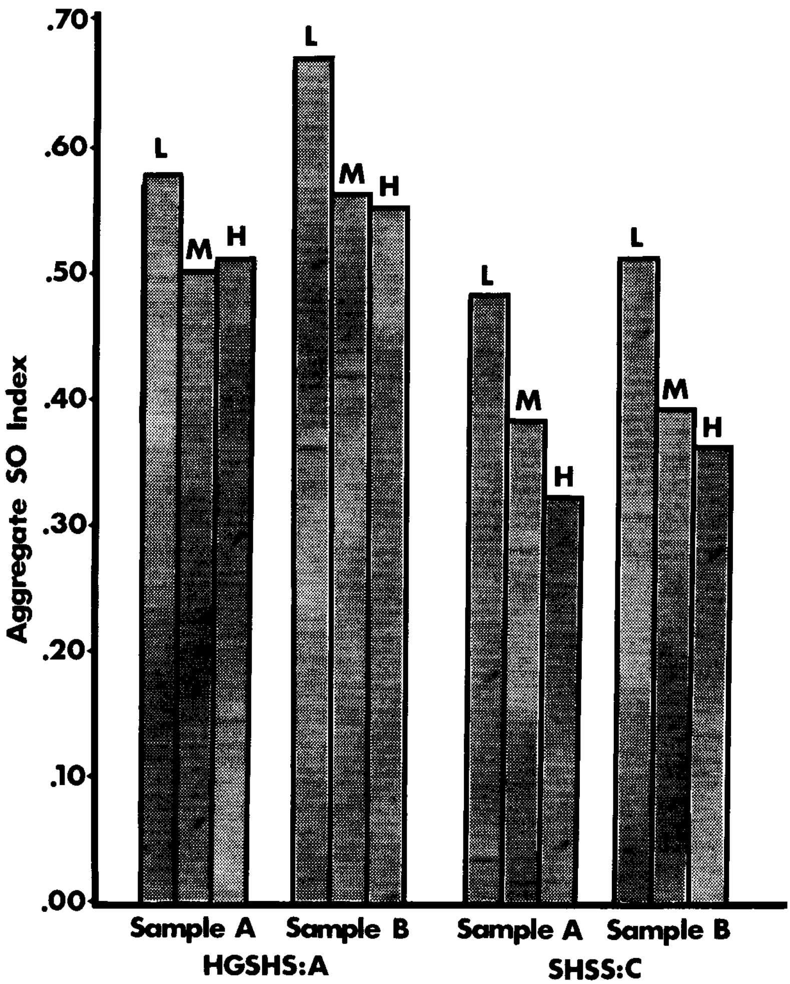

FIG. 6.3. *SO* index of group stereotypy in the organization of recall on the initial amnesia test of HGSHS:A and SHSS:C. Subjects have been classified as low, medium, or high in hypnotizability.

and in both samples, there is less subjective organization in the recall of hypnotizable subjects than in that of insusceptible subjects. This difference is especially apparent on SHSS:C. Tests of statistical significance are not available for this kind of data, but the consistency of the pattern observed permits us to have some confidence in the results. During the time that amnesia suggestions are in effect, insusceptible subjects tend to recall those items that they can remember in a relatively consistent, organized, and stereotyped fashion, compared to the more idiosyncratic recall of the hypnotizable subjects. This is consistent with the hypothesis concerning disrupted retrieval processes; accordingly, we have continued to explore aspects of the organization of recall during posthypnotic amnesia.

TEMPORAL ORGANIZATION OF RECALL DURING POSTHYPNOTIC AMNESIA

A number of considerations suggest that of all the cues and strategies that could be used in organizing recall, for the kind of memory task under consideration here, spatial and especially temporal relations among the to-be-remembered items are probably the most salient and important (Neisser, 1967). As Tulving (1972) has pointed out, retrieval of any episodic memory requires the specification of the spatiotemporal context in which the to-be-remembered material was encoded. Moreover, as is the case with any series of personal experiences, the principal organizational rubric has to do with temporal sequence: Ask someone to recollect everything that he did yesterday, and there is a high likelihood that those events will be recalled in the temporal sequence in which they occurred. Accordingly, we decided to focus our attention on the temporal organization of recall during posthypnotic amnesia.

Differential Recall of the First Experience

The test of posthypnotic amnesia begins with the instruction that the subject should report everything that he remembers having occurred since the induction of hypnosis began, thus implying a specific temporal anchor point for the search process and probably implying temporal-sequence organization as well. In this respect it was interesting to note that the serial-position curves discussed earlier suggest a tendency for hypnotizable subjects to fail to recall particularly those suggestions that occurred early in the hypnotic procedure. More germane to the point, though, is the matter of *when* the subject recalls the early items if in fact he does. Table 6.2 presents this comparison for Samples A and B combined. On both HGSHS:A and SHSS:C, the first item was recalled first by the insusceptible subjects almost to the exclusion of the other items. Proportionately fewer of the more hypnotizable subjects, however, recalled the first item first; this was

TABLE 6.2
Differential Recall of the First Item in Standardized Hypnotic Procedures by Subjects of Low, Medium, and High Hypnotic Susceptibility

	Hynotizability		
Group	*High*	*Medium*	*Low*
HGSHS:A			
Total N	60	51	68
Subjects recalling Item #3	48	42	61
Initial item recalled			
Item #3	39	36	58
Any other item	9	6	3
SHSS:C			
Total N	58	56	74
Subjects recalling Item #1	19	40	68
Initial item recalled			
Item #1	11	26	62
Any other item	8	14	6

Note. On HGSHS: A, Items #1 and #2 are not counted in scoring amnesia, as they occur either before or during the induction of hypnosis. For the purpose of this analysis, Item #3 is counted as the "first item" on that procedure.

especially the case for the most deeply hypnotized subjects (HGSHS:A: $\chi^2(2) = 5.27$, $p < .10$; SHSS:C: $\chi^2(2) = 15.28$, $p < .001$).

The findings with respect to the differential recall of the first item encouraged us to continue to look for group differences in the temporal organization of recall during posthypnotic amnesia, considering now the entire output of the subject. In order to determine whether subjects' recall was organized according to the chronological sequence of the suggested hypnotic experiences, order-of-retrieval scores were calculated for each subject who recalled at least three items on a particular recall trial. Specifically, Spearman rank-order correlation coefficients (*rho*) were calculated between the order in which each subject recalled those suggestions that he could remember and the order in which those scale items were actually administered during the hypnotic procedure. The resulting correlations were treated as scores representing the extent to which the order of recall followed the temporal sequence of events. Rho, of course, varies from +1.00 (items recalled in perfect temporal sequence), through 0.00 (no correspondence between order of administration and order of recall), to −1.00 (items recalled in reverse order). As a rule of thumb, recall was considered *ordered* when rho was found to be positive and statistically significant ($p < .05$, one-tailed); otherwise, rho was considered *random* (in practice, recall in perfect or almost-perfect reverse order is hardly ever observed). With this index in hand, we were ready to ask the question: How orderly is the recall of hypnotizable and insusceptible subjects under various conditions? In the remainder of this chapter, we describe a series of studies that bear on this question.

Temporal Sequencing of Recall During Amnesia

First, we wished to address the issue of temporal organization in recall during the time that the amnesia suggestion was in effect. For this analysis, we examined amnesia recall data from three separate samples of subjects, each of which had received one or more of the hypnotic susceptibility scales, including the suggestion and test for posthypnotic amnesia, under standardized conditions. Two of these samples, A ($N = 112$) and B ($N = 107$) have already been described in the section on the subjective organization of recall. The subjects in Sample C ($N = 488$) received one of four slightly modified versions of HGSHS:A as part of a formal experiment (Kihlstrom et al., in preparation). Again, the temporal sequencing of recall for Sample A was first reported by Evans and Kihlstrom (1973); Samples B and C, then, constitute replication studies. The subjects in Samples A, B, and C were classified as low, medium, and high in hypnotic susceptibility according to the best available measure: SHSS:C in the case of Samples A and B, HGSHS:A in the case of Sample C. Because HGSHS:A ratings of medium hypnotizability are somewhat unreliable, Sample C subjects scoring in the middle range (5 to 8 in this sample) were dropped from consideration.[5]

The principal results of the analysis are presented in Table 6.3, which lists the mean rho score for recall during amnesia for each hypnotizability subgroup on each standardized procedure. It is apparent that the insusceptible subjects consistently show a higher average rho score than do the hypnotizable subjects. The differences are significant in all cases ($p < .05$) except SHSS:B for Sample A, where the trend is in the appropriate direction. Note also that from sample to sample, the magnitudes of the mean rho scores, and the differences

[5]The parameters of HGSHS:A response for Sample C were $M = 7.09$, $SD = 2.58$. Because of the slightly higher mean scale score obtained in this sample, the criterion for high hypnotizability was adjusted to require a minimum of 9 items passed, instead of the usual 8 items.

TABLE 6.3
Temporal Organization of Recall (Rho) During Posthypnotic Amnesia

Procedure	*Subjects with Recall* ≤ *3*	*Hypnotizability* *Low*	*Medium*	*High*	*Low vs. High* *t*	*p*<
		A. Sample A (N = 112)				
HGSHS:A	25	.80	.70	.67	1.94	.050
SHSS:B	32	.58	.17	.39	1.47	.100
SHSS:C	22	.55	.31	.08	3.34	.001
		B. Sample B (N = 107)				
HGSHS:A	27	.81	.71	.61	2.26	.050
SHSS:C	25	.68	.50	.16	3.59	.001
		C. Sample C (N = 488)				
HGSHS:A	97	.85	– – –	.68	2.90	.005

Note. Sample Ns are given in Table 6.4.

between them, remain fairly constant for a given procedure. When the scores for each subject were entered into contingency tables according to hypnotizability (low, medium, or high) and rho score (ordered or random), as shown in Table 6.4, the resulting chi-square tests were significant ($p < .05$) in each case except HGSHS:A for Sample B, where again the general trend was shown. Supplementary nonparametric analyses confirmed the essential trends.[6] Across the board, the subjects of relatively high hypnotizability showed a clear tendency to remember hypnotic events out of correct temporal order.

Of course, the distribution and set of possible values for rho varies with the number of items recalled. Thus, for $n = 3$, rho can take only the values +1.00, +.50, −.50, and −1.00; whereas for $n = 6$, rho can have the values of +1.00, +.94, +.89, +.83, +.77, . . . , and −1.00. Clearly, a minor error in sequencing "costs" the subject more at low levels of recall than at high levels. As has been noted previously, hypnotizable subjects generally recall significantly fewer items during amnesia than do insusceptible subjects. Thus it is possible that the

[6]For example, combining Samples A and B, the median rho scores for subjects of low, medium, and high hypnotizability were, respectively: on HGSHS:A, .92, .90, and .68; on SHSS:C, .70, .58, and .40. Kruskal–Wallis one-way analysis of variance by ranks showed that these differences were significant (HGSHS:A: H = 26.57, $p < .001$; SHSS:C: H = 10.43, $p < .005$), as did the Mann–Whitney U test comparing just the highs and lows (HGSHS:A: U = 2109, z = 2.37, $p < .001$; SHSS:C: U = 2386, z = 4.22, $p < .001$). Similar nonparametric analyses for a portion of Sample C are reported by Kihlstrom (1975).

TABLE 6.4
Frequency of Ordered and Random Recall (Rho)
During Posthypnotic Amnesia

Procedure	*Hypnotizability*	*Temporal Sequence* *Ordered*	*Random*	χ^2	*p*<
	A. Sample A (*N* = 112)				
HGSHS:A	Low	22	15		
	Medium	12	11		
	High	8	19	5.75	.050
SHSS:B	Low	19	18		
	Medium	3	17		
	High	4	19	11.18	.005
SHSS:C	Low	22	18		
	Medium	6	21		
	High	3	20	13.04	.001
	B. Sample B (*N* = 107)				
HGSHS:A	Low	16	12		
	Medium	10	15		
	High	10	17	2.61	.150
SHSS:C	Low	17	17		
	Medium	12	15		
	High	3	18	7.46	.050
	C. Sample C (*N* = 488)				
HGSHS:A	Low	41	18		
	High	27	51	14.98	.001

generally lower rho scores of hypnotizable subjects are an artifact of the lower average recall shown by these same subjects. If this were the case, it would be expected that at low levels of recall, rho would be low for both hypnotizable and insusceptible subjects; and at high levels of recall, rho would be correspondingly high in both groups. Figure 6.4 shows the mean rho scores on HGSHS:A for hypnotizable and insusceptible subjects (i.e., excluding medium hypnotizables from consideration) for Samples A, B, and C combined. As in the earlier discussion of reversibility, the hypnotizable and insusceptible subjects have been matched for the number of items recalled during initial amnesia testing. Although the subsample sizes are necessarily small at some points (ranging from 7 to 40, median = 27.2), there is a clear overall trend for hypnotizable subjects to have lower mean rho scores than their insusceptible counterparts, regardless of the level of amnesia recall. This difference is statistically significant at most points on the distribution (recall = 3: $t(45) = 4.16, p < .001$; recall = 4: $t(57) = 2.81, p < .005$; recall = 5: $t(59) = 1.96, p < .05$; recall = 6: $t(50) = 1.90, p < .05$; recall = 7−9; $t(36) = .66$). Nonparametric tests confirmed this trend (Kihlstrom, 1975).

At each point on the distribution of posthypnotic recall, then, the rho scores of hypnotizable subjects were considerably lower than those of insusceptible subjects. These findings indicate that the generally lower rho scores shown by hypnotizable subjects are not merely artifacts of the fewer number of items recalled. Furthermore, they offer additional evidence supporting the concepts of partial amnesia and pseudoamnesia (Kihlstrom & Evans, 1976). Temporal disorganization is found among hypnotizable subjects even for those who recall five or six items during amnesia, indicating that the effects of the amnesia suggestion extend well beyond the cutoff established by the standardized criterion.

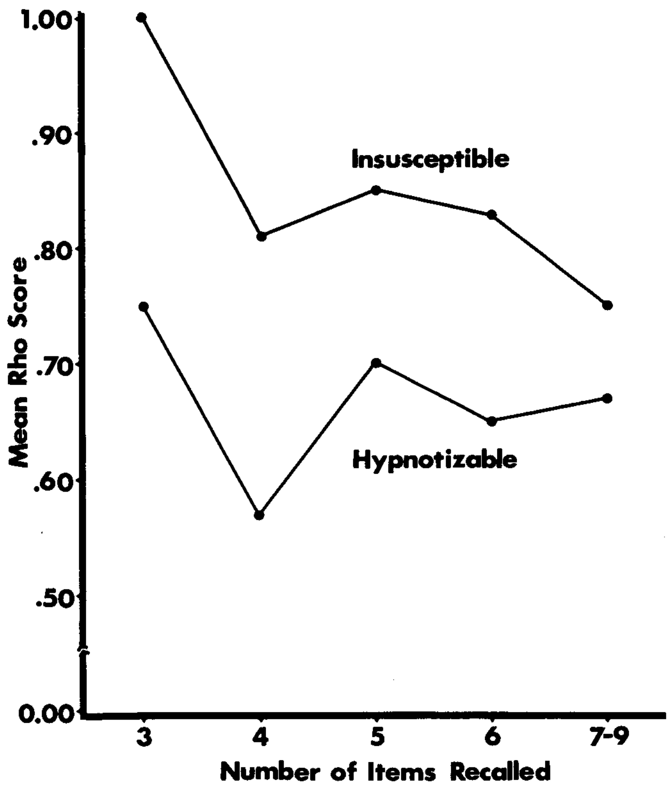

FIG. 6.4. Mean rho index of temporal organization of recall on the initial amnesia test for hypnotizable and insusceptible subjects matched for the number of items recalled (HGSHS:A only; Samples A, B, and C combined).

And at relatively low levels of recall (three or four items), the insusceptible subjects do not show the same degree of temporal disorganization manifested by the hypnotizable subjects, suggesting that the mechanisms underlying poor memory performance are different in the two groups.

Temporal Disorganization as an Index of Partial Amnesia

If the disruption in temporal sequencing of recall that we have observed is actually a manifestation of partial posthypnotic amnesia, then it should show the expected relationships with other aspects of hypnotic response. These other variables include hypnotic susceptibility (i.e., standardized scale score) and both initial amnesia and subsequent reversibility (i.e., the number of items recalled on the two amnesia tests). In addition to being related to other aspects of concurrent hypnotic performance, temporal disorganization during amnesia should predict these same variables with respect to performance on a future hypnotic procedure. Accordingly, a series of analyses was performed using the combined Samples A and B where information was available concerning subjects' behavior on both HGSHS:A and SHSS:C (total $N = 219$). A portion of this analysis has been reported previously for Sample A alone (Evans & Kihlstrom, 1973).

Table 6.5 shows the mean rho for these subjects classified according to whether they met the criterion for reversibility after the cue was given to cancel the amnesia suggestion (collapsing across the three categories of hypnotic susceptibility). This analysis necessarily excludes those subjects who showed virtually complete initial amnesia, for whom rho scores could not be calculated ($N = 52$ on HGSHS:A; $N = 47$ on SHSS:C). On HGSHS:A the 46 subjects who showed reversibility after amnesia also tended to have lower rho scores during amnesia than did the 121 subjects who did not recover any substantial amount of new material after amnesia. This trend was highly significant on SHSS:C, where there were 66 reversers and 106 nonreversers.

TABLE 6.5
Mean Rho Score During Amnesia for Subjects Passing and Failing Criterion for Subsequent Reversibility

Samples A and B Combined ($N = 219$)

	Reversibility		
Procedure	*Pass*	*Fail*	*t*
HGSHS:A	0.66	0.75	1.49*
SHSS:C	0.23	0.54	3.60**

* $p < .10$
**$p < .001$ (1-tailed)

Table 6.6 presents corresponding analyses relating the temporal sequence of recall during amnesia to general hypnotic susceptibility and to aspects of response to the specific suggestion for amnesia. As might be expected, those subjects with virtually complete amnesia on either HGSHS:A or SHSS:C showed the highest levels of hypnotic response. However, among the remaining subjects, there were substantial differences between those with ordered or random temporal sequencing in recall. For example, Part A of Table 6.6 shows that although those subjects with virtually complete amnesia on HGSHS:A achieved the highest overall scores on that scale (dropping the amnesia item itself in the calculation of HGSHS:A score), of the remaining subjects, those with random recall ($N = 89$) during amnesia scored significantly higher than those with ordered rho ($N = 78$). In the same manner, subjects with random rho recalled significantly fewer items on the initial amnesia test, and recovered significantly more new items on the subsequent reversibility test, than did their counterparts with ordered rho. The same trends are apparent in Part B, where the 109 subjects who showed random rho on SHSS:C proved to score higher on that procedure (again, SHSS:C score was corrected by dropping the amnesia item), recalled less on its amnesia test, and recovered more on the reversibility test than the 63 subjects with ordered rho. Finally, Part C of Table 6.6 shows that temporal sequencing has some predictive power, in that subjects with random rho on HGSHS:A scored higher on the later SHSS:C and also showed more initial amnesia and subsequent reversibility than those with ordered rho on HGSHS:A. In all instances the categories of complete amnesia, recall with random sequencing, and recall with ordered sequencing form a continuum of amnesic response. Like reversibility (Kihlstrom & Evans, 1976) and fragmentary recall (Evans et al., 1973; Kihlstrom & Evans, 1978), relatively random temporal sequencing appears to be a manifestation of partial posthypnotic amnesia.

A final aspect of the continuity among the three broad categories of amnesia was observed when the subjects were jointly classified according to the nature of their recall (i.e., complete amnesia, random recall, and ordered recall) on both HGSHS:A and SHSS:C. The resulting contingency table showed a significant relationship among the categories ($\chi^2(4) = 37.51$, $C = .38$, $p < .001$). Table 6.7, which presents the results for the hypnotizable subjects only (SHSS:C score ≥ 8), shows the actual nature of the relationship more clearly. Subjects who manifested complete amnesia on HGSHS:A tended to show it again on SHSS:C; if not, they overwhelmingly showed random rather than ordered recall. By the same token, subjects who showed random recall on HGSHS:A tend to be more completely amnesic on SHSS:C; if not, they show random recall again rather than ordered recall. This regular pattern ($\chi^2(4) = 15.18$, $C = .38$, $p < .005$) is consistent with the continuity hypothesis: Some subjects "fall back" from their group scale performance when they receive the more demanding SHSS:C; similarly, some subjects become more deeply hypnotized and respond more fully to amnesia suggestions once they have become familiar with the procedure.

TABLE 6.6
Relationship Between Temporal Sequencing of Recall During Amnesia and Other Aspects of Hypnotic Response ($N = 219$)

Criterion	Complete Amnesia	Random Recall	Ordered Recall	F^a	t^b
A. HGSHS:A Amnesia Predicting Concurrent HGSHS:A Performance					
HGSHS:A Score[c]	7.08	5.83	5.15	8.65**	1.70*
HGSHS:A Amnesia recall[d]	0.83	4.55	5.30	211.32***	3.62***
HGSHS:A Reversibility recall[c]	2.52	1.17	0.73	29.15***	2.56*
B. SHSS:C Amnesia Predicting Concurrent SHSS:C Performance					
SHSS:C Score[c]	8.85	5.63	3.98	56.50***	4.07***
SHSS:C Amnesia recall[d]	0.85	5.81	7.54	179.91***	5.29***
SHSS:C Reversibility recall[e]	5.49	2.00	0.89	77.29***	4.11***
C. HGSHS:A Amnesia Predicting Future SHSS:C Performance					
SHSS:C Score[c]	7.27	5.98	4.76	12.77***	2.79**
SHSS:C Amnesia recall[d]	3.10	5.30	6.60	25.08***	3.07**
SHSS:C Reversibility recall[e]	3.62	2.30	1.78	8.55**	1.50

[a]Overall.
[b]Comparing random vs. ordered.
[c]Based on 11 items, excluding amnesia.
[d]Number of items recalled on initial amnesia test.
[e]Number of items recalled on subsequent reversibility test.
$^{*}p < 0.05$ $^{**}p < 0.005$ $^{***}p < 0.001$ (all 1-tailed)

TABLE 6.7
Consistency of Amnesia Performance:
Joint Classification of Subjects
Based on Category of Amnesia on HGSHS:A and SHSS:C
(Hypnotizable Subjects Only)

	SHSS:C Amnesia		
HGSHS:A Amnesia	*Complete Amnesia*	*Random Recall*	*Ordered Recall*
Complete	24	9	1
Random recall	11	23	2
Ordered recall	9	6	3

FURTHER STUDIES OF TEMPORAL SEQUENCING IN POSTHYPNOTIC RECALL

So far we have focused on documenting the basic finding of relatively random temporal sequencing in recall during posthypnotic amnesia. We have twice replicated the effect first reported by Evans and Kihlstrom (1973), as has Crawford (1974). The same findings are obtained even when the classification of hypnotic susceptibility is based on HGSHS:A, rather than the more satisfactory SHSS:C. Further analyses of this data ruled out the possibility that the temporal sequencing effect was some kind of artifact of the low number of items recalled by hypnotizable subjects during amnesia, as well as some other statistical artifacts. Moreover, our data confirm that random temporal sequencing is located on a continuum of response to suggestions for posthypnotic amnesia and in fact is a manifestation of partial amnesia. In addition to these studies, we have carried out a number of smaller experiments to explore other aspects of temporal organization in posthypnotic recall. For reasons of economy and to reduce the subtle effect of experimenter-subject interactions, these studies have employed the group-administered HGSHS:A as the sole hypnotic procedure. Even so, the results have helped settle some questions, and raise others that are important, about the temporal organization of recall and posthypnotic amnesia.

Temporal Sequencing in the Absence of Amnesia

The analyses reported so far indicate that a relative lack of temporal-sequence organization is observed in the recall of hypnotizable subjects during the time that the suggestion for posthypnotic amnesia is in effect. However, it is possible that this apparent temporal disorganization may not be functionally related to the specific suggestion for posthypnotic amnesia. For example, the effect may be due to hypnosis alone. Hypnosis is generally considered to be a special state of consciousness, and the subject's failure to organize what he remembers according to temporal sequence (or any other principle) may reflect the manner in which those memories were encoded during hypnosis, or the cognitive sequelae of the transition from hypnosis to the usual waking state (Schwartz, 1978). Alternatively, it may be that the temporal disorganization seen during amnesia testing merely reflects a somewhat disorganized "memory style" present in hypnotizable subjects even in the waking state. Some of the research on the personality correlates of hypnotizability, for example, may be interpreted as suggesting that hypnotizable subjects are more disorganized in their personal lives than insusceptible subjects; they frequently become lost in thought or fantasy (Hilgard, 1970; Shor, Orne, & O'Connell, 1966; Tellegen & Atkinson, 1974), for example, and tend to arrive late for experimental appointments (Evans, Orne, & Markowsky, 1977).[7]

A further study, therefore, addressed both the "state-specific" and "memory style" hypotheses directly by analyzing various aspects of posthypnotic recall in subjects who were hypnotized but who did not receive any suggestions for amnesia. A modified version of HGSHS:A was administered to 72 introductory psychology students in the course of a lecture-demonstration on hypnosis. At the close of the usual hypnotic procedure, the standard suggestion for amnesia was deleted, but the subjects still were asked to recall everything that had happened while they were hypnotized, as in the standard test of posthypnotic amnesia. The subjects were classified as low, medium, or high in hypnotizability according to the usual criterion, and mediums ($N = 21$) were excluded from further consideration.

The overall HGSHS:A scores for this sample (based on 11 items after dropping amnesia) were similar to those obtained in other studies: $M = 6.47$, $SD = 2.56$. However, perhaps because of the circumstances of testing, the levels of recall shown were relatively low: Despite the absence of the amnesia suggestion, a few subjects recalled less than three critical items on the amnesia test. Because these subjects came in equal proportions from the pools of insusceptible (6/22) and hypnotizable (10/29) subjects ($\chi^2(1) = .36$), pseudoamnesia, rather than spontaneous amnesia, is a possibility here. Nevertheless, the important analyses concern the remaining 16 insusceptible and 19 hypnotizable subjects. They were not found to differ in terms of either the number of items recalled ($M = 5.81$ and 5.63, respectively; $t(33) = .36$) or rho score ($M = .89$ and .88, respectively; $t(33) = .23$). These figures contrast sharply with the differences in both the number of items recalled and the order of recall seen in the earlier analyses, when posthypnotic amnesia had been suggested to the subjects. Evidently the disruption in temporal sequencing observed in the earlier experiments is a specific effect of the amnesia suggestion and not a function of the subjects' waking memory style or the experience of hypnosis alone.

Effect of Instructions on Temporal Sequencing During Amnesia

Implicit in the studies that have been described so far is the assumption that the temporal disorganization of recall observed during amnesia reflects the inaccessi-

[7]In this context, it is important to note that among hypnotizable subjects, those who can experience posthypnotic amnesia do not appear to be more "forgetful" in ordinary waking life. In fact, studies comparing these subjects on tasks involving short-term auditory and visual memory, prose memory, free recall, incidental memory, and recollection of salient public events suggest that if anything, amnesic subjects may have *better* memories than nonamnesics (Evans & Kihlstrom, 1975; Kihlstrom & Evans, 1975; Kihlstrom & Twersky, 1978).

bility of temporal cues; in other words, that there is some impediment to adequate organization that cannot be easily transcended by the amnesic subject. On the other hand, the temporal disorganization observed during amnesia may arise from the subject's failure to employ temporal cues that in fact are readily accessible to him. If that were the case, the association between temporal disorganization and posthypnotic amnesia might be simply adventitious. The essential issue is the subject's possible neglect of temporal sequence; during amnesia, can the hypnotizable subject adopt the correct temporal sequence if instructed to do so?

Data from the experiment by Kihlstrom et al. (in preparation), discussed earlier, is relevant to this issue. In the experiment the conventional version of HGSHS:A was modified, so that a second recall test of posthypnotic amnesia was interpolated between the initial standardized test and the subsequent cancellation of the amnesia suggestion and testing for recovery of memory. This interpolated amnesia test was preceded by one of four kinds of treatments. The Retest group ($N = 115$) simply received a further recall test with no further instructions; a second, Cue, group ($N = 139$) was asked to recall the suggestions in the order in which they actually occurred during the hypnotic procedure. The other groups received instructions to exert extra effort in recalling the material or to be completely candid in reporting those events that they actually remembered. The most important comparisons for present purposes pertain to the Retest and Cue groups. Table 6.8 shows the mean recall and rho scores on Test 1 and Test 2 during amnesia for those hypnotizable and insusceptible subjects who recalled at least three items on Test 1, the initial standardized test of posthypnotic amnesia.

In accordance with the results obtained in the larger combined sample discussed earlier (Sample C), the hypnotizable subjects in both conditions showed substantially lower rho scores on Test 1 than did the insusceptible subjects (Retest: $t(39) = 2.69, p < .01$; Cue: $t(37) = 1.71, p < .05$). On Test 2

TABLE 6.8
Classification of Temporal Sequencing of Recall During Two Tests of Posthypnotic Amnesia

Condition	Group	*Total N*	*Subjects with Recall ⩾ 3*	*Rho During Amnesia Test 1*	*Test 2*
Retest	Low	24	18	0.94	0.93
	High	38	23	0.62	0.71
	t			2.69**	2.71**
Cue	Low	19	16	0.87	0.96
	High	46	23	0.74	0.85
	t			1.71*	3.24**

*$p < 0.05$ **$p < 0.005$

in the Retest condition, there was essentially no change in temporal sequencing for the insusceptible subjects ($t(17) = .31$), and the increment observed in the hypnotizable subjects proved not to be significant ($t(22) = 0.01$). In the Cue condition, however, both groups of subjects responded to the instruction by showing a general increase in rho on Test 2 (insusceptible: $t(15) = 2.42$, $p < .025$; hypnotizable: $t(22) = 1.79$, $p < .05$). Despite the significant shift upward in the temporal organization of recall, however, the hypnotizable subjects continued to show a significantly lower average rho score than the insusceptible subjects ($t(37) = 3.24$, $p < .005$). In relative terms, the changes in temporal organization for the hypnotizable subjects were of the same order of magnitude. Nonparametric analysis of these data (McNemar's test of the significance of changes applied to the shifts between ordered and random rho) showed essentially the same outcome. Explicit instructions to recall the items in correct sequence did not completely rectify the temporal disorganization observed in the hypnotizable subjects' recall on the initial amnesia test. Thus, the disorganization was not a function of their simple neglect of that strategy on the earlier recall trial.

We have documented the corresponding changes in the amount of material recalled across the two tests during amnesia elsewhere (Kihlstrom et al., in preparation) and will not detail those results here. On Test 1, there was, of course, a significant deficit in memory among the hypnotizable subjects in both Retest and Cue conditions, compared to insusceptible subjects. As we have shown, the hypnotizable subjects also showed a significant decrement in the temporal organization of recall. On Test 2, there was an increase in the amount of material recalled and in the temporal organization of recall, but a relative deficit on both measures persisted among the hypnotizable subjects in both groups. For both the extent of recall and the temporal organization of recall, the improvements shown by the hypnotizable subjects on Test 2 (while the amnesia suggestion remained in effect) were not different, relatively speaking, in the Retest and Cue conditions.

It appears, then, that during amnesia, hypnotizable subjects are relatively less able to recall their experiences in correct temporal sequence than are insusceptible subjects—even when they are requested to do so. A specific instruction to recall the items in order produced no more improvement in temporal sequencing among the hypnotizable subjects than was found for their counterparts who were uninstructed. Apparently, reminders are not sufficient to produce the correct temporal order in recall. The lower rho scores of hypnotizable subjects during amnesia seem to reflect their inability to gain access to and capitalize upon temporal cues, rather than their simple neglect of them.

Temporal Sequencing After Amnesia

What happens to the temporal organization of recall after posthypnotic amnesia is lifted? If the failure observed during amnesia is due (at least in part) to the amnesic subject's inability to employ temporal cues in the organization of recall, it would seem reasonable to expect that when memory is restored after the amnesia suggestion has been canceled, the subject would organize his recall according to temporal sequence.

Some evidence from studies previously described reinforces this expectation. During the initial standardized test of posthypnotic amnesia, those subjects with random rho scores recalled significantly less critical material than did those with ordered rho; this was especially true in the hypnotizable group. Moreover, if memory testing continues during the amnesic period, an improvement in recall also appears to be accompanied by an increase in temporal sequencing. During amnesia, then, there appears to be some regular correspondence between the extent of temporal organization and the amount of material recalled.

When one examines temporal organization after amnesia has been lifted, however, our preliminary studies suggest that a somewhat different picture may emerge. The subjects in the Retest condition of the experiment by Kihlstrom et al. (in preparation) provide the most complete data in this regard. Following the completion of Test 2, the reversibility cue was administered, and yet a third recall test was conducted on which the subjects were asked again to report everything that they now remembered of the events of the hypnosis session. On this Test 3, as on the two tests administered previously to this group, nothing was said about the manner of recall. A total of 15 hypnotizable subjects showed virtually complete amnesia on Test 1; on Test 3, after amnesia was lifted, they showed a significant increment in the number of items recalled as well as a high rho score. This, of course, is as we would expect. Somewhat more troubling findings were obtained in the groups of hypnotizable and insusceptible subjects who failed to meet the criterion for complete initial amnesia. The hypnotizable subjects showed the expected significant improvement in recall after the reversibility cue was given but surprisingly showed no substantial increase in the temporal organization of recall. The insusceptible subjects, for their part, showed (as expected) no significant change in recall after the reversibility cue was administered but surprised us with a significant drop in rho. These data contrast with the data taken during amnesia and from those subjects who show a virtually complete amnesia on initial testing, by showing that after amnesia has been canceled, the amount of material recalled and the temporal organization of recall do not always correspond.

These results also contrast with those obtained in another study in which the subjects were specifically instructed, after amnesia, to recall the items in correct temporal sequence. In this experiment, 90 subjects received a slightly modified version of HGSHS:A part of a lecture-demonstration given to an introductory psychology class. As before, the usual free-recall test of initial amnesia was given; this was followed by the reversibility cue and an instruction to recall everything that the subject remembered of the hypnosis session in the exact temporal order in which it had occurred. The HGSHS:A scores for this sample were comparable to those obtained in the other studies discussed: $M = 6.56$, *SD* = 2.43. The subjects were classified as low, medium, and high in hypnotic susceptibility according to the usual criteria, and the medium subjects were excluded from further consideration. For the hypnotizable subjects who were completely amnesic on the initial amnesia test, there was substantial recovery of memory shown on the later postamnesia test; in addition, the level of temporal organization was relatively high. For the remaining subjects, who had at least some recall on the initial amnesia test, the level of temporal organization was significantly lower in the hypnotizable subjects than in the insusceptible subjects ($M = .53$ vs. .84, respectively; $t(41) = 2.68$, $p < .01$), yielding another independent replication of the findings of Evans and Kihlstrom (1973). After the amnesia suggestion was lifted (resulting in a significant increment in the amount of material recalled by the hypnotizable but not by the insusceptible subjects), both groups listed the items in correct temporal order ($M = .88$ and .90, respectively). The ability of the hypnotizable subjects to place the items in correct temporal order when specifically instructed to do so after amnesia stands in apparent contrast to their relative inability to do so when similarly instructed *during* amnesia, and to their relative failure to do so spontaneously after amnesia.

We have not yet performed a definitive study of this matter, but it appears that we must be prepared to understand the failure of hypnotizable, partially amnesic subjects to recall the events and experiences of hypnosis in correct temporal sequence once amnesia has been lifted. Clearly they are capable of doing so in response to an appropriate instruction. Moreover, postamnesia temporal sequencing is relatively high for those subjects who were completely amnesic on initial testing. We suspect that temporal organization may be an important organizational strategy only the first time that a person tries to remember a series of events such as those with which we have worked. Once this material has been retrieved from long-term memory and placed in working memory, and assuming that it is not subsequently lost from working memory, different organizational strategies—or none at all—may be employed on subsequent recall trials. Such spontaneous shifting of strategies in subjective organization is quite commonly observed in conventional free-recall experiments. Moreover, although temporal cues may be most likely to be followed during amnesia, the administration of the reversibility cue may open up other possible organizational principles. Memory traces are stored with many attributes in addition to temporal tags, and retrieval may be organized in accordance with any of them (Bower, 1967, 1970; Underwood, 1969).

A SUMMARY, SOME CONCLUSIONS, AND SOME QUESTIONS

These experiments indicate that posthypnotic amnesia involves the loss of some cues and strategies by which memory retrieval is normally structured. This is particularly the case for one of the most salient principles by which memory for a series of personal experiences is organized: the temporal relationships uniting the individual events that make up the experience as a whole. While the amnesia suggestion is in effect, subjects who have been deeply hypnotized tend not to begin at the beginning and do not follow the temporal sequence of the events as they are recounting their experiences. Their recall seems in general to be more random and haphazard with a "catch-as-catch-can" quality that is not present in the memory reports of insusceptible subjects. These latter subjects, who have not been deeply hypnotized, tend to proceed in an orderly fashion during recall, following the chronological sequence of events. This deficit in temporal organization appears to be functionally tied to posthypnotic amnesia; it is not observed if hypnotized subjects do not receive the amnesia suggestion; and although there are some things that we do not yet understand clearly enough, it appears at least that these cues are accessible to subjects after amnesia has been lifted. In general terms, moreover, temporal disorganization in retrieval shows the expected relationships with other aspects of posthypnotic amnesia such as the number of items recalled during amnesia and the recovery of additional memories after amnesia has been lifted.

These findings, in turn, are consistent with our initial hypothesis about the disruption of retrieval processes in posthypnotic amnesia—that the subject's inability to capitalize on appropriate organizational cues and strategies renders the act of remembering difficult, inefficient, and unproductive. Although for methodological reasons these studies have been carried out largely with subjects who are experiencing only partial posthypnotic amnesia, we feel confident in extending our conclusions to cover the phenomenon in general terms. Source amnesia, for example, represents an extreme instance of the loss of temporal context cues. Perhaps complete posthypnotic amnesia involves the loss of an anchor point at which to begin the process of search and retrieval, or the extreme poverty of the tags associated with memories or of the associational network uniting them.

Armed with a new theory of memory provided by laboratory investigations of normal memory processes, we feel we have made significant progress in understanding the nature of memory-retrieval processes in posthypnotic amnesia. Nevertheless, there is clearly a great deal of empirical work remaining. Several questions are raised by individual exceptions to the group trends found in our studies. Some subjects recall events in the correct temporal order, for example, but the vagueness of their initial recall and their subsequent recovery of additional memories suggest that they are nonetheless partially amnesic; in such cases, it seems likely that some other retrieval cues and strategies have been disrupted. Recently, Spanos and Bodorik (1977; Bodorik & Spanos, 1977) have shown that subjects who are partially amnesic for a word list learned during hypnosis show a disruption of the normal organization of list items by taxonomic category. They have also performed a comparable analysis of the fate of subjective organization for unrelated words, but conclusions from the study are limited by difficulties in successfully indexing superordinate units of subjective organization and other methodological matters (Spanos, Bodorik, & Shabinsky, 1977). The shift from standardized scale items to word lists as the critical material in amnesia studies entails some sacrifice in ecological validity but gives the investigator the advantage of working with material that can be easily integrated with theories of memory search and retrieval emerging from the cognitive psychology laboratory.

In addition, subjects who show clearly random temporal sequencing still, obviously, remember some events; thus we are led to inquire into organizational cues and strategies that are not disrupted. It is possible to organize material according to its emotional valence (Clemes, 1964), for example, and several studies have shown that hypnotizable and insusceptible subjects do not differ in their tendency to favor the recall of suggestions that they have successfully experienced over items that they have failed (Hilgard & Hommel, 1961; O'Connell, 1966; Pettinati & Evans, 1978). We also need to know more about the vicissitudes of organization, temporal and otherwise, after posthypnotic amnesia has been lifted.

There are other, more general questions as well. What is the mechanism by which access to memories is blocked? The amnesia suggestion may function in a manner analogous to the cue in the instructed-forgetting paradigm studied by Bjork and others (Bjork, 1972; Epstein, 1972). The concept of dissociation, as revived by Hammer (1961) and by Hilgard (1973, 1976, 1977), is clearly important in amnesia, but more work is required before this notion can be formalized. How does the reversibility signal function to restore effective retrieval? The signal may be simply another retrieval cue, more effective than temporal sequence (and other cues) because of the manner in which the critical memories have been encoded or dissociated. Nevertheless, its dramatic effects, which often approach the "involuntary remembering" portrayed by Proust in *The Remembrance of Things Past* (Salaman, 1970), make us want to examine it more closely. Finally, we want to understand more about the properties of hypnosis that make this temporary, subjectively compelling disruption of memory possible.

The disrupted-retrieval hypothesis has unresolved problems, but we think that it has fared better than other hypotheses that have been offered (Kihlstrom, 1977, 1978). We note that our account of posthypnotic amnesia is consistent with accounts that have been provided for other amnesias (including many syndromes discussed elsewhere in this volume), as well as the vagaries of memory encountered in everyday existence. We expect to learn more about posthypnotic amnesia as we continue to learn about other normal and abnormal memory processes, and we hope that the study of posthypnotic amnesia will contribute in its own way to the further development of a comprehensive theory of remembering and forgetting.

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