

# HYPNOTIC EFFECTS ON HYPERMNESIA<sup>1</sup>

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**Abstract:** The effects of hypnotic suggestions for improved memory were explored using procedures known to produce hypermnesia in the normal waking state. In Experiment 1, 64 trait adjectives were randomly assigned to orthographic, phonemic, semantic, and self-referent orienting tasks in an incidental learning paradigm. These were presented to 40 Ss classified as low, medium, high, or very high in hypnotizability, followed by a series of 3 recall trials: immediately after the study phase, following a hypnotic suggestion for enhanced memory, and after termination of hypnosis. There were significant effects of both encoding condition and repeated trials on incidental recall. However, the hypermnesia effect observed in other experiments was not obtained, and there were no memory effects attributable to hypnosis. In Experiment 2, 60 line drawings of common objects were presented to an overlapping sample of 40 Ss, followed by the same recall procedure employed in Experiment 1. There was a significant hypermnesia effect of repeated trials, but again no effects attributable to hypnosis. In Experiment 1, the hypnotic procedure seemed to interfere with the normal waking hypermnesia effect; in Experiment 2, hypnosis failed to enhance it. These results fail to support the use of hypnosis to enhance the memories of eyewitnesses in forensic investigations.

Many experienced clinicians contend that hypnosis can be effective in improving a person's memory for events experienced in the past. The technique, generically known as hypnotic hypermnesia, involves direct suggestion for enhanced memory, sometimes combined with suggestions for age regression—a return, in imagination, to the time and place of the target event. It was employed by Breuer and Freud to recover traumatic memories in hysterical patients, and age regression was used in both world wars as an adjunct to brief hypnotherapy for war neurosis. More recently, there has been a dramatic increase in the use of hypnosis to improve the memories of witnesses, victims, suspects, and defendants in forensic situations. These cases, some of which have made national headlines, have stimulated a fair amount of inquiry into the effectiveness of hypnosis in improving memory.

Manuscript submitted November 2, 1984; final revision received February 10, 1986.

<sup>1</sup>This research was supported in part by Grant MH-35856 from the National Institute of Mental Health, United States Public Health Service.

<sup>2</sup>We thank William Heindel, Irene P. Hoyt, Stanley Klein, Ernest F. Mross, Paula Neidenthal, Jeanne Sumi Albright, and Leanne Wilson for assistance in conducting the experiments and comments during the preparation of this paper.

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Despite the increasing use of hypnotic hypermnesia in investigative settings, relatively few case reports have been published, and few of these have been subjected to peer review. Occasional reports of individual cases (Hull, 1933; Kroger & Douc e, 1979; Raginsky, 1969) leave little doubt that hypermnesia suggestions are sometimes associated with improvements in recollection, but they do not shed much light on the generality with which the technique may be applied in the population at large or the mechanisms mediating the effect.

Of somewhat greater interest is a report by Dorcus (1960) of eight cases, including both successes and failures. Hypnosis was unsuccessful in improving memory in any of four cases involving misplaced possessions, but two of these losses may not have been noticed by the individuals involved at the time they occurred, and a third may have involved malingering. In four criminal investigations, where there was reason to believe that the relevant memories had been adequately encoded and the individuals were appropriately motivated for the memory task, hypnosis was successful in three of the cases (accuracy was verified by subsequent police investigation). Sloane (1981), working with actual witnesses and victims interrogated at the Los Angeles Police Department, however, found no increments in either accurate or false recollection following hypnosis and suggestions for enhanced memory.

Laboratory studies of hypermnesia have a history extending back to the beginnings of the modern period of hypnosis research. For example, Young (1925) taught his Ss lists of nonsense syllables in the normal waking state, and then subsequently tested recall in the waking state and hypnosis. On each trial Ss were motivated for maximal recall, but there was no advantage found for hypnosis over the waking test. Later experiments involving nonsense syllables also failed to find any effect of hypnosis (Baker, Haynes, & Patrick, 1983; Barber & Calverley, 1966; Huse, 1930; Mitchell, 1932). On the other hand, studies employing meaningful prose and poetry, filmed material, and real-world memories have often shown some hypermnesia effects (DePiano & Salzberg, 1981; Hoffing, Heyl, & Wright, 1971; Reiff & Scheerer, 1959; Timm, 1981; Young, 1926; but see O'Connell, Shor, & M. T. Orne, 1970).

Most convincing in this regard are those studies in which nonsense and meaningful material have been tested in the same Ss. In the first study of this type (White, Fox, & Harris, 1940), hypnotic suggestions for hypermnesia resulted in striking improvements in memory for scenes from a motion picture travelogue and lines of poetry, but not for nonsense syllables. Similar results have been obtained in comparisons of nonsense syllables with poetry (Rosenthal, 1944) and prose (Dhanens & Lundy, 1975). It is also clear, however, that any increase in valid memory may be accompanied by a corresponding increase in false recollection. Stalnaker and Riddle (1932), for example, tested college students on their recollections for prose passages and verse that had been committed to memory (typically as part of a scholastic assignment) at least 1 year previously.

Hypnotic suggestions for hypermnesia resulted in a significant enhancement over waking recall, although there was also a substantial increase in confabulation. The result was that overall memory accuracy was very poor, although Ss were apparently willing to accept their reproductions as reasonable facsimiles of the originals.

More recent studies of hypnotic hypermnesia have been careful to take account of both accurate and false recollections produced by Ss. For example, Dywan and Bowers (1983) found that hypnotic testing led to an increase in both accurate and incorrect recall for pictorial material, and that both effects were correlated with hypnotizability. The Ss were equally confident that both classes of memories were correct. This suggests that hypnosis increases the productivity of memory reports, and S's willingness to accept a memory as an accurate representation of prior experience, but does not increase accurate memory per se.

Nogrady, McConkey, and Perry, (1985) performed a similar experiment, and found that both correct and false recall increased over trials, but there were no effects of hypnotizability. The performance of Ss given hypnotic suggestions for hypermnesia did not differ from that of un hypnotized Ss given imagination instructions, or of untreated controls. Over trials, Ss became more confident that their false recollections were in fact correct. This effect was greatest for those Ss of high hypnotizability and was confined to the hypnosis condition (see also, Shields & Knox, 1986).

Geiselman, Fisher, MacKinnon, and Holland (1985) employed very lifelike police training films as stimuli, and they included a condition in which un hypnotized Ss were administered a "cognitive interview" technique employing various mnemonic strategies. Compared to an initial baseline, Ss in both the hypnotic and mnemonic groups showed greater improvement in memory than controls, although these groups did not differ from each other. In contrast to the previous studies, there were no group differences in the occurrence of false recollection.<sup>4</sup>

While the literature on the effectiveness of hypnotic hypermnesia is equivocal at best (Kihlstrom, 1982, 1985; Smith, 1983), it is clear that certain procedures can improve memory in the normal waking state. It has long been known that a single test of recall does not necessarily retrieve all items that are available in memory. For example, memory typically (Tulving & Pearlstone, 1966)—but not always (Tulving & Thomson, 1973)—improves when richer, more informative retrieval cues are provided to S in the form of cued recall or recognition procedures. Even without a change in the type of test, recall of individual items can be improved by instructing Ss to take a different perspective on the critical material (e.g., Anderson & Pichert, 1978; Black, Turner, & Bower, 1979). More to the point, perhaps, Ss given repeated recall trials with no inter-

<sup>4</sup>The occurrence of memory distortion may be increased if leading questions are delivered while S is hypnotized (Putnam, 1979; Sanders & Simmons, 1983; Zelig & Beidelman, 1981; but see Sheehan & Tilden, 1983, 1984). Confabulated memories produced by hypnotic procedures can be unshakable in the normal waking state (Laurence & Perry, 1983).

vening instructions typically remember on later trials items that appeared to be forgotten on earlier ones. In many experiments, these items are exchanged for others that are recalled on earlier trials but forgotten on later ones, so that the level of trial-to-trial recall remains constant (Tulving, 1967; Waldfoegel, 1948).

Under other circumstances, however, intertrial recovery can exceed intertrial forgetting, resulting in a net improvement in memory over time (Ballard, 1913). Such reminiscence effects proved difficult to replicate (Ammons & Irion, 1954; Buxton, 1943; McGeoch, 1935), until Erdelyi and his colleagues introduced a paradigm that produces the effect (called "hypermnesia" by them) reliably — at least for pictorial material (e.g., Erdelyi & Becker, 1974; Erdelyi & Kleinbard, 1978; Erdelyi & Stein, 1981). The mechanisms underlying the effect remain controversial (Erdelyi, 1982; Madigan, 1976; Madigan & Lawrence, 1980; Roediger, 1982; Roediger & Payne, 1982; Roediger, Payne, Gillespie, & Lean, 1982; for a review, see Payne, 1987).

In the present context, however, the critical fact is that waking hypermnesia provides a baseline against which the effects of hypnosis can be assessed. The importance of such a baseline is underscored by a study by Cooper and London (1973), in which Ss attempted to remember details from a prose passage concerning a rare chemical. In contrast to most other studies, in which (following standard forensic procedures) the hypnotic test follows the waking test, these investigators employed a within-Ss design with counterbalanced order of testing. There were no effects of hypnosis on recall, although there was a significant effect of trials, such that recall improved on the second trial regardless of whether hypnosis had been induced, or whether S was hypnotizable. Similarly, Nogrady et al. (1985) found that memory improved across a series of recall trials regardless of whether hypnotic suggestions for hypermnesia were given, and regardless of S's hypnotizability.

In the experiments reported here, conducted independently of the studies by Dywan and Bowers (1983), Nogrady et al. (1985), and Shields and Knox (1986), hypnotic suggestions for hypermnesia were embedded in procedures known to produce linear increments in memory in the normal waking state. Experiment 1 involved incidental memory for words; Experiment 2 involved intentional memory for pictorial material. The Ss were stratified according to individual differences in hypnotizability and studied the critical material in the normal waking state. Following an initial test of recall, a hypnotic induction was administered and a second test of recall was given following a suggestion for hypermnesia; a third recall test was administered after hypnosis was terminated.

The experiments employed a stratified sample design similar to that used to document the effect of other hypnotic suggestions (Hilgard, 1965). On logical grounds, any specific effect of hypnosis must be correlated with S's ability to experience the effects of hypnotic suggestion. Research in other domains, such as analgesia (Hilgard, 1969) and amnesia (Kihlstrom, 1980) has shown a linear relation between hypnotizability and response

to hypnotic suggestions. Therefore, a specific effect of hypnosis on hypermnesia would be observed in an interaction between hypnotizability and recall trials. Although memory would be expected to improve across trials due to normal hypermnesia effects, greater improvement in memory, during and after hypnosis, should be observed in the most highly hypnotizable Ss. Unhypnotizable Ss, who do not respond positively to hypnotic suggestions, should show the least improvement.

### EXPERIMENT 1

Although experiments employing verbal materials do not reliably produce hypermnesia effects in the normal waking state (e.g., Erdelyi & Becker, 1974), some success in producing hypermnesia has been obtained in studies in which the words were recoded into images (Erdelyi, Finkelstein, Herrell, Miller, & Thomas, 1976; for a review, see Erdelyi, 1984; Payne, 1987; Roediger & Payne, 1985) or were generated by S in response to riddles (Erdelyi, Buschke, & Finkelstein, 1977). These findings suggest that hypermnesia is related to the depth or elaboration of processing received by the item at the time of encoding ( Craik & Lockhart, 1972). Although Roediger et al. (1982) failed to find a differential effect on hypermnesia of orthographic, phonemic, and semantic orienting tasks in the conventional depth of processing paradigm, Belmore (1981) reported significant hypermnesia in conditions using more complex semantic tasks. Most recently, hypermnesia has been obtained for items studied in a self-referent orienting task (Rogers, 1977) thought to yield especially rich and elaborate encodings (Klein & Kihlstrom<sup>5</sup>; Mross & Kihlstrom<sup>6</sup>). The present experiment employed words studied under orthographic, phonemic, semantic, and self-referent orienting conditions. Because field applications of hypnotic hypermnesia rarely seek information that has been intentionally committed to memory, the stimuli were presented under incidental learning conditions. Baker et al. (1983) failed to find any effect of hypnosis on incidental memory for objects pictured in a visual array.

### METHOD

#### *Subjects*

The 40 Ss participating in this study had earlier received the group-administered Harvard Group Scale of Hypnotic Susceptibility, Form A (HGSHS:A) of Shor and E. Orne (1962) followed by the individually administered Stanford Hypnotic Susceptibility Scale, Form C (SHSS:C) of Weitzenhoffer and Hilgard (1962). On the basis of SHSS:C scores, Ss were classified as low (0-4), medium (5-7), medium-high (8-10), or very high (11-12) in hypnotizability. The Ss were paid \$4.00 for their participation in the experiment, which lasted approximately 45 minutes. When Ss were recruited for the experiment, they were informed that the study was concerned with hypnosis and language processing.

<sup>5</sup>Klein, S., & Kihlstrom, J. F. Orienting tasks, retrieval cues, and the self-reference effect on memory. Unpublished manuscript, University of Wisconsin, Department of Psychology, 1985.

<sup>6</sup>Mross, E. F., & Kihlstrom, J. F. Levels of processing and levels of recall in hypermnesia. Unpublished manuscript, University of Wisconsin, Department of Psychology, 1985.

### Materials

A list of 64 trait adjectives was prepared, consisting of 32 socially desirable (e.g., "considerate," "intelligent," "witty"), and 32 undesirable characteristics (e.g., "conceited," "lazy," "selfish"). Words were assigned randomly to each of four encoding conditions: (a) orthographic ("is this word in capital letters?"); (b) phonemic ("Does this word rhyme with . . .?"); (c) semantic ("Does this word mean the same as . . .?"); (d) self-referent ("Does this word describe you?"). A different randomization was used for each S.

### Procedure

During the judgment task, Ss were seated at a TRS-80 Model IV micro-computer, which presented stimuli and recorded responses and reaction times. Prior to beginning, Ss were told that both accuracy and speed in answering the questions was important. Shortly after completing the task, Ss were surprised with a 5-minute free-recall test for the words about which they had made judgments. The Ss then received the induction procedure of SHSS:C, and subjectively rated their "depth" of hypnosis on a 0-10 scale. This constituted a sort of manipulation check, to insure that all Ss felt that they had become hypnotized. Then they received the suggestion for enhanced memory:

Now just keep your eyes closed and continue to be deeply relaxed, but listen carefully to what I am saying. As you know, sometimes things are very hard to remember, but if you make a special effort, you can usually remember them. Perhaps you didn't know that a person can usually remember past events much better under hypnosis than in the waking state — in fact, can have total memory for things previously forgotten. Now I want you to think about when you were at the computer before. Following a question you saw a word. . . . Imagine yourself being right back there now — put yourself right back there. I'm going to count to 5, and at "5" you're going to be able to remember the words you saw on the screen very clearly. You'll be able to remember the words easily. One . . . you're going to remember quite clearly, all of the words you saw. . . . Two . . . the words are beginning to come back to you now . . . coming back . . . more and more. . . . Three . . . you're remembering more of the words now. . . . Four . . . you can almost remember all of the words. . . . Five . . . now you remember all the words. All right, now tell me the words — just tell me all the words you remember.

After a second 5-minute recall period, Ss gave a second hypnotic depth rating. After termination of hypnosis Ss received a final 5-minute waking free-recall trial. No special instructions preceded this test. On all three trials Ss were encouraged to be accurate and to avoid repetitions. Finally, Ss were debriefed and dismissed.

### RESULTS

Table 1 presents the average number of items recalled on each trial for each of the encoding conditions by Ss in each of the four hypnotizability groups. A  $4 \times 4 \times 3$  mixed design ANOVA with one between-Ss factor (levels of hypnotizability) and two within-Ss factors (encoding condition and recall trials) revealed significant main effects for encoding condition ( $F = 68.82$ ,  $df = 3, 108$ ;  $p < .001$ ) and for trials ( $F = 4.95$ ,  $df = 2, 72$ ;  $p$

TABLE 1  
MEAN NUMBER OF WORDS RECALLED PER TRIAL IN EACH ENCODING CONDITION  
EXPERIMENT I

Encoding Condition	Trial	Level of Hypnotizability <sup>a</sup>				Mean Across Groups
		Low	Medium	Medium-High	Very High	
Orthographic	1	1.10	.90	.50	.90	.85
	2	.90	.70	.80	.40	.70
	3	.70	1.20	.70	1.10	.93
Phonemic	1	.70	1.20	1.00	1.15	1.01
	2	.90	1.10	1.10	1.90	1.25
	3	.80	1.20	1.10	1.70	1.20
Semantic	1	1.60	1.40	2.00	1.40	1.60
	2	1.40	1.50	1.00	1.00	1.23
	3	1.30	1.50	1.50	1.20	1.38
Self-referent	1	3.40	4.60	4.10	4.60	4.18
	2	2.80	3.40	4.30	3.60	3.53
	3	3.40	4.40	4.80	4.80	4.35

<sup>a</sup>N = 10 Ss per group.

< .01). As is commonly found in this incidental memory paradigm, retention levels as measured by free recall were quite low. As in the previous studies, however, recall was greatest for items subject to self-referent encoding. Recall *decreased* from Trial 1 (overall  $\bar{X} = 7.64$ ) to Trial 2 ( $\bar{X} = 6.86$ ), however, although recall did improve somewhat on Trial 3 ( $\bar{X} = 8.26$ ). This is in contrast to other studies (Klein & Kihlstrom<sup>7</sup>; Mross & Kihlstrom<sup>8</sup>) which have shown a significant increment in memory across trials. There was a significant interaction between encoding condition and recall trials ( $F = 3.04$ ,  $df = 6, 216$ ;  $p < .01$ ), such that the diminution of recall on Trial 2 was greatest, and the recovery of memory on Trial 3 was least, for items encoded in the semantic condition. This is also in contrast to the previous studies, which found the greatest *improvement* in memory across trials for items encoded in the self-referent condition. There was no main effect of hypnotizability ( $F < 1$ ); nor were there any interactions between hypnotizability and either encoding condition or trials (both  $F < 1$ ). The three-way interaction was not significant ( $F = 1.07$ ,  $df = 18, 216$ ; n.s.).<sup>9</sup> Thus, the suggestion for hypermnesia had no positive effect on recall. If anything, administration of the hypnotic procedure *diminished* recall and abolished the usual waking hypermnesia effect.

#### Analysis of False Recall

An analysis of intrusions was also planned. In fact, two different types of intrusions were observed in this experiment.

In addition to the 64 items targeted for the analysis, an additional 4 items had been presented at the beginning of the judgment task as practice items, and yet another set of 4 items were presented at the end of

<sup>7</sup>See footnote 5.

<sup>8</sup>See footnote 6.

<sup>9</sup>A  $4 \times 4 \times 3$  ANCOVA utilizing reaction time during the orienting task as a covariate did not change the results.

the task as buffer items to consume primary memory. Within each set of 4 buffer items, one word was presented in each judgment condition. The rate of recall of these 8 items averaged 3.4 per trial, collapsed across encoding conditions. A  $4 \times 3$  mixed-design ANOVA yielded no significant effect across trials, or for hypnotizability (both  $F < 1$ ).

Extralist intrusions were represented by items appearing in Ss' recall lists but which had not been presented at any point during the encoding phase. The rate of such errors was quite low (averaging 1.7 per trial), so the data were again collapsed across encoding conditions. Again, a  $4 \times 3$  mixed-design ANOVA yielded no effects across trials, or for hypnotizability (both  $F < 1$ ).

## EXPERIMENT 2

In Experiment 1, a procedure known to produce hypermnesia in the normal waking state failed to show the effect when hypnotic suggestions were interpolated in the series of retention tests. This finding, however, is difficult to interpret because hypermnesia in wordlists is weak and somewhat unreliable (Erdelyi, 1984). Therefore, a second experiment was conducted employing a procedure which more reliably results in hypermnesia. This experiment involves intentional memory for line drawings of common objects (Erdelyi & Becker, 1974; Erdelyi et al., 1976, 1977; Erdelyi & Kleinbard, 1978; Erdelyi & Stein, 1981; Madigan, 1976; Madigan & Lawrence, 1980; Roediger & Payne, 1982; Roediger & Thorpe, 1978; Shapiro & Erdelyi, 1974; Yarmey, 1976; for a review, see Payne, 1987).

## METHOD

### *Subjects*

The Ss were selected according to the same procedures employed in Experiment 1, with 10 Ss in each of four levels of hypnotizability as assessed by HGSHS:A and SHSS:C. The Ss were paid \$4.00 for their participation in the experiment, which lasted approximately 45 minutes. When Ss were recruited for the experiment, they were informed that the study was concerned with hypnosis and memory for pictures. A total of 24 Ss had previously participated in Experiment 1.

### *Materials*

A series of 60 slides prepared by Erdelyi and Becker (1974) served as stimulus materials. Each consisted of a simple line drawing depicting a common object (i.e., chair, book, toaster, flower, etc.). Half the Ss in each hypnotizability group received one of two randomizations of the slides.

### *Procedure*

The Ss were tested individually, seated in front of a Kodak 460 Ektagraphic audioviewer, which automatically controlled the stimulus presentations. The Ss were given 4 seconds to view each slide and named the objects while *E* took dictation. The Ss were informed in advance that they would be asked to recall the objects pictured. Shortly after completing this task, Ss were given a 7-minute free-recall test for the pictures as they had named them. The Ss then received the induction procedure of SHSS:C.



TABLE 2  
MEAN NUMBER OF PICTURES RECALLED PER TRIAL  
EXPERIMENT 2

Trial	Level of Hypnotizability <sup>a</sup>								All Groups $\bar{X}$
	Low		Medium		Medium-High		Very High		
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	
Trial 1: correct	29.80	6.32	31.40	5.56	30.10	5.74	30.60	3.72	30.48
errors	0	0	0	0	.10	.32	.10	.32	
Trial 2: correct	32.80	4.57	34.20	6.63	32.80	5.65	36.30	3.09	34.03
errors	.10	.32	0	0	.10	.32	.10	.32	
Trial 3: correct	33.90	6.67	36.50	5.10	34.00	7.12	37.20	5.77	35.40
errors	.10	.32	0	0	.10	.32	0	0	

<sup>a</sup>N = 10 Ss per group.

As in Experiment 1, Ss received specific suggestions for enhanced memory for the pictures they had seen on the slides. Following a second 7-minute free-recall period, Ss again gave a hypnotic depth rating. After termination of hypnosis, Ss received a final 7-minute waking free-recall trial. No special instructions preceded this test. On all trials Ss were encouraged to be accurate and to avoid repetitions. The Ss were then debriefed and dismissed.

### RESULTS

Table 2 presents the number of pictures recalled on each of the three trials in each of the hypnotizability subgroups. A  $4 \times 3$  mixed design ANOVA with one between-Ss factor (hypnotizability) and one within-Ss factor (repeated recall tests) yielded a significant main effect of repeated trials ( $F = 38$ ,  $df = 2, 36$ ;  $p < .001$ ). There was no main effect of hypnotizability ( $F < 1$ ); nor was there a significant interaction between hypnotizability and trials ( $F < 1$ ). Memory for the pictures grew significantly over three recall trials without any further opportunity to study the material, thus replicating the effect obtained by Erdelyi and others. The presence of hypnosis on the second of these trials had no effect on this pattern. This was true even when the analysis was repeated on subgroups drawn from the extremes of the distribution of hypnotizability.<sup>10</sup>

#### *Intertrial Recovery and Intertrial Forgetting*

The fact that recall increased over trials indicated that intertrial recovery of forgotten items exceeded intertrial forgetting of remembered items. It is possible that hypnosis had differential effects on intertrial recovery and forgetting that might have been obscured by the overall analysis described above. Accordingly, in a further analysis, the 60 critical items were coded in terms of their recall status (N = not recalled, C = correctly recalled) on each of the three memory tests administered to Ss. There are

<sup>10</sup>Because some Ss in Experiment 2 had previously participated in Experiment 1, a  $4 \times 3 \times 2$  (Hypnotizability  $\times$  Trials  $\times$  Groups) mixed-design ANOVA was performed in order to be certain that there were no differences in performance between those Ss who had participated in Experiment 1 ( $N = 24$ ), and those who had not ( $N = 16$ ). The analysis revealed no main effects and no interactions, and this aspect of the results is not further considered in the data analysis.

TABLE 3  
GROUP MEANS FOR VARIOUS MEASUREMENT METHODS FOR PICTURE HYPERMNESIA  
EXPERIMENT 2

Number of Items recalled	Level of Hypnotizability <sup>a</sup>							
	Low		Medium		Medium-High		Very High	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
Condition <sup>b</sup> : CCC	23.50	5.58	24.80	7.55	25.10	6.47	25.40	4.03
NNN	20.00	5.40	18.10	4.61	21.30	5.40	17.00	3.65
NCC	5.10	2.64	6.00	2.91	4.40	1.90	6.70	2.67
NNC	3.10	2.13	3.40	2.99	2.70	1.57	3.70	1.25
CNN	1.90	.99	2.00	1.83	1.40	1.78	1.60	1.07
CCN	2.30	2.00	2.30	1.06	1.80	1.62	2.20	1.62
NCN	2.00	2.36	1.10	1.10	1.50	1.43	2.00	2.26
CNC	2.10	1.60	2.30	1.83	1.80	1.23	1.40	1.26

<sup>a</sup>N = 10 Ss per group.

<sup>b</sup>CCC = Items consistently recalled on all three trials; NNN = Items consistently forgotten; NCC = Items initially forgotten, recovered in hypnosis and retained in subsequent waking state; NNC = Items recovered only on the final waking trial, posthypnotically and reflect the delayed effects of hypnotic suggestion; CNN = Items which were successfully recalled on the first trial, but forgotten during and after hypnosis; CCN = Items which were successfully recalled before and during hypnosis, but forgotten posthypnotically; NCN = Items which were recovered during hypnosis, but forgotten again on the subsequent waking trial; and CNC = Items which were forgotten during hypnosis, but remembered on the adjacent trials, and reflect the detrimental effects of hypnosis on memory.

eight ( $2^3$ ) possible permutations of such items. Cell means for all combinations are presented in Table 3.

Intertrial recovery is represented by two categories of items: NCC, items initially forgotten, recovered in hypnosis, and retained in the subsequent waking state; and NNC, items recovered only on the final waking trial, posthypnotically. Thus, NCC items reflect the immediate effects of the hypnotic suggestion, while NNC items reflect its delayed effects. One-way ANOVAs revealed no effect of hypnotizability on either type of item (NCC,  $F = 1.55$ ,  $df = 3,36$ ; n.s.; NNC,  $F < 1$ ).

Two other categories represent intertrial forgetting. Items bearing the code CNN were successfully recalled on the first trial, but forgotten during and after hypnosis. Similarly, items bearing the code CCN were successfully recalled before and during hypnosis, but forgotten posthypnotically. One-way ANOVAs again indicate no effect of hypnotizability (both  $F < 1$ ).

Another two categories represent intertrial fluctuations in memory. Items bearing the code NCN were recovered during hypnosis, but forgotten again on the subsequent waking trial; they are of special interest because they reflect recovery that is specific to hypnosis, and does not carry over to the subsequent waking state. Items bearing the code CNC were forgotten during hypnosis but remembered on the adjacent waking trials, and reflect the detrimental effects of hypnosis on memory. Again, one-way ANOVAs showed no effect of hypnotizability for either pattern (both  $F < 1$ ).

Finally, items bearing the code CCC were consistently recalled on all three trials, while those bearing the code NNN were consistently forgotten. These items are of interest because they reflect individual differences in normal waking memory that may be related to hypnosis. Consistent with other evidence (Kihlstrom & Twersky, 1978), separate one-way ANOVAs showed no effect of hypnotizability on the frequency of either type of item (CCC,  $F < 1$ ; NNN,  $F = 1.59$ ,  $df = 3,36$ ; n.s.).

Hypnosis had no differential effect on memory in this experiment, whether these effects were measured in terms of intertrial recovery or intertrial forgetting—and there was no state-dependent effect of hypnosis on hypermnesia. While hypermnesia occurred, as predicted, hypnosis had no effect on the phenomenon either during the time hypnosis was in effect, or following its termination.

#### *Analysis of False Recall*

Corresponding analyses of extralist intrusions had been planned. The rate of such false recollections was a too low (averaging .10, or less per trial), however, to permit meaningful analysis.

#### GENERAL DISCUSSION

The present study concerned the effect of hypnotic suggestions on hypermnesia for words presented under conditions of incidental learning (Experiment 1) and for pictures studied under conditions of intentional learning (Experiment 2). Experiment 1 failed to produce a hypermnesia effect; in fact, recall *decreased* on the second trial, after hypnosis was induced, though these memories were recovered on a subsequent waking recall trial (for contrary findings, see Shields & Knox, 1986). This loss of memory was not a specific effect of hypnosis, because the extent of loss was not associated with S's hypnotizability. Experiment 2 succeeded in producing hypermnesia, but the effect was not a function of hypnotizability. These findings are consistent with those of Nogrady et al. (1985). Apparently hypnosis does not enhance waking hypermnesia effects.

Dywan and Bowers (1983), who also embedded hypnosis in the waking hypermnesia paradigm, obtained somewhat different results. They observed a significant improvement in memory in hypnosis over and above what had been produced by waking hypermnesia. Moreover, they observed a significant increase in false recall on the hypnotic trial. These differences may have been due to the instructions given to Ss. Following the forced-recall procedure employed by Erdelyi and Becker (1974), Dywan and Bowers (1983) required their Ss to produce 60 items (the number of stimuli that had been presented during the study phase), even if they had to guess or respond randomly in order to do so. By contrast, neither Experiment 2 nor that of Nogrady et al. (1985) employed this forced-recall procedure. In addition, the instructions in Experiment 2 stressed accuracy in recall.

The implication of these three studies taken together is that there is a high correlation between two products of hypnotic hypermnesia: any increase in accurate recall resulting from hypnotic procedures may be offset by a corresponding increase in false recollections. When Ss are not

urged to produce more or new memories, hypnosis may not increase false recollection, but it will not increase accurate recall either. When hypnotized Ss are strongly encouraged to guess, as in Dywan and Bowers (1983), or in forensic situations, they may improve their levels of accurate recall, but this will be at the price of an increase in false recall. In fact, a study of normal waking memory by Roediger and Payne (1985) found that forced-recall instructions — in which Ss were asked to guess after they had exhausted their confident recall — increased intrusions tenfold over a condition in which Ss were warned “not to guess wildly [p. 4]” — although there were no differences in correct recall. Although Roediger and Payne did not collect confidence ratings, we can assume that their Ss were able to distinguish between wild guesses and accurate memories (Johnson, 1985). Hypnotized Ss, however, appear to be poor at making this distinction (Dywan & Bowers, 1983; Nogrady et al., 1985).

In the final analysis, hypnosis may encourage Ss to guess, but it does not appear to improve memory per se. Interestingly, hypnotized Ss do not seem to realize that they are guessing. Overall, their confidence levels tend to increase with no corresponding increase in accuracy (Dywan & Bowers, 1983; Nogrady et al., 1985). These Ss appear to confuse memories of prior guesses with those of the actual experience. For this reason, although cautionary instructions are likely to yield nothing new, instructions to guess are much more likely to produce misleading results when given to hypnotized individuals. This suggests that hypnosis is an unreliable technique for enhancing memory, and it should be used in forensic and other applied settings only with the utmost caution (for some guidelines see American Medical Association, 1985; M. T. Orne, 1979; M. T. Orne, Soskis, Dinges, & E. C. Orne, 1984). Other psychological techniques for improving memory may not possess these liabilities, and they may prove more suitable for use in field settings (Geiselman et al., 1985).

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### Hypnotische Effekte auf Hypermnesie

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Abstrakt: Man untersuchte die Effekte der hypnotischen Suggestion für ein gesteigertes Erinnerungsvermögen, indem man Verfahren benutzte, von denen bekannt ist, daß sie Hypermnesie im normalen Wachzustand erzeugen. In Experiment 1 wurden in einem detaillierten Erlernungsparadigma 64 Eigenschaftsadjektive wahllos orthographischen, phonematischen, semantischen und selbst-bezüglichen Orientierungsaufgaben zugeteilt. Diese wurden 40 Vpn. geboten, die in Hypnotisierbarkeit als schwach, mäßig, hoch oder sehr hoch klassifiziert worden waren, worauf eine Serie von 3 Rückrufsversuchen folgte: sofort nach der Studienphase, einer Hypnosesuggestion für verstärktes Erinnerungsvermögen folgend und nach Beendigung der Hypnose. Es zeigten sich bedeutende Effekte auf die chiffrierte Kondition sowie auf wiederholte Versuche auf detaillierten Rückruf. Jedoch wurde der in andern Experimenten beobachtete Hypermnesieeffekt nicht erhalten. In Experiment 2 wurden Zeichnungen von gewöhnlichen Objekten einem sich überlagernden Muster von 40 Vpn. präsentiert, worauf dasselbe Rückrufverfahren folgte, das in Experiment 1 benutzt worden war. Es zeigte sich ein bedeutender Hypermnesieeffekt bei wiederholten Versuchen, doch wieder kein Effekt, den man Hypnose zuschreiben könnte. In Experiment 1 schien das Hypnoseverfahren den Hypermnesieeffekt im normalen Wachzustand zu stören; in Experiment 2 verfehlte die Hypnose, es zu verstärken. Diese Resultate versagten in der Unterstützung der Hypnoseanwendung zur Verstärkung des Erinnerungsvermögens bei Zeugen in gerichtlichen Investigationen.

### Les effets de l'hypnose sur l'hypermnésie

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Résumé: Les effets de suggestions hypnotiques pour améliorer la mémorisation sont étudiés en utilisant des procédures reconnues pour produire l'hypermnésie durant l'état normal d'éveil. Dans l'expérience 1, 64 adjectifs ont été regroupés aléatoirement dans 4 types de tâches différents: orthographique, phonique, sémantique et auto-descriptive. Ces adjectifs ont été présentés selon une stratégie d'apprentissage fortuite. Les mots représentés à 40 sujets classifiés ainsi: faiblement hypnotisable, moyennement hypnotisable, fortement hypnotisable ou très fortement hypnotisable. Après la présentation, une

série de 3 essais de rappel a été effectuée: une immédiatement après la phase d'apprentissage, une autre après des suggestions hypnotiques d'amélioration de la mémoire, et enfin à la fin de l'hypnose. Les conditions d'encodages et d'essais répétés ont toutes les deux amené des effets significatifs sur le rappel fortuit. Toutefois, l'effet d'hypermnésie observé dans d'autres expériences n'a pas été obtenu. De plus, l'hypnose n'a pas eu d'effet sur la mémoire. L'expérience 2, 60 lignes de dessins d'objets communs ont été présentés à 40 sujets dont certains provenaient de la première expérience. La procédure de rappel utilisée a été la même que dans l'expérience 1. La répétition des essais a amené un effet significatif d'hypermnésie mais à nouveau aucun effet n'est attribuable à l'hypnose. Dans l'expérience 1, la procédure hypnotique a semblé interférer avec l'hypermnésie qu'on retrouve dans l'état normal d'éveil. Dans l'expérience 2, l'hypnose n'a pas réussi à améliorer l'effet d'hypermnésie. Ces résultats n'ont pas de support quant à l'usage de l'hypnose dans le but d'améliorer le rappel d'événements par des témoins dans le cadre d'investigations légales.

### Efectos hipnóticos sobre la hipermnesia

Patricia A. Register y John F. Kihllstrom

Resumen: Se exploraron los efectos de las sugerencias hipnóticas para mejorar la memoria mediante el uso de procedimientos conocidos por producir hipermnesia en el estado de vigilia. En el Experimento 1, se asignaron al azar 64 adjetivos que denotaban rasgos (deseables y no deseables) a tareas de tipo ortográfico, fonético, semántico y autoreferente en un paradigma de aprendizaje contingente. Esto fue presentado a 40 sujetos clasificados como de baja, media, alta o muy alta sugestibilidad hipnótica, seguido por una serie de 3 ensayos de recuerdos: inmediatamente después de la etapa de estudio, subsiguiente a una sugestión hipnótica para mejorar la memoria y luego de finalizada la hipnosis. Se hallaron efectos significativos en el recuerdo incidental, en ambos casos, en las tareas y en los ensayos de recuerdos. Sin embargo, no se obtuvo el efecto hipermnésico observado en otros experimentos y no hubo efectos en la memoria atribuibles a la hipnosis. En el Experimento 2, se presentaron 60 dibujos lineales de objetos comunes a una muestra de 40 sujetos, clasificados según su grado de sugestibilidad, como en el Experimento 1, a los que luego se aplicó el mismo procedimiento de recuerdo que a los del Experimento 1. Se encontró un efecto hipermnésico significativo en los ensayos, pero nuevamente no hubo efectos atribuibles a la hipnosis. En el Experimento 1, el procedimiento hipnótico pareció interferir con el efecto normal de hipermnesia de la vigilia. En el Experimento 2, la hipnosis no mejoró la hipermnesia. Estos resultados no apoyan el uso de la hipnosis para mejorar la memoria de testigos oculares en el caso de investigaciones forenses.