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Hypnotizability, Preference for an
Imagic Cognitive Style, and
Pseudo-Memory Creation in Hypnosis

Louise Labelle

A Thesis

in

The Department

of

Psychology

Presented in Partial Fulfillment of the Requirements
for the Degree of Master of Arts at
Concordia University
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ABSTRACT

Hypnotizability, Preference for an Imagic Cognitive Style, and Pseudo-Memory Creation in Hypnosis

Louise Labelle

The present study sought to replicate and extend Laurence and Perry's (1983) finding that it is possible to modify a person's memory of a specific event with the use of hypnosis. Subjects of high, high-medium and low hypnotic susceptibility were compared on their responses to a hypnotic pseudo-memory suggestion. The study also examined the relation between non hypnotic measures and response to the suggestion. Subjects completed three questionnaires measuring: preference for an imagic style of thinking, absorption, and degree of involvement in "hypnotic-like" experiences. Results showed that 45.45% of high and 46.15% of high-medium susceptible subjects gave evidence of incorporating the suggested memory. By contrast, none of the low susceptible subjects experienced memory distortions. Importantly, the combination of hypnotic susceptibility and preference for an imagic cognitive style was found to be a stronger predictor of pseudo-memory creation than either of these factors considered in isolation. The relevance of these findings to forensic and clinical settings, and their bearing on the reality monitoring model proposed by Johnson and Raye (1981) are discussed.

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In recent years there has been an upsurge in the use of hypnosis by police authorities as an aid to "refreshing" the memories of witnesses and/or victims of crime. Parallel to this trend has been the extensive study, in the laboratory, of the effects of hypnosis on memory. Despite the enthusiasm shown by police officials many of whom view memory as a giant video-tape recording apparatus and hypnosis as an effective tool in retrieving previously forgotten memories (Arons, 1967; Reiser, 1980) researchers have failed consistently to support these contentions. By contrast, it has been repeatedly shown that hypnosis can lead to confabulated and "pseudo" memories above and beyond any memory enhancement that may occur. Further, and this is perhaps one of the most robust findings in hypnosis research, hypnosis increases subjects' confidence in their memories whether or not the events recalled are historically true (Laurence and Perry, in press). The legal consequences of such findings are alarming in that the testimony of a highly confident eyewitness who has been hypnotized can lead to major miscarriages of justice if his/her testimony is tainted by false memories.

Contemporary researchers define hypnosis in a variety of different ways. Despite this, a consensus has developed in recent years that it basically involves an engagement in fantasy. Hypnosis has been described as a situation in which a person sets aside critical judgment (without abandoning it completely) and indulges in fantasy and make believe (Gill & Brenman, 1959; Hilgard, 1977). Orne (1980)

has argued that an individual who is talented at this task, can experience alterations, even distortions of perception, mood and/or memory. Sarbin and Coe (1972) have described the hypnotic experience as "believed in imaginings", J. Hilgard (1970/79) characterized it as "imaginative involvement" and Spanos and Barber (1974) as "thinking along with, and experiencing suggestion-related imaginings". ~~Settliffe~~ (1961) defined the hypnotized individual as deluded, in the descriptive, non pejorative sense that in hypnosis, imagined events take on reality value. Finally, Wilson and Barber (1982) went as far as to characterize highly hypnotizable individuals as "fantasy addicts".

More generally, it has repeatedly been shown that from 10 to 15% of the population is highly responsive to hypnosis (i.e., capable of post hypnotic amnesia), the same percentage is mostly unresponsive, and the remaining majority of 70 to 80% of the population is moderately responsive to varying degrees (Bernheim, 1889; Hilgard, 1965). Further hypnotizability (i.e., the ability to respond to hypnotic suggestions) appears to be a relatively stable characteristic of the individual (Perry, 1977); although recently, this view has been challenged (Spanos, de Groh & de Groot (1987)).

Correlates of Hypnotic Ability

Although Mesmer noted, but did not emphasize, individual differences in response to animal magnetism, the abbé di Faria (1819) was the first theorist to underline

their importance in determining hypnotic responsiveness (Laurence & Perry, in press; Nadon, 1983). Nonetheless, the view that hypnotizability reflected a mental weakness and/or disorder was dominant throughout the 19th century and even into the 20th century with the work of Hull (1933). Hull attempted to uncover personality characteristics related to hypnotizability. Using measures such as hysteria, acquiescence and neuroticism Hull found either very small, non-existent and/or unreliable relationships with hypnotizability (Barber, 1964; Bowers, 1976; Hilgard, 1965; Nadon, 1983).

More recently, theorists have changed the emphasis from a hypersuggestible personality type to that of a cognitive abilities dimension along which individuals differ. Individuals are now considered to possess different combinations of cognitive skills that enable them to respond to hypnotic suggestions in varying degrees. Thus, much recent research has focused on identifying and measuring nonhypnotic skills and "hypnotic-like" experiences in daily life thought to be related to hypnotic ability. This approach has proven to be more fruitful.

One finding stemming from these studies is that imagery ability is related to hypnotizability. Imagery ability has traditionally been measured using self-report inventories such as the shortened version of Betts' Questionnaire Upon Mental Imagery (Sheehan, 1967). Studies using this measure, however, have yielded conflicting results. In an initial study, Sutcliffe, Perry, and Sheehan (1970) found an overall

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significant relationship between vividness of imagery and scores obtained on the Stanford Hypnotic Susceptibility Scale Form C (SHSS:C) of Weitzenhoffer and Hilgard (1962), a valid and reliable measure of hypnotic ability (see Hilgard, 1965). This relationship which was significant overall, however, was found to exist for male subjects only. J. Hilgard (1970/1979), on the other hand, found the same relationship for her total sample but females carried the weight of the relationship on this occasion. Finally, two studies (Morgan & Lam, 1973; Perry, 1973) failed to find any significant relationship between these two measures, but uncovered a probabilistic trend in their data. When extreme scorers on imagery were examined it was found that vivid imagers were represented across all levels of hypnotizability (i.e., high, medium and low), whereas poor imagers almost always fell within the low range of hypnotic susceptibility. Thus it appears that good imagery ability is a necessary but not sufficient skill for high hypnotic ability, whereas poor imagery is almost always a predictor of hypnotic insusceptibility.

Sheehan (1979) has sought to account for these discrepant results. He argued that sex differences found in the previously mentioned studies could be explained by the failure to adequately control for factors such as socioeconomic background in the samples. Also, Nadon (1983) has argued that social desirability may in part account for the inconsistencies of findings across studies that have

examined the relationship between hypnotizability and imagery. He reported a study by DiVesta, Ingersoll and Sunshine (1971) which found that subjective imagery measures loaded on the factor on which social desirability loaded highest.

Isaacs (1982) has attempted to construct a self-report imagery preference scale which reduces social desirability effects. The Preference for an Imagic Cognitive Style (PICS) test measures four aspects of subjects' thinking styles: Verbal, Imagery, Absorption, and Effort. This measure presents both verbal and imagic thinking styles as equally desirable. He found that highly susceptible subjects as measured by the Harvard Group Scale of Hypnotic Susceptibility Form A (HGSHS:A) of Shor and E. Orne (1962) prefer an imagic and effortless thinking style whereas low susceptible subjects prefer a verbal and effortful style. This finding has been replicated twice by Nadon, Laurence and Perry (in press).

Another aspect of the hypnotic experience that has been emphasized both theoretically and empirically is subjects' capacity for involvement in suggestions (i.e., absorption). For this reason many studies have investigated subjects' absorptive abilities in situations outside of the hypnotic context. The Tellegen "Absorption" scale (TAS) (Tellegen, 1981, 1982; Tellegen and Atkinson, 1974) is a 34-item questionnaire aimed at measuring absorption. Examples of items on this scale include: The sound of a voice can be so fascinating to me that I can just go on listening to it, and

The crackle and flames of a wood fire stimulate my imagination. Tellegen and Atkinson (1974) found that this scale correlated significantly with hypnotizability. This finding has since been replicated by many independent laboratories (Finke & Macdonald, 1978; Nadon, et al., in press; Roberts, Schuler, Bacon, Zimmerman & Patterson, 1975; Spanos & McPeake, 1975).

Van Nuys (1973) studied subjects' ability to become absorbed in meditation tasks. In this study, subjects were seated alone in a room and were told to meditate on a candle for 15 minutes and for another 15 minutes on their breathing. Subjects were instructed to block all thoughts (including thoughts on the candle and on their breathing); further, they were asked to press a counter every time an intruding thought occurred. He found that the number of intrusive thoughts reported by subjects was significantly negatively correlated with hypnotizability. The more hypnotizable subjects reported fewer intrusions.

Inventories have also been constructed which attempt to measure the frequency of occurrence of "hypnotic-like" experiences outside of the hypnotic context. One such questionnaire, the Personal Experiences Questionnaire (PEQ), developed by Shor, Orne and O'Connell (1962), has yielded moderate correlations (e.g., .40) with hypnotizability (Nadon, 1985). The PEQ contains questions such as: Have you ever been able to make a daydream seem real? and, Have you ever become so absorbed in listening to music that you

become lost in imagination? This questionnaire is highly correlated with the TAS (Nadon, 1983, 1985).

Overall; the relationships between hypnotizability and imagery ability, absorption, and involvement in "hypnotic-like" experiences in everyday life have been emphasized theoretically and have been demonstrated empirically. There remains, however, a large portion of variance that must be accounted for in order to be able to predict hypnotizability more accurately. Insights are needed to guide researchers towards developing new measures that will decipher the multifaceted aspects of hypnotizability.

Hypermnesia

Hypermnesia ["increased recall levels associated with increasing retention intervals" (Payne, 1987, p. 5)] is a phenomenon that has been reliably demonstrated (see Payne, 1987 for a review). A large body of research seems to show that this phenomenon is related to imagery. For example, Erdelyi and his co-workers (e.g., Erdelyi & Becker, 1974; Erdelyi, Finkelstein, Herrell, Miller & Thomas, 1976; Shapiro & Erdelyi, 1974) have repeatedly shown that hypermnesia is obtained consistently when pictures but not when words are used as the to-be-remembered (TBR) stimuli. Erdelyi et al., (1976) have also shown that failure to obtain a consistent hypermnesia effect with words is not due to presentation format. They demonstrated that hypermnesia could be obtained with words if subjects are given imaginal coding instructions (i.e., if subjects are told to form an image of the word's referent as the word is presented). In

view of these findings and others, (see Payne, 1987) it seems apparent that imagery plays an important role in producing hypermnesia (Erdelyi & Becker, 1974).

In recent years much research has been conducted on the effects of hypnosis on recall in general and more specifically research has been conducted to investigate the claim that hypnosis can be used to increase cumulative recall levels (i.e., to produce hypermnesia).

In one such study, Dywan and Bowers (1983) presented low and high hypnotizable subjects with 60 slides of black and white drawings of common objects. Subjects then completed three recall trials (with 3-minute inter-trial periods) immediately following the slide presentation. For the following six days subjects were required to recall the slides (at home) once a day. On all recall trials subjects were required to write the name of 60 line drawings indicating as well which items represented memories and which were just guesses (this forced recall is standard procedure in hypermnesia studies). Subjects then returned to the laboratory where they performed a final recall session. At this point half the subjects were hypnotized and the other half were given task-motivating instructions.

Results showed that subjects in the hypnosis condition recalled significantly more correct new items (i.e., items that had never been reported as memories before) than did subjects in the task-motivated condition. They also, however, recalled three times as many new incorrect items.

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In view of these findings Dywan and Bowers concluded that hypnosis may result in a shift in report criterion (i.e., in hypnosis, subjects may be more willing to report an item as a true memory). These authors also provided an alternative explanation for their results. They argued that hypnosis may enhance the vividness of mental images and thus the subject may be "fooled" into believing that the image generated must be one of a true memory given its high degree of vividness, indicating a failure of reality monitoring (Johnson & Raye, 1981). This explanation is consistent with theories and research in the fields of hypermnesia and hypnosis.

In a similar study, Nogrady, McConkey and Perry (1985) tested low and high hypnotizable subjects using the same stimulus material as Dywan and Bowers (1983). Subjects completed two recall trials immediately following the slide presentation (the forced recall procedure was not used in this study). Subjects were then divided into three groups. One group consisted of a hypnotic procedure with suggestions of hypermnesia, the second was given motivation instructions and instructed to use imagination strategies to help them recall the information and the third group was a no treatment control. Two additional recalls were performed under these conditions.

Results showed that in all three groups both correct and incorrect information increased equally over time. The authors concluded that although repeated testing increased recall levels, hypnosis did not.

The results of studies investigating the effects of hypnosis on recall can be summarized as follows: (a) Increased cumulative recall has been demonstrated when meaningful material is used as the TBR material but not when non-meaningful material is used (e.g., Barber & Calverley, 1966; DePiano & Salzberg, 1981; Dhanens & Lundy, 1975; Dywan & Bowers, 1983; Orne, Soskis, Dinges, E. Orne & Tonry, 1985); (b) increases in recall of correct information are usually accompanied by even greater increases in amount of incorrect information recalled (Dywan & Bowers, 1983; Putnam, 1979; Sheehan & Tilden, 1983; Zelig & Beidleman, 1981); (c) subjects' confidence in their hypnotically elicited reports increases whether or not the information recalled is true (Button, 1986; Dywan & Bowers, 1983; Laurence & Perry, in press; Putnam, 1979; Sheehan & Tilden, 1983; Timm, 1981; Zelig & Beidleman, 1981); and d) highly susceptible subjects in hypnosis are most vulnerable to leading questions (Putnam, 1979; Sanders & Simmons, 1983; Zelig & Beidleman, 1981). Therefore, it is apparent that although hypnosis has been shown to produce hypermnnesia when meaningful information is used as the TBR event the benefit in obtaining an increase in recall level needs to be weighed carefully against the cost of increases in errors "recalled" and uncritical heightened confidence in recall.

These findings are in sharp contrast with laypeople's beliefs and knowledge of the hypnotic situation. It has been shown that beliefs about hypnosis held by the general

public are at odds with current empirical findings (Labelle, Lamarche & Laurence; 1987; McConkey & Jupp, 1985, 1985-86; McConkey, 1986; Orne et al., 1985; Wilson, Greene & Loftus, 1986). For example, the belief that hypnosis increases accurate memories is widespread among laypeople. In fact, there is no experimental or field evidence that hypnosis uniquely increases accurate memories (Perry, 1986; Laurence & Perry, in press). Rather, the content of a hypnotically-induced recall has been shown to be an admixture of fact and fantasy. Thus when hypnosis is used as a method to enhance the retrieval of memories, subjects' beliefs must be taken into consideration. If subjects erroneously believe that what they recall in hypnosis represents a "true state of affairs" they may come to believe that their hypnotic confabulations are veridical.

This issue is highly relevant when one considers the increasing use of hypnosis by law enforcement agencies. In this situation a well intended victim/witness may uncritically accept inaccurate recollections as reflecting truth. This uncritical acceptance may be fostered by erroneous beliefs held by an individual who has a strong desire to help the authorities solve the crime (Laurence & Perry, in press; Orne, et al., 1985).

Memory Creation in the Clinical and Legal Settings

As early as 1884 Liégeois claimed that individuals in hypnosis could fabricate false testimonies as the result of suggestions that had altered their memories (Laurence &

Perry, in press). From 1884 to 1900 a heated scientific debate on the effects of hypnosis on memory in the legal context ensued (Laurence & Perry, 1983). Clinicians and researchers of the time became progressively more aware of the malleability of the memory system. Burnham (1889) for example, described three types of paramnesia (i.e., "pseudoreminiscences or illusions and hallucinations of memory" 1889, p. 431). The first type, simple paramnesias, was said to be the result of imagination: "We remember certain points, the imagination fills out the picture" (p. 435). The second type, identifying paramnesias, is better known today as the déjà-vu phenomenon. The third type, suggested or associating paramnesias, was said to be an illusion or a hallucination of memory created by actual impressions (perceptions). Burnham did not, however, discuss the possibility of manipulating memory by suggestion in hypnosis. This possibility, however, was well known to other investigators of the period such as Bernheim, Ladame, Forel and Janet (Laurence & Perry, in press).

Janet (1889) reported a clinical case in which he modified a traumatic memory in one of his patients. Marie, a 19 year-old woman, suffered from a number of hysterical symptoms including blindness of the left eye, a condition which she believed was congenital. He investigated this claim by age regressing her to various periods of her childhood. To his and her own surprise he observed that at age 5 Marie could see with both eyes. Janet then explored various events surrounding her sixth year through hypnotic

age regression. He found that around this period Marie had been forced to share a bed with a child who suffered from impetigo on the left side of his face. Some time later she developed identical symptoms, and became blind in her left eye. The impetigo was treated successfully by orthodox dermatological methods but the blindness persisted into young adulthood. When Marie was age regressed to that earlier period once again, Janet suggested that the child with whom she was in bed was normal, and that she could caress him without danger. After only two sessions, Marie had regained her vision. Janet used the same method for all of Marie's symptoms and removed them one by one.

Bernheim also demonstrated that one could implant a pseudo memory in some receptive individuals. He wrote:

The memory of the scene which was suggested to them in a waking or sleep state is present in their minds as if it had really happened. I have shown how a false memory can cause false testimony given in good faith, and how examining magistrates can unwittingly cause false testimony by suggestion.

Here is the experiment which you attended yesterday. I found the patient asleep. He is suggestible, afflicted by chronic myelitis, and has often been hypnotized (with hallucinations and amnesia after awakening). While he slept, I said to him, "I know very well why you are sleeping now! You did not sleep last night. Your neighbor in number six did not

let you sleep; he coughed, sang, and then opened the window; then he busied himself fixing the fire and made such a racket that every patient was awakened".

Several minutes later, I awakened him. He rubbed his eyes, believed he had awakened spontaneously, and remembered nothing. Then I said to him, "Do you sleep like this everyday?"

"No, he said to me, but I didn't sleep last night."

"Why?"

"The patient in number six is sick. He choked and complained. I don't know what he did. He also sang as in a delirium. Then he opened the window and was fixing the fire."

"This is true? You heard him?"

"Of course! Everyone in the room heard him."

Then I made his imagination work on this theme, and I created new memories which were not suggested during his sleep. "And the other patients said nothing? What did the one in number four say?"

"Number four told him to close the window and not to make such a din. Then they exchanged some foul language. Number four got up, went for him, and they fought."

"And a sister was there?"

"The sister could not quiet them down."

"Then the director came? You saw him dressed for the bedroom!"

"He had his bathrobe on and told them he would throw them both out today."

"This is not true, any of it, you dreamed it!"

"I didn't dream it. I was wide awake! All the other patients can tell you about it."

I questioned, in succession, the other patients in the room (all awake). Out of 14, seven had heard and seen it all. They were convinced that it had happened; the scene took place before their eyes. These seven were suggestible subjects who had been hypnotized before...

The patient in number four who was supposed to have caused all this ruckus (and is less suggestible than the others), remembered nothing; the retroactive hallucination was not successful with him...

...The experiment is not always successful in the same way. Among subjects questioned as witnesses, some have seen it clearly, whereas others have seen nothing.

Others have seen nothing but they have heard their neighbors talk about it, and they recount what they have heard and report their testimony (nonvisual or direct, but auditory and indirect). You see how, with the help of artificial or natural sleep, a false idea, an illusory memory, or a false testimony can slip into the brain. (Bernheim, 1891/1980, pp. 92-94; cited by Laurence & Perry, in press).

Although there are obvious demand characteristic confounds in this demonstration, Bernheim can be credited for his insight that highly susceptible subjects were the

most vulnerable to the incorporation of suggested memories.

Forty-five years later, Erickson (1935) reported a case which has since been cited as an example of memory creation (Lamb, 1985; Mott, 1986). The case involved a 25 year old, highly hypnotizable psychologist suffering from premature ejaculation. Erickson's treatment strategy was to activate an "artificial neurosis" in his patient with the use of a "complex" story told to him in hypnosis as if it had been an actual past experience.

The complex story contained Freudian symbols and was designed to represent the patient's wishes and fears. The story involved the patient depositing a partially smoked cigarette in a hand painted ashtray, given to him by the beautiful, young female artist who had made it. The ashtray had never been used and the burning cigarette heated the glass, causing it to shatter. He felt extreme guilt about his carelessness and wished to leave the premises.

The patient was rendered amnesic to the hypnotic procedure; following hypnosis, he exhibited neurotic-like behaviors such as a phobia of ashtrays, and conversation that was embedded with themes related to the complex. He was then rehypnotized and the amnesia suggestion was lifted. His neurotic behavior then ceased and he even made a point of showing Erickson that he could now use an ashtray without fear!

Three days later he returned to Erickson declaring "I can do it!". He explained that he had had successful sexual

intercourse. He was later again able to engage in intercourse and on the occasions on which he did experience premature ejaculation, it no longer caused him emotional disturbances.

Although memory creation could be inferred from Erickson's statement that the patient was "trained to accept artificial complexes" (p. 300)¹, it is clear from Erickson's report that at follow up the patient was aware that the story had been suggested in hypnosis and was not perceived as an actual past event in his life. For this reason, the case does not appear to reflect memory creation in the sense that Janet and Bernheim intended it, but rather the metaphorical use of imagery to alter the cognitive and affective components of a maladaptive response².

Erickson and Rossi (1980) reported another case which has also been cited as an example of memory creation (Lamb, 1985; Mott, 1986) but which likewise does not appear to qualify as such. The case of the February Man involved a pregnant patient who feared that she would not be a good mother given her lack of parental love as a child. Erickson age regressed her to various times in her life introducing himself, in her imaginings, as the February Man "a kindly granduncle type who became a secure friend and confidant" (p. 525). As she would confide in the February Man he would attempt to alter the manner in which she recalled certain past unhappy events, by emphasizing their positive values. For example, she perceived her fall on a dance floor in her teens as a devastating experience. The February Man taught

her that this incident could be viewed as minor and perhaps even amusing. At the end of treatment Erickson removed the patient's amnesia of all hypnotic sessions thus allowing her to realize that the February Man was in fact Erickson himself. For this reason it cannot be argued that the patient's memories were changed (e.g., she did not believe that the February Man was truly a part of her past); only that their affective valence had been modified.

More recently there has been a resurgence in the clinical use of memory creation or transformation. Different authors label this process in different ways [e.g., partial reformulation of memory (Baker & Boaz, 1983); reconstructive hypnotherapy (Miller, 1986)]. All of these approaches seem to produce similar outcomes: symptom alleviation via memory alteration or reconstruction.

Baker and Boaz (1983) used a memory creation technique with a 50 year old female who had not been to a dentist in almost 20 years. The patient was in need of extensive dental treatment but was unable to commit herself due to a dental phobia.

She proved to be highly hypnotizable and during age regression she reported a traumatic event that had occurred at age nine. This incident involved her being wheeled into an operating theatre and becoming terrified when the anesthetic mask was placed over her face; she could not recall anyone comforting her. The treatment of this phobia involved the therapist telling her, in hypnosis, that as she

was going into the surgery room, the doctor would provide comfort by holding her, stroking her forehead and telling her that he would take care of her. The patient returned for treatment one week later and was again age-regressed to this event. This time she recalled the memory which had been implanted as veridical. The treatment ended after only two sessions since the patient reported a significant reduction in her fear of dentistry. Several weeks later she was able to undergo the extraction of two wisdom teeth, reported no fear of dentists, and was able to continue with the additional necessary dental restoration work.

Lamb (1985) reported three case studies in which she claims to have used memory reconstruction. Only two of these (cases 1 and 2), however, can be considered to represent the phenomenon of memory creation in the sense that Janet (1889) and Bernheim (1891; cited by Laurence & Perry, in press) intended it. The other follows a more "Ericksonian" vogue in that it appears that the affect associated with certain memories rather than memories themselves was modified. Similarly, Domangue (1985) reported two cases which have been cited as examples of memory alteration (e.g., Mott, 1986) but follow the "Ericksonian" trend described previously.

One of the cases in which Lamb (1985) actually used memory creation involved a 33-year-old female who had a phobia of the dark. She attributed her phobia to a traumatic event which occurred when she was five. Her mother had been telling her and her two siblings a bedtime

story but the children were noisy and did not calm down after she threatened to stop reading. The mother left the room closing the door behind her. All of the children then yelled for her to return. The father hearing the screams pushed the bedroom door open and the patient's (Mary) great toenail was torn off by the door, causing excruciating pain.

Mary proved to be highly hypnotizable. She was age regressed to the time of the traumatic event and asked to relive the events vividly until the time of the mother's warning. At this point, the therapist suggested that the children would quiet down, that Mary would fall asleep following the reading and that the mother would leave the room closing the door behind her. When she came out of hypnosis, Mary was able to remain in a pitch dark room for three minutes. Six months later she reported that she was no longer frightened of darkness.

Finally, Miller (1986) successfully treated a 20-year-old woman (Mary) suffering from separation anxiety. Her anxiety stemmed from a childhood experience at summer camp. She had pleaded with the counselor to let her visit her parent's cabin and was denied access. It was suggested, during hypnotic age regression to the event, that the parents would berate the counselor and that the counselor would apologize to Mary. Mary would accept the apology and hug the counselor. Following this, Mary would again ask to see her parents, the counselor would point to the parent's cabin and Mary would run to it. Once in the cabin she would

tell her parents that she missed them and when given the opportunity to spend the night with them she would opt for returning to her own cabin. Although Miller did not assess whether Mary believed that this represented an actual life event it is clear from the report that after this session she was more at ease with separation issues. At six-months follow-up, for example, she was planning a trip to Europe.

In the clinical situation it may often be useful to alter a patient's memories. It should be noted, however, that this method could have potential drawbacks. Janet (1919) argued that the transformation of a memory is never complete; therefore, fragments of the original memory could remain and cause symptom substitution.

If drawbacks can be encountered in the clinical milieu with this type of hypnotic manipulation (as much as can be ascertained when one considers the uncertainty of anecdotal clinical reports), the finding that it may be possible to change a person's memory by cueing him or her in hypnosis is alarming when extended to the forensic hypnosis context. This is especially so, given that the fairness of a trial often depends on the memories of witnesses and/or victims of crime. If for some reason hypnosis is used to "refresh" a person's memory, the possibility of a pseudo memory being created inadvertently becomes a crucial issue. A well intended hypnotist may unwittingly cue the subject to respond in a certain desired manner. If such is the case it is possible that the subject's memory and therefore, the fairness of the trial, may become contaminated by ideas

suggested by the hypnotist. In fact, such contamination has been reported recently..

Kirby (1984) reports a case of the murder, rape, and torture of an elderly woman in Union Mills, North Carolina. Four men were charged with the murder solely on the basis of the hypnotically elicited testimony of one of them, Reece Forney. No physical evidence existed to link any of the other three to the murder. The police kept secret the fact that a rake had been found at the scene of the crime on the logic that only the murderer(s) would be aware of its existence. The four men were brought to trial since police had records of Forney's "description" of the rake. The four men were found guilty and it was only later that it became known that Forney's "knowledge" of the rake did not occur until the following interaction in hypnosis:

"Forney: (describing walking home after the crime)

Seems like I grabbed something and ran back to I walked most of the way because I was so tired.

Hypnotist: (handed a note by the policeman which instructed him to ask about a rake) What did you grab?

Forney: Base of something. Base of something.

Hypnotist: Was it a rake?

Forney: I don't know. It could have been.

Hypnotist: Where did you get the rake from?

Forney: I think I got it from the yard of a house. I was so mad...

Hypnotist: What are you doing with the rake?

Forney: Running down at them....seems like I was fighting them.

Hypnotist: Did they take the rake from you?

Forney: Yeah.

Hypnotist: And what did they do with it?

Forney: I don't know." (Kirby, 1984, p. 160)

In this case it is obvious that Forney's "knowledge" of the rake was suggested by the hypnotist. Nevertheless the authorities concluded that Forney must have been at the scene of the crime and decided to prosecute four men solely on the basis of Forney's hypnotically elicited testimony. This case illustrates clearly how a grave miscarriage of justice can occur when hypnotic testimony is taken at face value and if proper safeguards are not taken in order to minimize the likelihood that a pseudo memory will be cued inadvertently.

A pseudo-memory can also be created with suggestions given outside of hypnosis. The case of State v Mack illustrates this point well. In this case the victim was exposed to hypotheses of the cause of her injuries before the hypnosis session. Additionally, following hypnosis, she was exposed to explicit suggestions that what she recalled in hypnosis was veridical.

The case involved a female plaintiff who had met Mack in a bar in May, 1978. They subsequently left together to go to a motel room where they started engaging in intercourse. The plaintiff started bleeding profusely from

the vagina during intercourse; alarmed, her companion called for an ambulance. He then returned home (to his wife) while she was on her way to the hospital. At the hospital she told the intern that she had been engaging in "sexual activity with fingers being placed in her vagina" (p. 766). At this point a second intern made the comment that her injury could not have been the result of intercourse nor the result of a human finger. It was also argued in court that another intern expressed the thought that the injury could have been caused by a sharp instrument such as a knife.

Two days after her injury she reported an assault to the police. Approximately six weeks later a police officer arranged for her to be hypnotized by a lay hypnotist. In hypnosis she recalled that upon entering the motel room Mack had ordered her to undress, pushed her onto the bed, pulled out a switchblade and proceeded to stab her repeatedly in the vagina. The hypnotist concluded the session by suggesting that she would now have a clear memory of what had happened that night in the motel room (an explicit suggestion that the events recalled in hypnosis were actually true). The following day she submitted to the police a signed statement reporting the events she recalled in hypnosis. This led to Mack's arrest in October, 1978.

The Minnesota State Supreme Court threw the case out on the basis of many inconsistencies in the plaintiff's testimony. For example, while she reported repeated stabbings her hospital record indicated only one deep cut inside her vagina. Further, there was no damage to external

genitalia as would be expected in the case of even one stabbing, and certainly in the case of multiple stabbings. Furthermore this hospital report was consistent with her gynecological history. In addition, the ambulance driver testified that the woman appeared "quite drunk" at the time of her injury, and that she had said that it was not Mack's fault during the ride to the hospital.

The court's ruling in this case was to be a landmark decision that was to be followed by 14 other U.S. State Supreme Courts (Laurence & Perry, in press). The court ruled that victims or witnesses who have been hypnotized would not be allowed to testify in court. Further, the court ruled that any information obtained during a hypnotic session could only be used as the basis for obtaining independent physical evidence.

The case of People v. Kempinski (1980) further illustrates how a confabulated memory in hypnosis may come to be accepted as fact if the hypnotist emphasizes that what is recalled in hypnosis actually represents the "true state of affairs".

Michael Kempinski was arrested and held in prison, as a murder suspect, for five months while awaiting trial, solely on the basis of a hypnotically elicited recall. The murder had taken place at around 9 o'clock at night and the main witness had been sitting in a pick-up truck approximately 270 feet away when it happened. The witness was subsequently hypnotized in the hope of "refreshing" his

memories of the event. His hypnotic recall led to the arrest and trial of Kempinski.

The hypnosis session was videotaped and careful examination of these tapes revealed that the witness' description of the event contained many inconsistencies. For example, the suspect was described in one instance as being "very ugly" and in another as "ordinary looking"; he was described also as being both "five feet ten" and as "six feet one". Moreover, the witness reported with conviction that he knew him and claimed to be able to see his face. He identified the suspect as a senior student in high school at the time he was a sophomore even though it was ascertained subsequently, that Kempinski did not ever complete high school. Despite inconsistencies in the witness' recall the hypnotist concluded the hypnosis session by implicitly suggesting that the hypnotically recalled events were accurate.

"Hypnotist: You go ahead and you can remember that face. If you ever want to see this face again, all you have to do is close your eyes to be able to see that face; to be able to know that that is the man. O.K. Fine.

Post hypnosis:

Hypnotist: Do you remember more now than you did before?

Witness: A little bit, just his face. I don't forget things like that.

Hypnotist: Did you realize that you knew the guy

before?

Witness: No, 'cause I didn't see him. I know who he is." (Barnes, 1982).

The hypnotically elicited testimony against Kempinski was rejected when an ophthalmologist testified that at a distance of 270 feet and in poor lighting conditions, it was not possible to make a positive identification of a face. Furthermore, it was later shown that Kempinski had never progressed beyond the second year of high school. Nevertheless, he was obliged to spend five months in jail and awaiting trial his wife's parents had to sell their house in order to pay for his attorney's fees (Barnes, 1982). It is alarming to consider what might have happened had the witness been standing within 25 feet of the scene of the crime (the distance at which the ophthalmologist reported that a positive identification would have been possible, although not necessarily accurate).

As with the clinical cases described earlier, the legal cases provide anecdotal evidence for the phenomenon of memory creation. In the legal context, however, these observations have more severe social consequences than in the clinic. The combination of findings stemming from these two fields, however, provides a strong indication that it is possible to modify memories with the use of hypnosis and points to the importance of studying this phenomenon in the more austere and controlled context of the laboratory.

Memory Creation in the Laboratory

There are few contemporary experimental studies that have investigated the occurrence of memory creation in hypnosis. Orne (1979) demonstrated such a possibility in a BBC film on this topic (Barnes, 1982). Following the suggestion that she had heard loud noises in the middle of a previous night, his subject firmly stated, post-hypnosis, that the suggested events had actually occurred. Even when confronted with her pre-hypnotic testimony that she had not awakened on that night, the subject maintained that the noises had actually occurred (she even stated that she would be willing to swear to this effect). This implied that the subject had incorporated the suggested events into her memory, perhaps because she believed that her hypnotically elicited recollections were more reliable than her non-hypnotic recall.

Laurence and Perry (1983; see also Laurence, Nadon, Nogrady & Perry, 1986) were the first to present experimental evidence that it is possible to modify a subject's memory of an event through the use of hypnosis. They adapted Orne's (1979) procedure and tested a group of 27 highly hypnotizable subjects in an experimental session designed to investigate the incidence of the creation of pseudo memories. In this study, subjects were asked, during hypnosis, to describe their activities during the last half hour before bed on an evening of the previous week. They were told to select a night during which they were certain that they did not awake and during which they did not

remember dreaming. This procedure was designed to ensure that there were no competing memories of the night in question. Subjects were then hypnotized and age regressed to the preselected evening of the previous week, and were asked again to give an account of the evening until bedtime. Via rapid time progression suggestions the subjects were then taken to half-way into that night and were asked if they heard some loud noises which may have awakened them. Subjects who reported hearing the noises were encouraged to describe them. It was found that after the hypnosis session approximately 48% of subjects reported that the suggested events had actually occurred. These subjects were now contradicting their previous testimony in which they stated that they had not awakened during that night. These findings have been replicated by Sheehan (personal communication, October 30, 1986) and by Spanos and McLean (1985-86).

Spanos and McLean (1985-86) investigated the role of social pressure on the incidence of hypnotically created "pseudo memories"; they hypothesized that subjects were more vulnerable to report bias than to actual memory distortions. They tested 33 highly hypnotizable subjects in a modified pseudo memory creation procedure modeled after Orne's (1979) and Laurence and Perry's (1983, 1986) procedure. Using direct as opposed to non-directive hypnotic suggestions, they instructed subjects that they had heard noises during a previous night. Those who reported hearing the noises were interviewed following hypnosis in order to determine whether

they believed that the suggested noises had actually occurred on the night in question or had only been imagined in hypnosis. They were then rehypnotized and given the following "hidden observer" instructions:

During deep hypnosis people often confuse reality with things that were only imagined. The hypnotized part of a person's mind accepts suggestions so completely that what was suggested actually seems to have been happening... Yet at the same time that you are experiencing suggestions, there is some other part of your mind, a hidden part, that knows what is really going on... The hidden part can always distinguish what was suggested from what really happened... (p. 157)

The hypnotist then proceeded to contact this "hidden part" with the use of a predetermined cue and again asked the subjects whether the noises had been real or imagined. Perhaps not surprisingly (given the directiveness of the "hidden observer" instructions) most subjects' reports were in line with the suggestion given. Following this, the hypnotist told subjects that they would be amnesic to their "hidden part" and proceeded to recontact their "hypnotized part". Subjects were then again asked to report on the reality of the noises. Finally they were told that they could remember their "hidden part" and were, for a fourth time, asked whether they believed that the noises had been real or imagined.

Spanos and McLean found dramatic changes in subjects'

responses from one set of instructions to another. Under the first set of instructions 9 of the 11 subjects who reported hearing the noises in hypnosis stated that they had actually occurred on the night in question. Under the "hidden observer" instructions, however, only two of these same subjects maintained that the noises actually occurred; the others now stated that they had merely imagined the noises. When the "hypnotized part" of the subjects was recontacted, subjects again manifested a reversal in their testimony. This time all 11 subjects reported that they had really heard the noises. Finally, in the last instructional set 4 out of 11 subjects claimed that they had really heard the noises on the night in question.

These results led Spanos and McLean (1985-86) to argue that their subjects' memories were not distorted since given the proper demands they were able to recall the true source of the noises. They further argued that subjects only reported the correct origin of the noises when the demands of the situation called for accurate recall in a manner in which subjects could maintain their role of highly hypnotized individuals. Thus, they maintained that pseudo memory creations merely reflect reporting biases.

Despite all of Spanos and McLean's contextual manipulations, which in the hidden observer condition involves telling subjects that events in hypnosis could be imagined or real, 4 out of 11 subjects still maintained at the end of the experiment that the noises actually occurred on the night in question. This last finding is difficult to

reconcile with Spanos and McLean's own hypothesis. The authors concluded that these four subjects "shied away" from saying the truth. They did not, however, provide any data to support this post hoc hypothesis.

If memory creation merely reflects reporting biases it would be interesting to investigate whether or not subjects are aware of such biases. If subjects are unaware that they are responding to demand characteristics, then, in the forensic context, the consequences of reporting biases are identical to those of memory creation. That is, it becomes impossible to discriminate between the "true" and the newly reported memory. In such a situation the distinction between reporting biases and actual memory creations becomes extremely blurred. By contrast, if one assumes that the subjects are aware that they are biased this would imply that they are deliberately lying. Such a hypothesis appears to be unwarranted, especially when what is involved is a crime victim in the forensic setting (and especially when those who allegedly lied in the experimental context are only those who did not substantiate Spanos and McLean's hypothesis).

McCann and Sheehan (1987) examined the memory creation phenomenon using a different paradigm. They presented a video-tape of a bank robbery to 31 highly hypnotizable subjects. Subjects were then required to recall the events depicted on the video and to provide a description of the robber. Following this, they were hypnotized and age

regressed to the time when they saw the video. At this point the hypnotist exposed them to false memory suggestions. Three such memories were suggested: that the robber wore a stocking mask (which he did not), that he swore (which he did not) and that he entered the scene from the right (in fact, he entered from the left of the screen). Subjects were then dehypnotized and divided in two groups. Half of the subjects were shown a series of four perceptibly different videos involving the same actors but with varying combinations of swearing - not swearing and wearing - not wearing a mask. The subjects were required to choose (i.e., recognize) which of the videos had originally been presented. This "recognition first" group of subjects was then asked to recall the events depicted on the original video, and to provide a description of the robber. The second group underwent the recall first, followed by the recognition task.

Subjects were rated as displaying memory creation if they had incorporated one or more of the false suggestions into their description of the robber (i.e., if they reported that the robber wore a mask and/or that he swore and/or that he entered from the right). McCann and Sheehan found that seven subjects (44%) in the "recall first" condition displayed memory creation whereas only two subjects (13%) in the "recognition first" condition did so; this difference was statistically significant. Further, 28 out of 31 subjects correctly identified the original video.

These results led McCann and Sheehan to argue that

subjects could hold two memories simultaneously (i.e., they were able to identify the correct video in which the robber did not swear, wear a mask or enter from the right, yet in their free recall they mentioned some of these attributes). These authors further argued that, under certain conditions, subjects are able to retrieve their original memory.

McCann and Sheehan can be credited for extending the memory creation paradigm to one which more closely resembles the forensic situation. That is, the subjects in their paradigm witnessed a video-tape of a crime and were later hypnotized under the pretext of refreshing their memory. In hypnosis the subjects were asked leading questions in a manner similar to what might occur on some occasions when a police officer questions a witness. For some subjects these leading questions resulted in the creation of pseudo memories (the incidence of the memory creation phenomenon, however, varied depending on when the recognition test was administered).

There is, however, one crucial difference between this paradigm and an actual forensic situation. In the forensic situation it is extremely unlikely that a victim and/or witness would ever have the opportunity to undergo a recognition test! Even in the case where a witness is asked to look at a photo line-up or an actual line-up, this task is not entirely one of recognition, since there is no guarantee in the real-life situation that the police have a photograph of the actual perpetrator of a crime.

McCann and Sheehan suggested a total of three false memories to their subjects [i.e., that the robber (a) wore a mask, (b) swore and, (c) entered from the right]. The suggestion that the robber wore a mask involved a central detail of the event which is of strong saliency since the mask would have been visible throughout the entire video. It is interesting to note that seven subjects (five in the "recall first" and two in the "recognition first" condition) incorporated this suggestion. In fact, only two out of the nine subjects exhibiting memory creation did not incorporate this particular suggestion. This indicates the fragility of the memory system in general; even memories for very salient details are manipulable with the use of hypnotic suggestions (assuming of course that there was existing memory). It would be interesting to investigate whether saliency of the to be remembered event would influence the incidence of memory creation. Although McCann and Sheehan suggested false details of a less salient nature, the fact that a total of three suggestions was used in this study makes it difficult to evaluate the effect of detail saliency on the occurrence of memory creation.

In sum, empirical investigations of the memory creation phenomenon are scarce. All studies which have been conducted tested highly susceptible subjects only. There is a need for studies comparing the incidence of this phenomenon across all levels of hypnotic ability.

The present study was a partial replication of the Laurence and Perry (1983) (reported in more detail by

Laurence et al. 1986) study. It examined the incidence of the memory creation phenomenon in high, high-medium, and low susceptible subjects. The study also examined the effect of such variables as preference for an imagic style of thinking, absorption, and hypnotizability upon subjects' response to a pseudo memory creation suggestion. The subjects were tested in one experimental session on several hypnotic items, including the memory creation item described by Laurence and Perry. Following the hypnosis session, subjects were interviewed by a second experimenter whose task was to determine whether or not subjects believed that the suggested noises had really occurred on the night in question.

It was expected that some of the high hypnotizable subjects would incorporate the suggested noises into memory, whereas low hypnotizable subjects would not since they are usually unable to respond to hypnotic suggestions of auditory hallucinations. The high-medium hypnotizable group was the one for which no prediction could be made. In view of the relationship between imagery and hypnotizability and the importance of imagery in hypermnesia in general, it was also expected that imagery preference as measured by the PICS would be related to subjects' responses to the pseudo memory creation item.

Method

Subjects

Thirty-two subjects (16 females and 16 males) participated in the present study. Of these, 10 were enrolled in an experimental psychology course, 16 had previously participated in hypnosis experiments and agreed to complete the present study and 6 subjects were recruited by the present experimenter through short presentations in various introductory courses in Psychology at Concordia University. Following a rigorous assessment of their hypnotizability (described in the following section) they were divided into three groups. Eight subjects were classified as low hypnotizable (two females, six males). Their mean age was 22.0 years (S.D. = 4.17). Thirteen subjects (eight females, five males) were classified as moderately hypnotizable in the high range of this interval (these subjects will be referred to as high-medium susceptible). Their mean age was 23.4 years (S.D. = 4.94). Finally, 11 subjects were classified as highly hypnotizable (six females, five males). Their mean age was 22.1 years (S.D. = 3.45). Across the total sample of subjects the mean age was 22.6 years (S.D. = 4.20), with ages ranging from 18 to 33.

Hypnosis Testing

Subjects were initially screened for hypnotizability on the Harvard Group Scale of Hypnotic Susceptibility: Form A (HGSHS:A) of Shor and E. Orne (1962). The mean HGSHS:A scores for subjects in each group were as follows: low

susceptible subjects ($M = .87$; $S.D. = 1.46$) with scores ranging from 0 to 4, high-medium susceptible subjects ($M = 9.07$; $S.D. = 1.80$) with scores ranging from 5 to 11 without post hypnotic amnesia, and high susceptible subjects ($M = 10.6$; $S.D. = 1.71$), with scores ranging from 8 to 12, including passing the posthypnotic amnesia item.

There are several reasons for administering an additional measure of hypnotic ability. First, the HGSHS:A usually represents subjects' first exposure to hypnosis. Therefore subjects' performance on this test may be affected by misconceptions regarding hypnosis and/or apprehensions about the procedure. Also, since this session is performed in a group, subjects' behavior may be affected by their neighbors. Further, the HGSHS:A does not contain many of the more "difficult" cognitive suggestions like hallucinations and performance on these items provides a better index of high hypnotizability. Finally, the HGSHS:A correlates only moderately with the more stringent Stanford Hypnotic Susceptibility Scale: Form C (SHSS:C) of Weitzenhoffer and Hilgard (1962) ($r = .60$, Evans, 1979).

Consequently, subjects were tested on a modified version of the SHSS:C which was individually administered to confirm their previous HGSHS:A scores. One modification consisted of replacing the anosmia to ammonia item with the posthypnotic suggestion item of the Stanford Hypnotic Susceptibility Scale: Form B (Hilgard, 1965). A further modification of the SHSS:C consisted of replacing the age

regression item with an age regression to age 5 item adapted from Perry and Walsh (1978) and Laurence (1980, 1983).

Subjects' level of hypnotizability was determined on the basis of their SHSS:C score. Subjects who scored between 0 and 4 on this measure were classified as low susceptible. Subjects who scored between 7 and 10 (without posthypnotic amnesia) were classified as high-medium susceptible. Subjects who scored between 8 and 12 (including posthypnotic amnesia) were classified as high susceptible. The mean SHSS:C scores for the three groups were as follows: low hypnotizable subjects ($M = 1.25$; $S.D. = 1.38$), high-medium ($M = 8.30$; $S.D. = 1.10$) and high susceptible subjects ($M = 10.72$; $S.D. = 1.19$).

The 10 subjects recruited from the experimental psychology course underwent the HGSHS:A as a laboratory requirement for the course. HGSHS:A and SHSS:C scores were available for the 16 subjects who had participated in previous studies in the hypnosis laboratory. The remaining six subjects were paid \$4.00 for their participation in the HGSHS:A. Subjects who had not already been assessed on the SHSS:C were paid \$5.00 for their participation in that session. All subjects were paid \$10.00 for their participation in the experimental session.

Experimental session

On arrival for the experimental session subjects were asked to read and sign an Informed Consent Form (see Appendix A). Any questions that subjects had about the

session were answered. The subjects were then asked if they agreed to have the session videotaped, and they were informed that following the hypnosis session a second experimenter (C.P.) would interview them to ask them how they felt subjectively at various points during the session.

Before the hypnosis session, a short enquiry was conducted during which subjects were asked to think about and report on their activities on a night of the previous week. Following subjects' detailed account of the evening, the experimenter ascertained that they had not awakened and did not remember dreaming during the night in question. Subjects were asked also at what time they went to sleep that night and at what time they woke up the next morning. Following this enquiry a hypnotic induction procedure was administered. The hypnotic session comprised the following six items: arm levitation (adapted from Reiser, 1980) arm rigidity (Weitzenhoffer & Hilgard, 1959), a pseudo-hypnotic item in which subjects are instructed to place a finger on the forehead following which they are asked to turn their eyes upwards and "see" the finger through the top of the head using "X-Ray eyes" (adapted from Perry & Mullen, 1975), memory creation (Laurence, 1983), source amnesia (Evans & Thorn, 1966)^a, and posthypnotic amnesia (Weitzenhoffer & Hilgard, 1962). A description of each of the items used in the experimental session can be found in Appendix B.

Immediately following the hypnosis session a short post experimental enquiry was conducted to test the source amnesia and the posthypnotic amnesia items. A complete

transcript of the experimental session can be found in Appendix C. Following the post experimental enquiry subjects were introduced to a second experimenter (C.P.) who interviewed them using the Experiential Analysis Technique (EAT) of Sheehan, McConkey and Cross (1978).

Memory Creation Item

This item was taken from Laurence and Perry (1983) and closely modeled on Orne's (1979) suggested memory instructions. Before hypnosis, subjects were asked to select an evening of the previous week which they would like to report on. They were asked to describe in detail the last half hour before going to sleep. They were told to select a night during which they were certain that they had not awakened and during which they did not remember dreaming. During hypnosis, subjects were age regressed to the night of the previous week that they had chosen to report on in the prehypnotic enquiry. They were again asked to describe their activities during that evening, and specifically during the half hour before going to sleep. Once they reported falling asleep, the experimenter suggested a rapid time progression until half way through the night. At this point the subjects were asked if they could hear some loud noises (i.e., they were given an implicit suggestion to hallucinate loud noises). If they reported hearing noises, they were asked a series of questions to allow them to elaborate on their memories. The questions were: Do they wake you up?, And perhaps you look

at your clock and see what time it is..., Tell me what the noises sound like, How many noises do you hear?, What are you doing?, Are you getting out of bed?, Do you think they might be important?

The item was terminated in the same way whether or not subjects reported hearing the noises. They were told that "...your mind works like a tape-recorder and has probably recorded that information. Later on when you will be out of hypnosis again and you think about that particular night you will remember clearly everything that happened that night". Following these instructions it was suggested that it was the next morning and subjects were asked to describe what they were doing upon awakening. Following this, the age regression was terminated and the hypnotic session resumed.

The Experiential Analysis Technique

This technique was developed by Sheehan et al. (1978) and later modified by Laurence and Perry (1981). The technique involves subjects viewing, with a second experimenter, and commenting on preslected segments of the videotape playback of their hypnotic session.

Accordingly, following the hypnosis session subjects were introduced to a second experimenter (C.P.) who interviewed them using the EAT. The entire interview was audiotaped. The experimenter told the subjects that he would show them parts of the videotape of the session and that he would ask them to describe how they felt, subjectively, at the time. They were encouraged to ask the

experimenter to stop the videotape at any point if they wanted to comment on something in particular. The experimenter proceeded to place the video in the "forward-search" position and stopped it at preselected points during the session (i.e., at the beginning of each item). Thus, a set of standardized questions were asked to the subjects (e.g., What happened there?, How did that feel?, What was that experience like?....).

During the memory creation item the experimenter stopped the videotape at the beginning of the age regression item and asked "What happened there?" The subjects were then asked whether their experience during the age regression was more like a) reliving the situation, b) vividly imagining it, c) remembering it, or d) something else. Subjects were encouraged to describe their experience. The subjects were also asked if they remembered more information about that particular night with hypnosis. If subjects did not spontaneously mention that (1) the hypnotist suggested some noises or that (2) they remembered, in hypnosis, that they were awakened by noises, the interviewer asked the following question: "Then she suggested you'd go to sleep; what happened then?" All subjects who mentioned being awakened by some noises were asked if this was something that had actually happened on that night, or whether this was something that the hypnotist suggested. When subjects reported that it was something that actually happened they were shown the section on the

videotape in which the hypnotist had suggested the noises. They were then asked if they still believed that the noises had really occurred. Finally, many subjects who spontaneously remembered that the hypnotist suggested some noises were asked if they had any idea why the hypnotist did this. This was intended as an indirect evaluation of the demand characteristics of the test situation (Orne, 1962).

Finally, at the end of the EAT they were debriefed and thanked for their participation in the study.

In sum, the interviewer's main task during the EAT was to question subjects in order to determine whether they believed that the suggested noises had actually occurred or had been suggested.

Other Measures

All subjects completed two questionnaires following testing on the HGSHS:A. The first was the Tellegen "Absorption" Scale (TAS) of Tellegen (1981, 1982; Tellegen & Atkinson, 1974) (see Appendix D). The TAS is a 34 item questionnaire which measures individual's involvement in fantasy, new experiences and "absorbing" events. Each item is answered by a True or False statement and the total score is determined by summing all True answers.

Tellegen and Atkinson (1974) reported a factor analysis of a 71-item questionnaire considered to represent at least five content areas: Absorption, Dissociation, Trust, Impulsiveness and Relaxation. The factor analysis revealed that seven subscales of this questionnaire loaded on the

first factor: Absorption, fantasy absorption, dissociation, openness to experience, devotion-trust and autonomy-criticality. Tellegen and Atkinson (1974) labeled this factor "Openness to Absorbing and Self-Altering Experiences" or "Absorption" (p. 271). The alpha internal consistency coefficients of reliability ranged from .48 to .74 for each subscale. Isaacs (1982) reported an internal consistency coefficient of reliability of 0.89 for the TAS.

The second questionnaire that subjects completed during the HGSMS:A session was an 18-item shortened version of the Personal Experiences Questionnaire (PEQ) of Shor, Orne and O'Connell (1962) (Evans, 1982), (two subjects did not complete this questionnaire) (see Appendix E). This questionnaire measures subjects' willingness to report the occurrence of hypnotic-like experiences outside of the hypnotic context. Each question is answered by a Yes or No statement. The total score is determined by summing all Yes answers.

The questionnaire can be divided into two subscales: controlled and automatic absorption (Evans, personal communication, October 22, 1984). The nine items contained in the controlled absorption subscale involve aspects of voluntary cognitive processing (e.g., "Have you ever been able to make a daydream seem real?"). The items which form the automatic absorption subscale involve aspects of involuntary cognitive processing (e.g.; "Have you ever had strange images---vivid and real as life---flow into your

mind, seemingly out of nowhere?"). No reliability data have been reported thus far (Nadon, 1983).

Finally, all subjects completed the Preference for an Imagic Cognitive Style Test (PICS) of Isaacs (1982) (see Appendix F) following testing on the SSHS:C. This questionnaire measures subjects' Preference (as opposed to ability) for imagic thinking. This test was designed to reduce social desirability effects, which may exist in other available self-report imagery scales; this appears to be effected by presenting verbal and imagic cognitive styles as being as equally desirable (Isaacs, 1982).

Subjects are first asked to read the instructions for the test. Following this, they are given the opportunity to "think about" (as opposed to imagine) three scenarios, in turn. Subjects are given one or two minutes to think about each scenario. Following each of the scenarios, subjects answer four forced-choice questions, one for each of four subscales (Verbal, Imagery, Absorption, and Effort).

Isaacs (1982) reports alpha internal consistency coefficient ranging from 0.58 for the absorption subscale, 0.61 for the effort, 0.69 for verbal, and 0.75 for the imagery subscale. The total score on the PICS is determined by subtracting the scores of the Verbal and Effort subscale from the Imagery plus the Absorption scores. The scores range from -22 to +24.

Results

The present results replicated Laurence and Perry's (1983) findings that it is possible to create a pseudo-memory with the use of hypnosis. Results extended these prior findings in that it was found that both high-medium and high susceptible subjects are vulnerable to pseudo-memory suggestions. By contrast, low hypnotizable subjects were found not to be affected by the memory creation procedure. Additionally, hypnotizability, preference for an imagic cognitive style and their interaction were found to predict a significant proportion of variance in response to this procedure.

Preliminary Analyses

Before presenting the main results of the study, the interrelation among the variables will be examined.

One-way analyses of variance (ANOVA) were performed on the following variables: PICS, the four PICS subscales (i.e., Imagery, Absorption, Verbal, and Effort), TAS, PEQ, Controlled and Automatic Absorption subscales of the PEQ, with hypnotizability (low, high-medium and high) as the grouping factor. Five of the nine measures demonstrated a significant ANOVA. Table 1 shows the measures of central tendency for these variables along with the groups found to significantly differ from each other using Tukey's Honestly Significant Difference Test (HSD).

The five variables showing a significant one-way ANOVA are as follows:

- 1) PICS (global score) ($F(2,29) = 6.07; p < .006$).

Table 1
Measures of Central Tendency for the Five Variables
Showing a Significant One-way ANOVA

| Variables | Hypnotic Susceptibility | | |
|--------------------------------|----------------------------|--------------------|--------------------|
| | Low | High-Medium | High |
| PICS Global | 4.25(a)(b) (6.96) | 10.92(a) (4.85) | 12.63(b) (4.65) |
| Imagery Subscale of PICS | 9.50(a)(b) (2.61) | 12.61(a) (1.85) | 12.72(b) (1.79) |
| Effort Subscale of PICS | 6.12(a) (1.35) | 5.46 (1.66) | 4.09(a) (1.37) |
| TAS | 16.12(a)(b) (6.37) | 23.46(a) (5.73) | 26.72(b) (4.56) |
| PEQ Global | 9.12(a) (3.64) | 12.92 (3.79) | 14.77(a) (2.68) |

Note. Group means are indicated first; standard deviations are indicated in parentheses.

Note. Means sharing the same subscript (a or b) are significantly different from each other at $p < .05$, at least.

Tukey's HSD post hoc test revealed that high and high-medium susceptible subjects reported a significantly greater preference for imagic style of thinking than low susceptible subjects ($HSD (3,29) = 5.87; p < .05$).

2) The Imagery subscale of the PICS ($F (2,29) = 7.71; p < .003$).

High and high-medium susceptible subjects reported a greater use of imagery than low susceptible subjects ($HSD (3,29) = 2.23; p < .05$).

3) The Effort subscale of the PICS ($F (2,29) = 4.73; p < .02$).

Low susceptible subjects reported significantly more effort than high susceptible subjects ($HSD (3,29) = 1.63; p < .05$).

4) The TAS ($F (2,29) = 8.68; p < .001$).

High and high-medium susceptible subjects reported being significantly more absorbed than low susceptible subjects ($HSD (3,29) = 6.04; p < .05$).

5) The PEQ ($F (2,27) = 5.85; p < .008$).

High susceptible subjects reported a significantly greater degree of involvement in "hypnotic-like" experiences than low susceptible subjects ($HSD (3,27) = 3.78; p < .05$).

Pearson Product Moment Correlations were performed between the following variables: PICS (global score), the four PICS subscales (i.e., Imagery, Absorption, Verbal, Effort), TAS, PEQ, the two PEQ subscales (i.e., controlled and automatic absorption) and SHSS:C. The intercorrelation matrix is shown in Appendix G.

Results of these analyses validated the

representativeness of the present sample. Results of the ANOVA are very similar to those obtained by Nadon (1983) in that PICS, TAS and PEQ were all found to significantly discriminate between hypnotizability groups. Further, the intercorrelation matrix revealed correlations consistent with values reported in the past. For example, PICS, TAS and PEQ were significantly related to SHSS:C scores ($r = .50$, $p = .003$; $r = .64$, $p = .001$; $r = .56$, $p = .001$, respectively). Further, TAS and PEQ were highly correlated ($r = .84$, $p = .001$).

Pseudo Memory Creation Item

The pseudo-memory creation item was scored by having three independent judges listen to the audio tape recording of the EAT. Subjects were rated as (a) incorporating the suggested memory, (b) as exhibiting confusion as to the origin of the suggested noises or (c) failing the memory creation item. The raters agreed on 93.75% of the protocols.

Overall, 7 subjects (4 high, 3 high-medium) were rated as incorporating the memory creation item, 4 subjects (1 high, 3 high-medium) were rated as exhibiting confusion as to the origin of the suggested noises and 21 subjects were rated as failing the memory creation item.

The following are excerpts of the EAT for two subjects rated as having incorporated the suggested memory. It is important to note that all subjects reported, in a prehypnotic interview, that they were certain that they had

not awakened during the night in question.

Subject #31

I: Then she said you'd go to sleep, what happened there?

S: You know, it was that time leading up to when I went to sleep and when I went to sleep and I recalled a lot more of what occurred while I went to sleep. In fact because she asked me if I got up in the night and I said "No". But I did, I could remember that now. In fact I took-

I: What had happened there?

S: I just, just when she said, you know, under hypnosis, she was going through the hours of sleeping and I recalled that at one point I actually took the pillows from one end of the bed and put them to the other and then turned around. And then later on in the night, I reversed, so when I woke up I was in the same place I went to bed in.

I: But this was something you'd done in your sleep or...?

S: Yeah.

I: Uh-Uh.

S: But woken up slightly.

I: Was there anything that woke you up?

S: Birds.

I: Birds.

S: Yeah, birds, I live in the suburbs and we have very loud birds.

I: I see, so you were woken up temporarily by birds?

S: By birds.

I: And then stuck your pillows at the other end

S: Exactly.

I: And bunked down on the other end

S: 'cause, you see, my headboard is right by the window, you see, my (laugh).

I: And that was something that happened, it wasn't something she suggested?

S: No, it was something that actually happened, yeah, I could remember that now.

I: You sure of that?

S: Yeah.

I: What if I told you it was something she suggested.

S: I'd be very surprised.

I: (Shows the video of the suggested noises). What do you think about that now?

S: How did I hear them, or...?

I: Well, do you think that, you know, you still really heard them or...?

S: I'm sure I heard, well also, it's a thing that I hear them often enough, like let's say, you know, not every day but I had been woken up by them before so.

I: So, do you recall now that she suggested you'd hear some noises?

S: Yeah, that I heard birds, I didn't hear anything else, it was Saturday so...I didn't hear any city, well I don't live in the city, so I didn't hear any city noises and every one in my house was asleep so, that was it.

I: You're fairly certain that it did happen that night?

S: I'm fairly certain, yeah."

Subject #17

I: O.K., what happened then, she suggested that you'd go to sleep?

S: And then she asked me if I could hear any noises. And I remembered, I have a neighbor upstairs whose is rather young she's a student and she gets up very early Saturday morning and she put on her sound system full blast. And I'm so used to it that I just, at first I just opened my eyes and then turned right over. I turned over and I could hear the bass of the song Life is Life. I just don't know how to forget this, turned over and pulled the blankets over my head and said I'm sleeping more.

I: So this was something that Louise suggested or something that actually happened?

S: It happened, it's just I don't remember it. She'd asked me if I had awoken and to me, I don't know, it was kind of like, sometimes, you know, you wake up in the middle of the night and you don't even remember the next day.

I: Let me get this straight, is this something that happened last Saturday morning or something she suggested or...?

S: No it actually happened.

I: It actually did happen?

S: Yeah, in the interview before the hypnosis, I didn't really really remember.

I: So it was something that you remembered...?

S: Afterwards.

I: When she suggested it in hypnosis.

S: Yeah.

I: Well, let me get an idea of it. Say on a 1 to 10 scale of confidence, where 1 is just unsure and 10 is totally confident, how confident are you of it?

S: About a 7 or an 8. But then again, this is a very normal occurrence, my neighbor is always pretty like, she's like a clock. But sometimes I don't even remember all I know is when I wake up, I hear the music and-

I: What is it every morning or just every Saturday?

S: Every Saturday morning she's up at around seven and she puts on her music full blast, she does her housecleaning and then at 9 she splits. She's like that."

Subjects exhibiting confusion as to the origin of the suggested noises were not as adamant as those exhibiting certainty. The following is an excerpt from the EAT of a subject rated by all judges as exhibiting confusion.

Subject #13

I: What was she saying when you started listening?

S: She started talking about, I don't know, what time it was. She started talking about "you're hearing sounds now" and that's when I sort of started listening to her again.

I: And did you hear some sounds?

S: I heard a car screeching, like tires screeching.

I: Did you think that they were, you know, things that you remembered from that night?

S: I don't know whether if they were or not, it possibly,

could have been because I live right downtown and it could have been but I don't know that they were just like suggestions that she'd given me and that I'd heard or it could very well have been, but I don't remember now.

I: What do you think is the most likely; something that happened or something that she suggested?

S: It's most likely something that happened because she didn't suggest, she suggested a door banging or something like that whereas, where I, like, it would most, because I always leave my window open anyway and it's right down on Dorchester, so it could very well have been something like that.

I: So you think that it's most probably something that did happen, but you're not sure of it, is this right?

S: Yeah, I don't remember waking up at all, but then I could have, a lot of time I don't remember, so.

I: Say if I was to ask you, you know, to give you a confidence scale of 1 to 10 where 1 is guessing and 10 is you're extremely confident, how confident would you say you are that it was something that actually happened that night?

S: Probably around 5."

By contrast, many subjects who reported hearing the noises during the hypnosis session correctly identified their source in the EAT. For example, subject #9:

I: Right, O.K. So then she suggested that you'd go to sleep and (as you did that night) what happened there?

S: Sort of, then my thinking sort of got like more free form

and sort of more dreamlike, more, you know, and then she suggested that if I heard any noises and she suggested maybe like a gunshot or this or that and I heard a door slam, the garage, but the way she was talking it was actually as if I was, if I had actually, if that noise, she asked me if "did it wake you up?" and I said "no" 'cause I was just, went on sleeping 'cause I was talking about a dream. And the way she was talking about as if it was reality. For me I was just like dreaming.

I: Was it something that happened that night or?

S: I don't know, I don't remember dreaming that dream then. Normally, I remember my dreams if I think of them right in the morning. There is no way I could exactly know what I dreamt then.

I: So it's more likely to be something you dreamt is that right?

S: My guess would be that I just imagined, I just had sort of a dream now, as if I'd dreamed it then. But I don't know, I could have dreamt it then. But then, then I didn't have someone suggesting to me that I'd hear a car slam, so."

These protocols are very similar to those reported by Laurence (1983). Subjects whose memories were changed were either very certain about their memory or exhibited confusion about the origins of their memory. By contrast subjects rated as failing the item either heard the noise during the hypnosis session and identified their accurate source in the posthypnotic interview or denied hearing the

noises during the hypnotic session.)

For the purpose of statistical analysis, subjects exhibiting confusion were considered as having passed the pseudo-memory creation item since they were no longer certain that they had not awakened (i.e., their memories were changed). Thus, 45.45% (5 out of 11) of high, 46.15% (6 out of 13) of high-medium and 0% of low susceptible subjects were rated as passing the pseudo-memory creation suggestion.

T-tests were performed to examine differences between means in the group that passed and the group that failed memory creation on the following variables: PICS, the four PICS subscales (i.e., Imagery, Absorption, Verbal, and Effort), TAS, PEQ, Controlled and Automatic Absorption subscales of the PEQ and SHSS:C. Five of the ten measures demonstrated a significant t-test. Table 2 shows the measure of central tendency for these variables.

The five variables showing a significant difference between subjects who did and did not rate the suggested pseudo-memory as veridical were:

- 1) PICS (global score) [$t(30) = 3.79$; $p = .001$].
- 2) The Imagery subscale of the PICS [$t(30) = 4.31$; $p = .001$].
- 3) The Absorption subscale of the PICS [$t(30) = 2.74$; $p = .01$].
- 4) TAS [$t(30) = 2.41$; $p = .005$].
- 5) SHSS:C [$t(30) = 2.44$; $p = .005$].

On all these variables, subjects in the group that passed

Table 2

Measures of Central Tendency for the Five Variables
Showing a Significant T-test

Memory Creation

Variables

| | Pass | Fail |
|-------------|--------|--------|
| PICS | 14.63 | 7.33 |
| Global | (3.55) | (5.82) |
| Imagery | | |
| Subscale of | 13.90 | 10.80 |
| PICS | (0.83) | (2.29) |
| Absorption | | |
| Subscale of | 12.18 | 10.57 |
| PICS | (1.32) | (1.69) |
| Tas | 26.45 | 20.80 |
| | (2.97) | (7.42) |
| SHSS:C | 9.54 | 6.23 |
| | (1.80) | (4.27) |

Note. Group means are indicated first; standard deviations are indicated in parentheses.

memory creation had higher scores than subjects in the group that failed memory creation.

The relation between hypnotizability and the occurrence of memory creation was further examined. For the purpose of this analysis, the high and the high-medium susceptible groups were combined and compared to low susceptible subjects. The relation between these two variables was found to be significant (Fisher's Exact $p = .02$) (see Table 3).

Discriminant Analyses

The relation between the variables and memory creation was examined further in a multivariate framework. Hierarchical discriminant analyses maximizing Rao's V were performed in order to statistically discriminate between subjects who passed and those who failed the pseudo-memory creation item.

Because subjects were originally selected on the basis of their hypnotizability, SHSS:C was forced first into the analysis. PICS was forced second on the basis of findings that indicate the importance of imagery in producing hypermnnesia (a phenomenon which may be related to memory Creation) and on the basis of the reality monitoring model of Johnson and Raye (1981). This model proposes that good imagers are more vulnerable than poor imagers to confusing memories of fantasies with memories of real events. Further, according to the model, automaticity in responding reduces information regarding cognitive operations which are

Table 3

Relationship between Hypnotizability and
the Occurrence of Memory Creation

| | | Hypnotizability | |
|--------------------|---------|----------------------------|-----|
| | | High and High-medium | Low |
| Memory Creation | Absent | 13 | 8 |
| | Present | 11 | 0 |

Fisher's exact $p = .02$

helpful cues in distinguishing between these two types of memories (this model will be discussed at greater length in the discussion section of this paper). Thus, because the PICS measures both preference for an imagic cognitive style and amount of effort placed in imagery, it was entered second into the analysis. The TAS was forced to enter third in the equation. Following evaluation of these main effects the three two-way interactions between the variables were allowed to compete for entry at steps four, five and six of the equation (this is executed in a stepwise fashion). Finally, the three-way interaction between SHSS:C, PICS and TAS was forced into the equation.

Three significant predictors emerged from the analysis. Both the SHSS:C and the PICS accounted for a significant proportion of the grouping variance at steps 1 and 2, respectively. Thus, the PICS was able to account for a significant proportion of the grouping variance at step 2 that had not been accounted for by the SHSS:C. At step 3 of the analysis the TAS did not produce a significant increase in Rao's V . At step 4 the interaction between SHSS:C and PICS entered the equation and accounted for a significant increase in V . Finally, the two-way interactions between PICS and TAS, and SHSS:C and TAS and the three-way interaction between SHSS:C, PICS and TAS did not account for significant increases in V at steps 5, 6, and 7, respectively. The order of entry of the predictor variables, the corresponding F values, and the changes in V for each step of the analysis are presented in Table 4.

Table 4

Step-by-Step Change in Rao's V for the Hierarchical
Discriminant Analysis Using the Variables: SHSS:C, PICS, TAS
and their Interactions

| Step | Measure | F-to-enter | df | Change in V |
|------|---------------------|------------|------|------------------|
| 1 | SHSS:C | 5.94* | 1,30 | 5.94** |
| 2 | PICS | 7.82** | 1,29 | 9.70** |
| 3 | TAS | 0.71 | 1,28 | 1.16 |
| 4 | SHSS:C X PICS | 5.12* | 1,27 | 8.88** |
| 5 | PICS X TAS | 0.10 | 1,26 | 0.21 |
| 6 | SHSS:C X TAS | 0.00 | 1,25 | 0.00 |
| 7 | SHSS:C X PICS X TAS | 0.43 | 1,24 | 1.00 |

* $p < .05$. ** $p < .01$.

The discriminant function was found to be significant [$\chi^2(7) = 16.96; p < .02$]. The canonical correlation between group membership and the discriminant function was equal to .69 indicating that the function accounted for 47% of the variance in the grouping variable. Further, with the use of this discriminant function 84.38% of subjects in the sample were classified correctly.

There are reasons, however, for performing another discriminant analysis. First, the variable TAS and all interactions containing this variable did not add any significant discriminating power to the discriminant function (as indexed by the non significant changes in Rao's V). Secondly, the classification of cases phase of a discriminant analysis uses all variables that enter the equation in order to generate subjects' classification scores. That is, even variables not contributing significantly to the separation of groups are considered in this phase. Finally, one of the main objectives in using multivariate techniques is to obtain as much predictive power as possible using as few variables as possible. Thus, a second hierarchical discriminant analysis was performed using only the variables which were found to be significant in the first analysis.

In this analysis, the SHSS:C variable was again forced to enter first, the PICS was forced second and the interaction between these two variables was entered last into the equation. Again, all variables produced significant increases in V at their respective steps. The

order of entry of the predictor variables, the corresponding F values, the change in V and the percentage of correct classification for each step of the analysis are presented in Table 5. The discriminant function was found to be significant [$X^2(3) = 16.07$; $p < .001$]. The canonical correlation between group membership and the discriminant function was equal to .66 indicating that the function accounted for 43% of the variance of grouping variable.

Total and unique variance in memory creation explained by SHSS:C, PICS, and their interaction was calculated. The former values are equivalent to r^2 and the latter to squared semipartial correlation coefficients (sr^2) in multiple regression analysis (Tabachnick & Fidell, 1983, p. 322). That is, each variable's contribution is assessed with the other variables partialled out. The total proportion of variance in memory creation accounted for by SHSS:C was equal to .17, for PICS it was .32. The overlap between these variables was equal to .15. Thus, the unique contribution of SHSS:C or the squared semipartial correlation between SHSS:C and Memory Creation was .02 [$F(1,28) = .88$, $p > .05$], for the PICS it was .17 [$F(1,28) = 8.61$, $p < .05$]. Thus, almost all of the variance explained by SHSS:C is also explained by PICS, which also contributed an additional unique 17% of the grouping variance. By definition the interaction between these two variables is completely orthogonal to its main effects (Cohen & Cohen, 1983; p. 213). The Sr^2 of the interaction term was equal to .09 [$F(1,28) = 4.43$, $p < .05$]. The relation between

Table 5

Step-by-Step Change in Rao's V and Correct Classification
for the Hierarchical Discriminant Analysis using Variables
SHSS:C, PICS and their Interaction.

| Step | Measure | F-to-enter | df | Change in V | % of Correct Classification |
|------|---------------|------------|------|----------------|--------------------------------|
| 1 | SHSS:C | 5.94* | 1,30 | 5.94* | 59.38 |
| 2 | PICS | 7.82** | 1,29 | 9.70** | 75.00 |
| 3 | SHSS:C X PICS | 4.34* | 1,28 | 7.08** | 81.25 |

*p < .05. **p < .01.

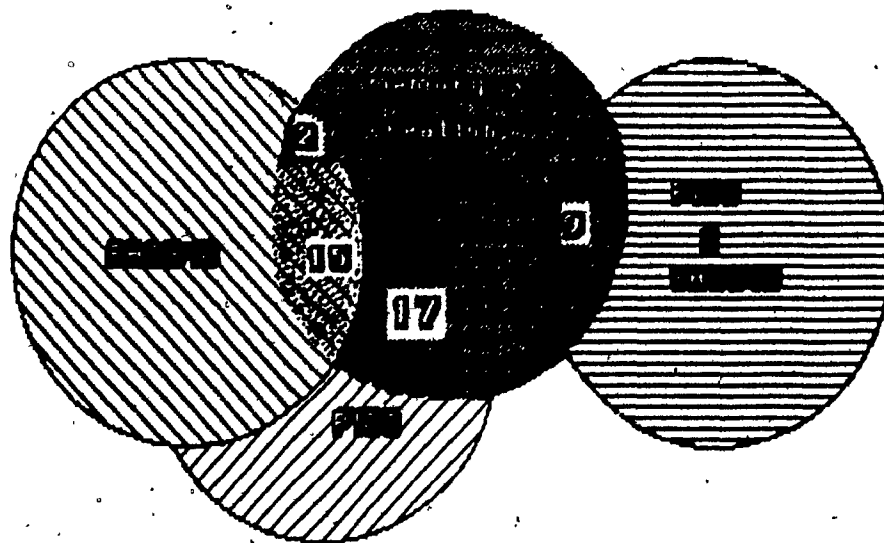
these variables and pseudo-memory creation is shown schematically in Figure 1.

The nature of the interaction between SHSS:C and PICS was examined. Because discriminant analysis with two groups is mathematically identical to multiple regression, (Tabachnick & Fidell, 1983) multiple regression terms will be used in the following discussion for reasons of clarity. The presence of an interaction in the discriminant analysis described above means that the regression of memory creation on SHSS:C depends on (or varies with) the level of PICS or, equivalently, the regression of memory creation on PICS is dependent on the level of SHSS:C (Cohen & Cohen, 1983). In other words, each value of SHSS:C defines a different regression line of memory creation on PICS and vice versa. In order to facilitate the understanding of an interaction, Cohen and Cohen (1983, p. 329) have suggested that three representative equations for each predictor variable be generated.

In this manner, the regression of memory creation on SHSS:C was examined at three levels of PICS. A tri-median split was performed and the resulting three representative PICS scores were inserted in turn into the discriminant equation. The resulting three slopes provide a description of this interaction.

Similarly, in order to observe the regression of memory creation on PICS, as moderated by SHSS:C, three representative values of SHSS:C were selected. Since subjects were selected on the basis of their hypnotizability

Figure 1. Schematic Representation of the Shared and Unique Contribution of Variables PICS, SHSS C, and their Interaction to Memory Creation.



Note. The variance accounted for by each variable is expressed in percentage.

and since three groups of subjects were sampled (i.e., low, high-medium, high); the means for each of these groups were used to calculate the three representative equations.

Table 6 shows the regression equations of memory creation on SHSS:C as moderated by PICS and on PICS as moderated by SHSS:C. With a "low" value of PICS there is little or no linear regression of memory creation on SHSS:C (i.e., slope = $-.03$). As the values of PICS increase the slope of memory creation on SHSS:C becomes steeper. The relation between memory creation and PICS was similarly moderated by SHSS:C. That is, at "low" values of SHSS:C there is little or no linear regression of memory creation on PICS; as the values of SHSS:C increase the regression slope becomes steeper. In other words, a subject with high scores on both SHSS:C and PICS has a greater probability of exhibiting memory creation than a subject with a high score on only one of these variables.

In the second phase of discriminant analysis, all cases (i.e., subjects) in the sample are classified into the group on which they obtain the highest classification score. Table 7 shows the step-by-step classification of subjects into either the group that passed or the group that failed the pseudo-memory creation suggestion. At Step 1 of the analysis (in which only the SHSS:C served to generate classification scores) the subjects exhibiting memory creation were almost all correctly classified (i.e., 81.8%) whereas subjects failing the pseudo-memory creation were approximately equally classified into both groups. At Step

Table 6

Regression of Memory Creation on SHSS:C as Moderated by
PICS and on PICS as Moderated by SHSS:C

Regression Equation of Memory Creation on SHSS:C with
varying degrees of PICS:

$$\hat{Y} = (-.124 + .023 \text{ PICS})\text{SHSS:C} + (.022 \text{ PICS} - 1.3)$$

Letting PICS = 4, 10.34, and 13 results in the equations:

"Low" (PICS = 4.0): $\hat{Y}_L = -.030 \text{ SHSS:C} - 1.20$

"Medium" (PICS = 10.34): $\hat{Y}_M = .119 \text{ SHSS:C} - 1.06$

"High" (PICS = 13): $\hat{Y}_H = .182 \text{ SHSS:C} - 1.00$

Regression Equation of Memory Creation on PICS with varying
degrees of SHSS:C:

$$\hat{Y} = (.022 + .023 \text{ SHSS:C})\text{PICS} + (-.124 \text{ SHSS:C} - 1.3)$$

Letting SHSS:C = 1.3, 8.3, and 10.7 results in the
equations:

"Low" (SHSS:C = 1.3): $\hat{Y}_L = .053 \text{ PICS} - 1.46$

"Medium" (SHSS:C = 8.3): $\hat{Y}_M = .219 \text{ PICS} - 2.33$

"High" (SHSS:C = 10.7): $\hat{Y}_H = .275 \text{ PICS} - 2.63$

Table 7

Step-by-step Prediction of Group Membership
for Each Step of the Discriminant Analysis
(SHSS:C, PICS and their Interaction "Forced")

| Step | Actual Membership | | | |
|------|-------------------------|------|-------------------------|------|
| | Pass Memory Creation | | Fail Memory Creation | |
| | Predicted Membership | | Predicted Membership | |
| | Pass | Fail | Pass | Fail |
| 1 | 81.8 | 18.2 | 52.4 | 47.6 |
| 2 | 90.9 | 9.1 | 33.3 | 66.7 |
| 3 | 81.8 | 18.2 | 19.0 | 81.0 |

Note. Values are presented in percentages.

2 of the analysis, the classification of the group failing the pseudo-memory suggestion improved slightly. Finally, at Step 3 both groups of subjects are approximately equally correctly classified (i.e., 81.8% of subjects exhibiting memory creation and 81.0% of subjects failing the suggestion). Thus, the interaction between SHSS:C and PICS (Step 3) served to increase the correct classification of subjects not exhibiting memory creation. This increase of correct classification from Step 1 to Step 3 was significant [McNemar's repeated-measures chi-square test for change: $X^2(1) = 4.0$; $p < .05$; (see Tabachnick & Fidell, 1983, p. 329)]. The percentage of cases correctly classified was equal to 81.25% at Step 3. This was statistically significant ($Z = 3.35$; Binomial $p = .001$, two-tailed) (see Seigel, 1956, p. 40).

Finally, a last hierarchical discriminant analysis was performed excluding the low hypnotizable subjects. The purpose of this analysis was to examine whether memory creation could be predicted in subjects of high and high-medium hypnotizability (i.e., subjects who are equally likely to be vulnerable to pseudo-memory suggestions). The SHSS:C was not included in this analysis since approximately the same percentage of high and high-medium hypnotizable subjects passed the pseudo-memory suggestion (i.e., hypnotizability is not related to memory creation among these subjects). The PICS was forced to enter first, followed by the TAS, followed by their interaction.

The PICS accounted for a significant proportion of the

grouping variance at Step 1 of the analysis. At Step 2, the TAS approached but did not produce a significant increase in Rao's V (i.e., $p = .07$). The interaction between PICS and TAS was not significant and did not enter the analysis. The order of entry of the predictor variables, the corresponding F values, and the changes in V for each step of the analysis are presented in Table 8.

The discriminant function was found to be significant [$\chi^2(2) = 10.54$; $p = .005$]. The canonical correlation between group membership and the discriminant function was equal to .63 indicating that the function accounted for 39% of the variance in the grouping variable. The total contribution of PICS was equal to .336, for TAS it was .069. The unique contribution of the variables PICS and TAS was calculated. The squared semipartial correlation between PICS and memory creation was .33 [$F(1,28) = 16.47$; $p < .01$], for the TAS it was .06 [$F(1,28) = p < .10$]. The relation between the variables PICS and TAS and pseudo-memory creation is shown schematically in Figure 2.

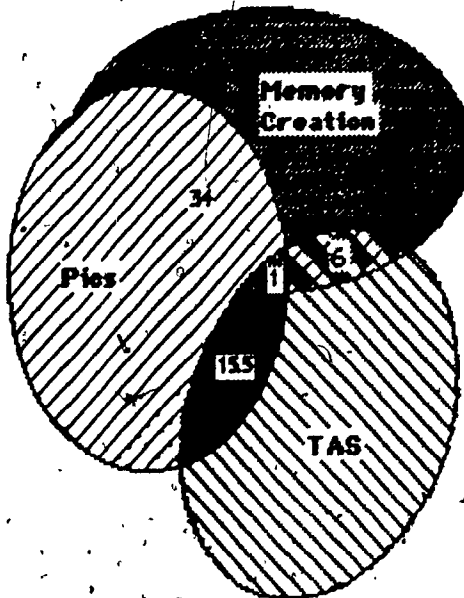
Table 9 shows the step-by-step classification of subjects into either the group that passed or the group that failed the pseudo-memory creation suggestion. At Step 1 of the analysis (in which only the PICS served to generate the classification scores) approximately 73% of subjects exhibiting memory creation were correctly classified. The percentage of subjects correctly classified failing the item was close to 69%. At Step 2 the number of subjects

Table 8

Step-by-Step Change in Rao's V for the Hierarchical
Discriminant Analysis Using the Variables: PICS, TAS
and their Interaction

| Step | Measure | F-to-Enter | df | Change in V | p |
|------|---------|------------|------|------------------|-------|
| 1 | PICS | 11.17** | 1,30 | 11.17 | .0008 |
| 2 | TAS | 2.01 | 1,29 | 3.17 | .0747 |

Figure 2. Schematic Representation of the Shared and Unique Contribution of Variables PICS and TAS to Memory Creation



Note. The variance accounted for by each variable is expressed in percentage.

Table 9

Step-by-step Prediction of Group Membership
for Each Step of the Discriminant Analysis
(PICS and TAS "Forced")

| Step | Actual Membership | | | |
|------|-------------------------|------|-------------------------|------|
| | Pass Memory Creation | | Fail Memory Creation | |
| | Predicted Membership | | Predicted Membership | |
| | Pass | Fail | Pass | Fail |
| 1 | 72.7 | 27.3 | 30.8 | 69.2 |
| 2 | 81.8 | 18.2 | 23.1 | 76.9 |

Note. Values are presented in percentages.

correctly classified increased for both groups. This increase of correct classification from Step 1 to Step 2 was not statistically significant [McNemar's repeated-measures chi-square test for change: $\chi^2(1) = 0.5$; $p > .25$]. The percentage of cases correctly classified was equal to 79.17% at Step 2. This was statistically significant ($Z = 2.65$; Binomial $p = .009$, two-tailed).

Other Measures

Quality of Age Regression

Twenty-six subjects were rated in terms of the quality of the age regression they experienced. This was done by having three judges listen to the EAT conducted following the experimental session. The judges rated subjects' age regression experience in terms of (1) "reliving", (2) vividly imagining or (3) remembering the suggested experience. The three judges agreed on 75% of the protocols. The mean agreement rate when two (instead of three) judges were considered was 81%. The judges discussed their disagreements and in all cases a final rating was given in a manner which satisfied all judges.

The relation between hypnotizability and the quality of age regression that subjects experienced was examined. For the purpose of this analysis, subjects of high and high-medium susceptibility levels were combined into a single group. The categories "remember" and "vividly imagining" were combined also. The relation between these two variables was found to be significant (Fisher's Exact $p =$

.0001) (see Table 10).

The relation between pseudo-memory creation and the quality of age regression experienced was examined also. Again the categories "remember" and "vividly imagining" were combined for the purpose of this analysis. The relation between these two variables was found to be significant (Fisher's Exact $p = .03$). The relation between these two variables is shown in Table 11.

Quality of Verbal Protocols³:

The content of subjects' prehypnotic and hypnotic verbal descriptions as well as their comments during the EAT of the evening they chose to report were classified in terms of three types of qualitative attributes: (a) The mention of a "factual" statement (e.g., "I watched T.V.", "I went to bed"), (b) the mention of a "rationalization", that is, a statement made to justify a memory [e.g., "because I don't usually wake up when they pass by (referring to fire trucks)"], and (c) the use of "verbal hedges" (see Schooler, Gerhard & Loftus, 1986), such as "I think" or "I'm not sure" or "I'm pretty sure".

Three 2 by 3 Analyses of variance (ANOVA) were performed with one within-subjects factor [time (pre and during hypnotic descriptions)] and one between-subjects factor [hypnotizability (three levels)] on the number of facts, rationalizations and verbal hedges that subjects expressed. In each of the three analyses a main effect for time was observed [$F(1,27) = 7.21, p < .01$, for facts;

Table 10
 Relation between Quality of Age Regression
 and Hypnotizability

| Quality of Age Regression | | |
|------------------------------------|--------|----|
| Remember or Vividly Imagined | Relive | |
| Low | 8 | 0 |
| High and High-medium | 7 | 16 |

Fisher's exact $p = .0001$

Table 11
Relation between Quality of Age Regression
and Memory Creation

| | | Quality of Age Regression | |
|--------------------|---------|------------------------------------|--------|
| | | Remember or Vividly Imagined | Relive |
| Memory Creation | Absent | 13 | 8 |
| | Present | 2 | 8 |

Fisher's exact $p = .03$

$F(1,27) = 3.96, p < .05$, for rationalizations; and $F(1,27) = 5.31, p < .02$ for verbal hedges]. While the number of facts increased during hypnosis, the number of rationalizations and verbal hedges decreased. The source tables for these analysis can be found in Appendix H. The measures of central tendency for these variables can be found in Appendix I.

Two 2 by 2 ANOVA were performed with one within-subjects variables [time (pre and during hypnotic descriptions)] and one between-subjects variable [memory creation (presence or absence)]. Main effects for time were observed for facts and verbal hedges [$F(1,28) = 8.59, p < .006$; $F(1,28) = 5.73, p < .02$, respectively]. These analyses revealed that the number of facts increased during hypnosis while the number of verbal hedges decreased. The source tables for these analysis can be found in Appendix J. The measures of central tendency for these variables can be found in Appendix K.

One-way analyses of covariance were performed on the number of facts, rationalizations and verbal hedges that subjects stated during the EAT, with hypnotizability as the grouping factor. During the EAT subjects were answering questions asked by an interviewer. Since the extent to which the subjects described the memory creation item was directly related to the number of questions they were asked, it was decided to covary the number of questions that subjects were asked about this item so that all groups would

be equated on this variable. No main effects were observed among the three analyses. The source tables for these analyses can be found in Appendix L; the measures of central tendency are shown in Appendix M.

One-way analyses of covariance were also performed on the number of facts, rationalizations and verbal hedges that subjects stated during the EAT, with memory creation (pass/fail) as the grouping factor and the number of questions asked as the covariate. One of these analyses revealed that the group that passed the memory creation item stated significantly more rationalizations in the EAT [$F(1,27) = 10.40$; $p < .005$] than the group that failed the item. The source tables for these analyses are shown in Appendix N; the measures of central tendency are in Appendix O.

Discussion

Results of the present study served both to corroborate and extend the work of Laurence and Perry (1983) and Laurence et al. (1986). The finding that it is possible to create a pseudo-memory in highly susceptible subjects with the use of hypnosis replicates the earlier results of these authors. Their results were extended by the finding that high-medium hypnotizable subjects also gave evidence of memory creation. Further, a positive relation between hypnotic susceptibility and memory creation vulnerability was established by the finding that low susceptible subjects failed to exhibit any form of memory distortion.

Importantly, the combination of hypnotic susceptibility and preference for an imagic cognitive style was found to be a stronger predictor of pseudo-memory creation than either of these factors considered in isolation.

Memory Creation in Clinical and Legal Settings

Nearly one hundred years ago, Bernheim (1891; cited by Laurence & Perry, in press) anticipated the finding that highly susceptible subjects are most vulnerable to the incorporation of suggested memories. The present study supported and extended this hypothesis in that medium susceptible subjects (in the higher range of this interval) are vulnerable also to this procedure. Bernheim's claim was also substantiated by the finding that subjects of low hypnotic susceptibility did not experience memory distortions.

This malleability of memory was used to clinical advantage by Janet (1889), who was the first author to report using hypnosis therapeutically for altering traumatic memories. Contemporary clinicians have rediscovered the phenomenon of pseudo-memory creation in hypnosis (e.g., Baker & Boaz, 1983; Miller, 1986). The present findings suggest that individuals of at least moderate hypnotizability, particularly those individuals with a pronounced preference for an imagic style, may be the most likely to benefit from this type of clinical intervention.

In the forensic context, Orne (1979) has argued that the memories of victims or witnesses of a crime could be modified, unbeknown to both hypnotist and subject, by the use of hypnotic techniques. For this reason, Orne, Soskis, Dinges, E. Orne, & Tonry (1984) have developed a series of guidelines to be followed when hypnosis is used with a witness prior to trial. The guidelines aim to minimize the danger of altering a person's memories of a crime during the hypnotic interview. The relation between imagery preference and memory creation in the present study supports the view, however, that ostensibly different and less problematic procedures for "refreshing" memory, such as guided imagery, may be equally hazardous (see Perry & Nadon, 1985; Perry & Nogrady, 1985).

Among other safeguards, the Orne et al. (1984) guidelines specify that the witness and the hypnotist should be alone in the room in which the interview takes place.

This is recommended in order to prevent the possibility of other people in the room cueing the witness (e.g., nodding to express approval, or head shaking in disapproval). The guidelines also recommend that all interactions between the hypnotist and witness be recorded on video tape. This requirement makes it possible to evaluate the extent to which a witness may have been inadvertently cued by the hypnotist (see Orne et al., 1984 for a complete transcript of the guidelines).

It is important to note, however, that these guidelines do not prevent pseudo-memory creation; they merely facilitate the evaluation of such a possibility. In fact, there are no absolute safeguards against the possibility of pseudo-memory creation. In the forensic setting there exists no way to distinguish between a "true" and a "pseudo" memory in the absence of hard physical evidence. Accordingly, Orne et al. (1984) recommend that "hypnotically refreshed" memories not be used as evidence in court if they are not accompanied by independent corroboration, especially if the event or detail is mentioned for the first time in hypnosis.

It should be noted that presently, in the Canadian legal system, there are no laws which state that all parties in a case should be notified that a witness has been hypnotized. In order to avoid potential miscarriages of justice this information should be required to be disclosed (in much the manner that courts require mandatory reporting of the details of police line-up procedures).

Reality Monitoring and Memory Creation

Johnson and Raye (1981) define reality monitoring as "the processes by which a person attributes a memory to an external or an internal source" (p. 67). Externally generated memories are said to result from perception whereas internally generated ones result from imaginal and thought processes. Central to Johnson and Raye's model are the cues that people use in order to distinguish between these two types of memories and the circumstances under which the memory sources are confused.

One major factor thought to affect the extent of confusion a person displays is the nature of the memory trace itself. The representations of externally generated memories are said to contain more contextual (spatial and temporal) information and sensory details. By contrast, the representation of internally generated memories are said to contain more operational attributes (i.e., cognitive operations that are performed while imagining, or thinking). This latter distinction is based on the assumption that perception is more automatic than imaginal processing; thus imaginal processing results in more cognitive operations. Other information, such as prior knowledge, may also be considered when a decision as to the source of a memory must be made. For example, a person may remember a vivid dream about a money tree but would not confuse this memory with an externally generated one since money does not grow on trees!

Finally, metamemory assumptions [i.e., beliefs that people possess about mnemonic processes (Schacter, 1986)] may influence a person's decision as to the source of a memory (e.g., "I wouldn't forget something like that").

According to the reality monitoring model, good imagers should be able to generate details of imaginal experiences better than poor imagers. The generation of such elaborate detail could lead to a memory trace that is similar in quality to a trace of a perceptual experience. Thus, because of the qualitative overlap between traces emanating from real and imagined experiences, good imagers may be more prone to confusion than poor imagers. Further, according to the model, if less effort is placed in imagining, fewer cognitive operations should be contained in the memory trace. These cognitive operations usually constitute cues that the memory is internal. Thus, the combination of high imagery ability and effortless experience should increase the probability of confusion.

This hypothesis was supported by the main effect observed in the present study for the PICS. The PICS not only measures imagery preference but also amount of effort placed in generating imaginal thinking. Further support for the contention that effortless experience may increase confusion comes from the finding of a main effect for hypnotizability. In fact, P. Bowers (1978; 1982) found that hypnotizability was related to effortless experiencing of suggestions.

Finally, the significant interaction between these

variables suggests that individuals who possess both high hypnotic abilities and high imagery preference are particularly vulnerable to suggested distortions of memory. Sarbin and Coe (1972) have defined the hypnotic experience as "believed in imaginings" and J. Hilgard (1970/79), as "imaginative involvement". Thus, it could be argued that low hypnotizable subjects, even if they have good imagery, do not believe in their imaginings. These conceptualizations are reflected by the the finding of a flat regression line between memory creation and PICS at low levels of SHSS:C.

Johnson and Raye's (1981) argument that metamemory assumptions can also affect a person's judgement as to the source of a memory can also help to explain why certain subjects accepted the suggested memory as true. Subjects' beliefs about the effects of hypnosis on memory can be considered as part of their metamemory assumptions. Many studies have shown that laypeople believe that hypnosis is an effective method for retrieving previously forgotten memories (e.g., Labelle, Lamarche, Laurence, 1987; McConkey & Jupp, 1986; Orne et. al 1985). In the present study, the instructions during the pseudo-memory creation item emphasized the notion of increased accuracy of recall in hypnosis. These instructions may have encouraged subjects to accept the "new" memory as accurate. Thus, subjects' failure at distinguishing external and internal memories in this case may have been in part fostered by their assumptions (i.e., "hypnosis increases memory - therefore my

hypnotic recall is more reliable than my non hypnotic one").

In another line of enquiry, Schooler, Gerhard and Loftus (1986) have examined subjects' descriptions of real as opposed to unreal memories (memories of objects whose existence had merely been suggested). In experiment 1, subjects viewed a slide sequence involving a traffic accident. In one condition, subjects saw a sequence involving a yield sign. In a second condition subjects did not see a yield sign but had its existence suggested. Many subjects later reported seeing the sign and later provided verbal descriptions of it. The verbal descriptions of both types of memories were compared.

The descriptions of real memories were found to contain more sensory attributes (e.g., shape, color, size). By contrast, the descriptions of suggested memories contained more references to cognitive processes (i.e., what the subject was thinking about or paying attention to while viewing the critical slide). These memories also contained more verbal hedges (e.g., "I think", "I believe").

Schooler, et al. (1986) have demonstrated that differences exist between subjects' descriptions of "true" and "untrue" memories. Thus in the present experiment post hoc analyses of subjects' protocols were conducted in order to see if differences between susceptibility levels and/or in response to the memory creation item would lead to qualitatively different descriptions of the evening they chose to report. Results showed that hypnotizability and response to the pseudo-

memory creation item did not produce significant differences in terms of subjects' prehypnotic and hypnotic description of the night in question. It is interesting to note, however, that the quality of reports changed during hypnosis (i.e., a main effect for time was observed). Number of facts increased during hypnosis while the number of verbal hedges and rationalizations (with hypnotizability as the grouping variable only) decreased.

This finding may also be explained in part by subjects' metamemory assumptions. If subjects believe that what is recalled in hypnosis represents "a true state of affairs" they might conclude that their hypnotic recall is necessarily accurate. This finding may also shed light as to why many studies have found that hypnosis increases subjects' confidence in their recall whether or not the memory is true (e.g., Button, 1986, Dywan & Bowers, 1983).

The analysis of subjects' description after the experimental session (i.e., during the EAT) revealed a different pattern. Here, hypnotizability level did not produce differences between descriptions of the evening. When response to the memory creation procedure served as the grouping factor, however, differences in the quality of the protocols were observed. The group of subjects that passed the memory creation item stated more rationalizations than the group that failed the item. That is, subjects whose memory had been altered made more statements that were aimed at justifying their claims.

This finding is consistent with Schooler et al.'s (1986) finding that subjects' descriptions of "unreal" memories contained more references to cognitive processes (e.g., "I think", "I believe"). These authors argued that their subjects may have lacked reference to sensory details of the memory and may have compensated for this by justifying their memory. Similarly, in the present study, subjects exhibiting memory creation may have lacked reference to attributes associated with externally generated memories (e.g., sensory, spatial, temporal) and compensated for this by rationalizing their new memory.

More research is necessary in order to better identify dimensions along which "real" and "unreal" memories differ. One important use of such knowledge is that in the absence of a reference point, the analysis of verbal protocols could help reveal whether a memory was self or externally generated.

In summary, it can be concluded that metamemory assumptions may contribute to the vulnerability of the individual to memory creation. While one's belief system may contribute to memory creation to some degree, the present work indicates that relatively stable attributes of the individual, such as hypnotic susceptibility and preference for an imagic thinking style, are of paramount importance in determining the manifestation of created memories.

The present study testifies to the importance of these variables considered in isolation. Perhaps a fruitful line

of investigation would be to look at interactions among metamory, and individual differences along the hypnotizability and imagery dimensions.

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Footnotes

1. Erickson refers the reader to a 1934 paper in which he describes the procedure for hypnotically inducing a complex in subjects. The procedure is very interesting but again cannot be considered as an example of the memory creation phenomenon. While in hypnosis subjects were told stories of a reproachable act that they were said to have committed; following which amnesia for the hypnotic suggestions was induced. Erickson then presented words to subjects who were to respond with the first word that came to mind. He found that 9 out of 12 highly hypnotizable subjects behaved, post-hypnosis, in a manner which was consistent with the induced complex. That is, they responded with words which were related to the complex story more often than control subjects. Unfortunately, since subjects were always rendered amnesic for the story they were never asked questions which would ascertain whether or not they truly believed that they had committed the reproachable act.

2. The posthypnotic amnesia suggestion of the SHSS:C requires that the subject experiences a failure of memory after termination of hypnosis. It is one of the most difficult items to experience. In order to "pass" this item, the subject must recall three or fewer items before the amnesia suggestion is reversed. For this reason it was decided to use the response to this suggestion as the criterion to distinguish between high-medium and high susceptible subjects.

3. Six subjects who had previously participated in

experiments in the hypnosis laboratory had already been tested on Evans and Thorn's (1966) questions. Therefore a set of six new questions were devised for these subjects only. All questions, except for the first one, were taken from the popular board game Trivial Pursuit. The questions were the following:

- 1) What is the square root of 9? (3).
- 2) How many days are there in the month of September? (30).
- 3) Who discovered Jamaica? (Christopher Columbus).
- 4) What is the fifth largest country in the world? (Brazil).
- 5) How many U.S. states border the Pacific Ocean? (5).
- 6) Spare Question: What do you call an infant whale?
(Calf).

One disagreement involved subject #21. Two judges rated this subject as confused whereas the third rated her as passing the memory creation item. This issue was resolved by assigning a conservative "confused" rating to this subject since two of the three judges agreed on this rating. The other disagreement involved subject #17. This time, two judges rated this subject as failing the memory creation item whereas the third rated him as confused. Again the issue was resolved conservatively by assigning a rating of failing the memory creation item since two of the three judges agreed on this rating.

The PEQ was not inserted in this analysis in view of its high correlation with the TAS (.84) and because Nadon et al. (in press) found that this variable is redundant with TAS.

Also, because the present study was exploratory in nature it was important to keep a subject to variable ratio of approximately 10 to 1 in order to minimize the chance of sample specific results.

Both discriminant analysis yielded a significant Box's M test. This is a test of homogeneity of variance-covariance matrices (a central assumption of discriminant analysis).

Group variances and covariances were computed and it was found that the larger group (i.e., the group of subjects not passing the memory creation item) was associated with larger variances and covariances on all variables (i.e., SHSS:C, PICS, TAS, and interactions). When larger groups are associated with larger variances and covariances a conservative alpha level is produced. Thus a finding of significant differences under these conditions may be accepted with confidence (see Tabachnick & Fidell, 1983; p. 233).

Six subjects did not describe their age regression experience in the experimental session in sufficient detail for the judges to be able to make a rating. For five of these subjects ratings of the quality of age regression were gathered from previous studies they had completed. The other subject was excluded from the analysis since he had never described his experience in sufficient detail.

In a recent article Schooler, Gerhard and Loftus (1986) have examined the verbal descriptions of subjects' memories. Some of these subjects described objects that they had actually perceived whereas others described objects whose

existence had merely been suggested (out of the hypnotic context). These authors found differences between the descriptions of these two groups. Based on this finding it was decided to analyze the protocols of subjects in the present study in terms of qualities similar to those proposed by Schooler et al. It must be noted, however, that this was a post hoc idea and therefore the protocols are not of equal length nor did all subjects respond to the same number of questions. The purpose of these analyses was to explore the possibility of including this type of scoring in future research.

APPENDIX A

Informed Consent Form for the
Experimental Session

Informed Consent Form

Background Information for Participation in
Research Studies in the Hypnosis Laboratory,
Department of Psychology

Name: _____

Telephone: _____

The research carried out with volunteer subjects in the Hypnosis Laboratory of the Department of Psychology includes a number of continuing research projects. Our studies are concerned with understanding more about the nature of hypnosis and various hypnotic phenomena. The success of our research depends upon the assistance of volunteers like yourself and we are very grateful for your participation.

Please sign this form after reading the following section: Today I am volunteering to participate in a research study which will involve the individual administration of a combination of standardized hypnotic test items (e.g., arm levitation which will be tested by holding my arm out and seeing if it moves upwards; arm rigidity which will be tested by holding my arm out and seeing if it becomes rigid; hypnotic age regression where you will be asked to go back to a recent evening in your past, etc...); my participation will also involve discussing my experience of hypnosis. I understand that I will receive a nominal payment of \$10.00 for my participation in today's session.

Signature: _____

Investigator: _____

Date: _____

APPENDIX B

Description of the Six Items Tested
in the Experimental Session

Hand Levitation: This item was adapted from Reiser (1980).

In this item subjects are asked to imagine that there is a helium balloon attached to their right hand and arm, that the hand and arm are getting lighter and lighter and that the hand and arm begin to follow the balloon upwards. This type of item has traditionally been labeled as an ideomotor item. That is, just thinking about a movement causes a tendency to produce that movement. Placing such an item at the beginning of a hypnotic session is appropriate since approximately 90% of subjects pass the item and this in turn appears to enhance the rapport between hypnotist and subject. The criterion for passing the hand levitation suggestion was that the hand lifted two inches or more from the armrest of the chair.

Arm Rigidity: This item was taken from the SSHS:C (Weitzenhoffer & Hilgard, 1962). In this item suggestions are given that the arm is becoming progressively "more stiff and more rigid... so that it's becoming progressively more difficult to bend". This item has traditionally been labeled as a challenge item. Once the arm has become stiff and rigid subjects are "challenged" to try to bend it. The challenge type items are more difficult than the ideomotor ones (i.e.; fewer subjects pass the challenge items than ideomotor items) and for this reason the arm rigidity item was placed immediately following the hand levitation item. The criterion for passing the arm rigidity item was that the arm bent less than two inches.

Finger forehead: This item was adapted from Perry and

Mullen (1975). In this item, subjects are asked to close their eyes and to place their index finger on the top of their forehead. They are then asked to roll their eyes upwards and imagine that they have X-Ray eyes and can look through their head and see their finger. Subjects are then asked to try to open their eyes while looking at their fingertip. Thus, this item contains a suggestion to hallucinate a fingertip. The item was scored positively if the eyes remained shut. Although few people are aware of this, in fact, it is impossible to open the eyes while they are rolled upwards. This suggestion was included in the experimental session in order to give the low susceptible subjects the subjective impression that they were capable of responding to at least some suggestions.

Memory Creation item: This item has been described in detail in the Introduction and Method sections. Also, Appendix C contains a verbatim transcript of this item.

Refer to these sections for information about this item.

Source Amnesia: This item was taken from Evans and Thorn (1966) (see footnote 3). In this item subjects are provided with little known facts on certain topics (e.g.; "Lewis Carroll is the famous author of "Alice in Wonderland", apart from that, what was his primary occupation?"). Few subjects know the answer to these questions. After subjects have responded either with a false answer, or a report of "I don't know", they are given the correct answer (e.g., mathematician). Up to four such "difficult" questions are

asked. After all questions have been asked once (and the correct answer provided by the experimenter) the questions are asked a second time to ensure that subjects have learned the answers. At the end of the hypnosis session, during the recall test of the posthypnotic amnesia suggestion, the questions are asked again (if the subject did not mention them in his/her recall). Typically, subjects exhibiting the source amnesia phenomenon are able to give the correct answers to the questions but have forgotten that they learned them in hypnosis. When asked how they know these answers, subjects manifesting source amnesia often report that they don't know or else they rationalize their answers (e.g.; "I must have learned it in one of my literature courses in high school"). If this happens the item is scored positively.

Posthypnotic Amnesia: This item was taken from the SHSS:C of Weitzenhoffer and Hilgard (1962). In this item subjects are told that they will forget all that has happened during the hypnosis session until the hypnotist gives them a prearranged cue during the posthypnotic enquiry (i.e.; "Now you can remember everything"). If subjects remembered two or fewer items of the experimental session the posthypnotic amnesia suggestion was scored positively.

APPENDIX C

Transcript of the Experimental Session

First of all, I would like you to take a few moments to choose one of last week's evenings. An evening where you went to sleep and did not dream and did not wake up during the night. In a few moments I am going to ask you to describe that evening in detail. And later on, when you will be hypnotized, I am once again going to ask you to describe that particular evening. So think about last week's evenings and tell me which evening you are going to choose to describe to me. And I'm mostly interested in the last half-hour before you went to sleep.

(Subject reports)

That's fine... First, I'd like you to think about and remember in as much detail as possible what you did that evening, especially the half-hour before you went to sleep... You will be able to remember what has happened, because everything that has happened even if you do not recall it now, everything is recorded in your mind and you can remember it... (PAUSE)

So can you go ahead now and describe that evening.

(Subject gives account of evening)

Now tell me: What time did you go to sleep that night?

What time did you wake up the next morning?

Did you wake up at any time during the night?

Are you certain of that?

Do you remember dreaming during the night?

Are you certain?

Note: If subject reports waking up or dreaming, probe for

details; if need be ask subject to choose another night.

GO TO RELAXATION

Relaxation

First of all, get yourself comfortable in the chair... just move around until you find a comfortable position... notice the back of the chair is adjustable... just get comfortable and relaxed...

optional: and unclasp your hands and let them just rest loosely on your lap, or on the arm of the chair,

optional: and uncross your legs and let them find a comfortable position on the footrest of the chair.

And if at any time during the session you find that this position is uncomfortable you can simply adjust it to a more comfortable one without in any way disturbing the hypnosis.

I'd like you to look at the orange dot on the door... and just focus your vision on it. I shall refer to the dot as the target. In the meantime, I'm going to give you some simple instructions that will help you experience hypnosis. You'll find the instructions easy to follow and that you'll be able to experience the things I describe to you... As you stare at the target, you may find that occasionally your gaze may wander or that your vision may even blur... If this happens, simply refocus your vision and continue staring evenly at the target... Now take a deep breath in and hold it... hold it until it starts to feel a little uncomfortable... And then just let it out very slowly... You find that you start to experience a comfortable feeling... a feeling of well-being begins to develop as you continue to

rest in the chair... looking at the target... listening to my voice... Now take another deep breath in and hold it... notice the feeling of tightness and tension in your abdomen... and then... as it starts to feel uncomfortable... just as you did before... let it out very slowly... notice that breathing out... with letting the tension out of your lungs, makes you become even more aware of a feeling of comfort and well being settling over you... Just sink deeper into the chair... and focus your attention closely on feelings of warmth and relaxation in various parts of your body... In your head and in your neck... in your arms and in your legs... in your chest and in your back... and just breathe freely and evenly and deeply... freely... evenly... and deeply... not too quickly... not too slowly... just at a comfortable rate for you to notice that the relaxation increases gradually... as you breathe out...

You may even be aware of the walls of your chest growing looser... (PAUSE)... Continue relaxing your chest so that feelings of warmth and comfort irradiate to your back... your shoulders... and your neck... and your arms... and your legs... You're probably starting to notice some changes in the target... changes that occur from staring at it for so long... sometimes the target may look as though it's moving up and down or from left to right... at times it may appear very distinct and clear... at other times it may appear fuzzy and blurred... and it may change color... you may see one of these things or even all of these things... whatever

you see just continue staring at the target... continue listening to my voice... continue to become more deeply relaxed... more deeply relaxed. And as you watch the target your eyelids become heavier... your eyes become tired from staring... your eyelids start to feel very tired and heavy... as you sit there breathing freely and evenly and deeply... your eyelids are becoming so heavy... so tired... that soon they will just close of their own accord... as if they were coated with a lead paste... as if there were magnetic fields in the eyelashes... drawing your eyelashes together...

Concentrate now... even more carefully... on feelings of relaxation and comfort in various parts of your body...

First of all think of relaxation in the muscles of your left arm... the left hand... the fingers of the left hand... the left forearm... the left upper arm... the left shoulder...

And then relax the muscles of the right arm... the right hand... the fingers of the right hand... the right forearm... the right upper arm... the right shoulder...

Think of relaxation in each of these areas... and as you think of relaxation the muscles become progressively more relaxed... and then relax the muscles of your neck... your chest and... your back... relax each of these muscle groups... the neck... the chest... and the back...

And as you relax these muscles... your facial muscles will also relax and loosen of their own accord... Then relax the stomach muscles by doing this... Tighten your stomach muscles... make your abdomen hard... and then when you're

ready... let the tension out... Notice the feeling of well-being that comes with relaxing your stomach muscles... like a gentle massaging action all over your stomach and even perhaps... up to your chest... And then relax the muscles of your legs... the right leg... the right foot... try to feel it in the toes of the right foot... and then in the right calf... and then the right thigh... then the left leg... the left foot... the toes of the left foot... the left calf... the left thigh... Just thinking about relaxation in each of these areas causes the muscles to become more relaxed... and you may even find an interesting thing happens... that the feelings of relaxation you feel in each of these areas of the body start to spread and irradiate... so that they may seem to join up... like the parts of a jigsaw puzzle... and you feel a deep feeling of overall relaxation... of contentment... and of well-being permeating the whole of your body...

With your eyes closed... you're ready to experience hypnosis... to experience it profoundly... but you'll find that no matter how deeply relaxed you ever feel... no matter how deeply in hypnosis you ever feel... your mind is always clear... you're always aware of my voice and what I'm saying to you... you're aware of what is happening to you... even though you are deeply relaxed... deeply in hypnosis... You will remain deeply in hypnosis until I ask you if you would like to come out of hypnosis... You will experience many things... you will experience many things just for as long

as I ask you to experience them. --

And you will be able to speak to me when I speak to you...

to open your eyes... and to move around while remaining

deeply hypnotized... whatever you experience or do... you

will remain deeply hypnotized... deeply in hypnosis...

You can now go even deeper in hypnosis... Say to yourself,

just by thinking it, "Now I'm going deeper and deeper".

Think it to yourself... and imagine yourself standing at the

top of an escalator. Visualize the scene of the

escalator... of the steps moving down... and picture the

moving hand rail... Count backwards slowly from 10 to 1,

imagining as you count, that you are stepping onto the first

step of the escalator and standing with your hand on the

railing while the steps move down... carrying you deeper and

deeper... into hypnosis. You can plan it so that you reach

one just as you reach the bottom and step off the escalator.

And to indicate to me that you have reached one, the index

finger of your right hand will lift up slowly... and I'll

know that you have reached one... more and more deeply

relaxed as you start counting backwards... (WAIT FOR

SIGNAL)... You are deeply relaxed... deeply hypnotized.

Arm Levitation

Now, I would like you to pay close attention to your right

hand and arm... Pay close attention to your right hand and

arm now... and as you are thinking about your right hand and

arm... you may even feel your fingers twitching slightly...

And now, imagine that there is a balloon attached to your

wrist... A balloon, filled with helium is attached to your

wrist... And now your hand and arm feel lighter and lighter... more and more weightless as the balloon gently tugs at your wrist... Your hand and arm feel more and more light... more and more weightless... and soon you will find that your hand and arm begin to follow the balloon upwards... upwards in the air... Upwards towards a beautiful blue summer sky... Your hand and arm now feel light as air... light as a balloon... Your hand and arm are now drifting along with the balloon in the clear blue sky... Your hand and arm feel so light and so weightless... so light... and so weightless.

(PAUSE 10 SECONDS)

That's fine... now just let your hand and arm return to their original position... There is no longer a balloon attached to your hand... Just let them rest there... All the normal sensations are now returning to your hand and arm... There, your hand and arm now feel quite normal... You are deeply relaxed... deeply in hypnosis...

Arm rigidity

Now hold your left arm out at shoulder height... left arm out at shoulder height... and imagine that the left arm is becoming stiff... and straight... and rigid... stiff and rigid... like a bar of steel... stiff and stiffer and more straight and more rigid... so that it's becoming progressively more difficult to bend... that's how stiff and rigid it's becoming... it's becoming like a bar of steel... Test how stiff and straight and rigid it's become... try to

bend it... try very hard...

(PAUSE, FOR 10 SECONDS)

That's fine... don't try any more to bend it... just relax that arm and return it to its original position... the arm is no longer stiff and rigid... all the normal sensations have returned to it... and there is no feeling of tiredness or fatigue from trying so hard to bend it when it was so stiff and rigid... Continue to relax... and to enjoy the pleasant feelings of being deeply hypnotized... deeply in hypnosis...

Finger Forehead

Now, I would like you to experience something. Keep your eyes closed and place one of your index fingers on the top of your forehead... That's right, just place your index finger on the top of your forehead... Now with your eyes closed, roll your eyes upwards and look at your fingertip through the top of your head... and imagine that you have X-Ray eyes and you can look through your head and see your finger... Just try to see your finger through your head...

(PAUSE)...

Do you see it?

(IF YES) Can you describe to me what you are seeing?

(IF NO) Fine just take a few more moments and keep looking at your fingertip through the top of your head... and you should see your finger... (PAUSE)... Do you see it now?

(IF YES) Fine, can you describe what you see?

(IF STILL NO)... Just keep staring and maybe you can focus on the pressure point that your finger is making on your

forehead... Do you feel it?

(IF YES) Can you describe what that feels like?

(IF STILL NO KEEP GIVING SUGGESTIONS UNTIL SUBJECT
ACKNOWLEDGES BLUR)

Now that you see your finger clearly, keep staring at it intently... Now in a moment you will discover something interesting... I'm going to ask you to open your eyes... You will find that as long as you are looking at your fingertip, through the top of your head, you will be unable to open your eyes. As long as you are staring at your fingertip through your head, you will be unable to open your eyes... Now just try to open your eyes while looking at your fingertip... now... just try... That's fine, don't look at your finger anymore... Return your hand to its original position... Just keep your eyes closed and relax all the muscles in your eyes... just relax... There will be no fatigue or strain on your eyes from staring at your finger... Just relax...

Memory Creation item

In a few moments you will find yourself going back through time to about a week ago. You will be reliving the particular events of the evening of last week which you mentioned to me at the beginning of this session... Reliving the particular events of last (day of the week; adapt for each subject) evening. You're going back to the night of (day and date) 1986. In a few moments you will be there again reexperiencing the events of that particular evening

and night.

I will count slowly from 3 to 1 and as I do you will find yourself going back through time, back to the night of (day and date) 1986.

3... going back to the night of (day and date) 1986. In a few moments you will be there again reexperiencing the events of that particular evening and night...

2... you are nearly there now... back on (day and date) 1986, about half an hour before going to sleep...

1... back there now... back on (day and date) 1986 half an hour before going to sleep... and to indicate to me that you are back on (day and date) 1986, just let the index finger of your right hand lift up, so that I will know that you are back on (day and date) 1986, about half an hour before going to bed.

(Subject reports)

That's fine. Now I would like you to describe to me what you are doing... Be as detailed as possible in describing to me what you are doing...

First of all tell me what time it is.

(Subject reports)

That's fine... Soon you'll be getting ready for bed... It is now (repeat time subject gave) and you are getting ready to go to bed... You are reliving these moments clearly and vividly, and sometimes it may even happen that you will relive moments and details THAT YOUR CONSCIOUS MIND HAS FORGOTTEN... BUT YOUR SUBCONSCIOUS IS REMEMBERING THEM... Now tell me about this half hour as you are going to bed...

(Subject reports... Probe for details)

That's fine... It is now approximately (one half hour later than subject reported) and you are falling asleep... And you will sleep like this until tomorrow morning, (Say time at which subject reported waking up the next morning). You are sleeping now and time goes by... ~~You are~~ sleeping now and time goes by... It is now... (one hour later than bedtime; adapt for each subject)... and you are still deeply asleep... and time goes by... It is now... (one hour steps) ..., ..., (until half way through the night)... perhaps and I want you to tell me whether you hear some loud noises. Some loud noises that may sound like back-firings of a car, or door slamming... some loud noises. Listen carefully and tell me when you hear them (Pause).

(IF NO ANSWER)

Do you hear them? (IF STILL NO)

alright just attend carefully... Now tell me it's around (adjust for every subject)... o'clock... tell me whether you become aware of them now?

(Subject reports)... (if subject still denies hearing the noises, go on to the following...)

That's fine... maybe you are too deeply asleep to be bothered by the noises. But as I told you before... YOUR MIND WORKS LIKE A TAPE-RECORDER AND HAS PROBABLY RECORDED THAT INFORMATION. LATER ON WHEN YOU WILL BE OUT OF HYPNOSIS AGAIN AND YOU THINK ABOUT THAT PARTICULAR NIGHT YOU WILL REMEMBER CLEARLY EVERYTHING THAT HAS HAPPENED THAT NIGHT...

Now just continue to relax (GO TO THE END OF ITEM).

IF YES ANSWER

Do they wake you up?

(Subject reports)

That's right... Go on... And perhaps you look at your clock, and see what time it is...

(Subject reports)

And tell me what the noises sound like...

How many noises do you hear?

What are you doing?

Are you getting out of bed?

Do you think they might be important?

That's all right... Just continue to relax and you go to sleep again... AS I TOLD YOU BEFORE, YOUR MIND WORKS LIKE A TAPE-RECORDER AND HAS PROBABLY RECORDED THAT INFORMATION.

LATER ON WHEN YOU WILL BE OUT OF HYPNOSIS AGAIN AND YOU THINK ABOUT THAT PARTICULAR NIGHT YOU WILL REMEMBER CLEARLY EVERYTHING THAT HAS HAPPENED THAT NIGHT... (Go to the end of item)

End of item

You are going back to sleep again and very soon you will find yourself awakening the next morning. It is now (give time at which subject reported waking up)... and you are waking up. Can you tell me what you are doing?

(Subject reports)

That's fine... Now listen carefully to what I am saying.

These scenes are starting to fade now and you are coming back through time, coming back through time to today, (day

and date)... deeply hypnotized, relaxed and comfortable.
 You are back to today, (day and date) deeply relaxed, deeply hypnotized... And to indicate to me that you are back to (day and date), just let your index finger lift up again so that I'll know that you are back to today (day and date)...

Source Amnesia

This time I'm going to ask you a few questions. This is a test of general knowledge. Some questions will be harder than others, but do not worry if you cannot answer them all... Other people cannot answer all the questions either... Listen carefully to each question before giving me the answer...

Here's the first question...

1. What is the capital city of England? (London)
2. Who is the Prime Minister of the province of Quebec? (Robert Bourassa)
3. An amethyst is a blue or a purple gemstone. What color does it become when it is exposed to heat? (Yellow)
4. How many moons revolve about the planet Venus? (None)
5. Lewis Carroll is the famous author of "Alice in Wonderland". Apart from that, what was his primary occupation? (Mathematician)

Spare Question:

What is the difference between the antennae of a moth and the antennae of a butterfly? (The antennae of a moth have long, furry hairs)

... REPEAT QUESTIONS THAT HAVE BEEN MISSED UNTIL SUBJECT CAN

ANSWER THEM CORRECTLY.

That's fine. As you can see you are able to learn in this state of deep relaxation... of deep hypnosis... And you will find that it will be easy to remember these answers... You continue to remain completely relaxed... deeply in hypnosis.

Dehypnotization and Amnesia

In a little while I'm going to ask you if you would like to come out of hypnosis... and if you would I will count slowly from one to ten... you will come out of the state you are in slowly and gradually until at seven your eyes will open gently but you will not be completely un hypnotized... and at ten you will be fully roused up... in your normal state of alertness... When you come out of hypnosis... you will feel very refreshed... and invigorated... and full of vitality... which will persist for quite a long time after you have left this room... It will be the sort of feeling of exhilaration you feel when you've awakened from a very deep and dreamless sleep... just like a deep and dreamless sleep... so deep... and so dreamless in fact that at first you may have difficulty in remembering anything that has happened since this hypnosis session began...

You'll try hard to remember... you'll try ~~very~~ hard... but it will be very difficult to remember anything at all... and you may not be able to remember a single thing...

But later on... I will say to you... Now you can remember everything and the events of this session... everything that has happened will return to you with complete vividness and clarity...

That's when I say to you... now you can remember
everything... Up until then you'll find it very difficult to
remember anything... Now just rest there for a while
enjoying the warm... pleasant... and very tranquil
sensations of being in hypnosis... and in a little while I
will ask you if you would like to come out of hypnosis...
and if you would... I will count slowly from one to ten...
(Pause for one minute)

Are you ready to come out of hypnosis now?

O.K. I'm going to count from one to ten... 1 - 2 - 3 - 4 -
5 - 6 - 7 - 8 - 9 - 10--- Wide awake now... wide awake...

How do you feel?

APPENDIX D.

Tellegen's Differential Personality Questionnaire

Scale Ab (TAS)

(Tellegen and Atkinson, 1974)

Auke Tellegen, Ph.D.
University of Minnesota, 1978

DIFFERENTIAL PERSONALITY QUESTIONNAIRE: Scale Ad

In this booklet you will find a series of statements a person might use to describe his or her characteristics.

Each statement is followed by two choices -- True and False.

Read the statement and decide which choice better describes you. Then circle your answer on the answer sheet.

Please answer every statement if you are not completely sure of the answer. Read each statement carefully, but don't spend too much time deciding on the answer.

In marking your answers on the answer sheet, please be sure that the number of the statement in the booklet is the same as the number on the answer sheet.

1. Sometimes I feel and experience things as I did when I was a child.
2. I can be greatly moved by eloquent or poetic language.
3. While watching a movie, a television show, or a play, I may become so involved that I forget about myself and my surroundings and experience the story as if it were real and as if I were taking part in it.
4. If I stare at a picture and then look away from it, I can sometimes "see" an image of the picture, almost as if I were still looking at it.
5. Sometimes I feel as if my mind could envelop the whole world.
6. I like to watch cloud shapes change in the sky.
7. If I wish, I can imagine (or daydream) some things so vividly that they hold my attention as a good movie or story does.
8. I think I really know what some people mean when they talk about mystical experiences.
9. I sometimes "step outside" my usual self and experience an entirely different state of being.
10. Textures -- such as wool, sand, wood -- sometimes remind me of colors or music.
11. Sometimes I experience things as if they were doubly real.
12. When I listen to music, I can get so caught up in it that I don't notice anything else.
13. If I wish, I can imagine that my body is so heavy that I could not move it if I wanted to.
14. I can often somehow sense the presence of another person before I actually see or hear him or her.
15. The crackle and flames of a wood fire stimulate my imagination.
16. It is sometimes possible for me to be completely immersed in nature or in art and to feel as if my whole state of consciousness has somehow been temporarily altered.

17. Different colors have distinctive and special meanings for me.
18. I am able to wander off into my own thoughts while doing a routine task and actually forget that I am doing the task, and then find a few minutes later that I have completed it.
19. I can sometimes recollect certain past experiences in my life with such clarity and vividness that it is like living them again or almost so.
20. Things that might seem meaningless to others often make sense to me.
21. While acting in a play, I think I could really feel the emotions of the character and "become" him or her for the time being, forgetting both myself and the audience.
22. My thoughts often don't occur as words but as visual images.
23. I often take delight in small things (like the five-pointed star shape that appears when you cut an apple across the core or the colors in soap bubbles).
24. When listening to organ music or other powerful music, I sometimes feel as if I am being lifted into the air.
25. Sometimes I can change noise into music by the way I listen to it.
26. Some of my most vivid memories are called up by scents and smells.
27. Certain pieces of music remind me of pictures or moving patterns of color.
28. I often know what someone is going to say before he or she says it.
29. I often have "physical memories"; for example, after I've been swimming I may still feel as if I'm in the water.
30. The sound of a voice can be so fascinating to me that I can just go on listening to it.
31. At times I somehow feel the presence of someone who is not physically there.
32. Sometimes thoughts and images come to me without the slightest effort on my part.

33. I find that different odors have different colors.

34. I can be deeply moved by a sunset.

APPENDIX E
Personal Experiences Questionnaire
(PEQ)
(Evans, 1982)

PERSONAL EXPERIENCES QUESTIONNAIRE
Form CA-79

Name : _____ Date : _____

Description and Instructions

A great many phenomena are considered common and everyday in one culture and bizarre or even pathological in another. Hallucinations, for example, are eventually experienced by every male Crow Indian during his maturation process--he must see his Guardian Spirit in order to become a man. In our society, however, when an individual has such an experience, he rarely reports it since he feels it is at best peculiar. Yet the Yogi or Zen Buddhist deliberately seeks mystical or transcendental experiences which are considered in their culture among the highest expressions of the human intellect.

It is hard to get honest reports on things which are sometimes intensely personal. The present questionnaire is based on extensive interview data with normal subjects where it became obvious that such experiences are very common even though rarely spoken of. Please take this questionnaire seriously as we are concerned with getting a true approximation of the incidence of some of these experiences in a normal college population.

We are interested in experiences which have happened spontaneously in the natural course of living, and not as a

result of special techniques such as hypnosis, the experimental sensory-deprivation situation, or by means of drugs that cause hallucinations (such as lysergic acid, marijuana, or mescaline). Experiences which occurred only in dreams or as the result of special techniques should be labeled as such.

Read through each question, and beside each item where a yes or no response choice is provided, rate yourself as to whether you have ever had the experience described by placing a circle around the appropriate yes or no descriptor. Give additional information only if a simple yes or no cannot be given. Please answer every question.

Name : _____

Date : _____

-
1. Have you ever had the experience of walking in your sleep?
 2. Can you put yourself to sleep?
 3. Have you almost fallen asleep while you were driving on a quiet, level stretch of road?
 4. Have you ever been able to make a daydream seem real?
 5. When there are sounds that you do not want to listen to can you block them from your mind so that they are no longer important to you?
 6. Have you ever actively stared at something and had it slowly (or suddenly) become very strange before your eyes?
 7. Have you ever had strange images--vivid and real as life--flow into your mind, seemingly out of nowhere?
 8. Have you ever thought that you had said something when actually you had only thought about saying it?
 9. Have you ever thought you heard something, like someone calling your name or the telephone ringing, and then on checking found it was just your imagination?
 10. Have you ever been completely immersed in nature or in art (for example) in the mountains, at the ocean, viewing sculpture, etc.) and had a feeling of awe, inspiration, and grandeur sweep over you?
 11. Have you ever had the experience of being caught up by music or dancing so that you became enraptured by it and had it live and express itself through you so that you as yourself seemed to cease to be during it?
 12. Have you ever had the experience of seeming to watch yourself from a distance as if in a dream?
 13. Have you ever been lulled into a groggy state or put to sleep by a lecture or concert even though you were not otherwise fatigued or tired?
 14. Have you ever found yourself staring at something and for the moment forgotten where you were?

15. Have you ever been so lost in thought that you did not understand what people said to you even when you nodded token agreement?
16. Have you ever become so absorbed in listening to music that you became lost in imagination?
17. Have you ever walked up the aisle after a particularly absorbing movie and felt still so much in the movie that your walking up the aisle was unreal or like a dream?
18. Have you ever had the experience of reading a novel (or watching a play), and while doing so actually forget yourself, your surroundings, and even the fact that you are reading (or watching) and begin to actually live the story with such great reality and vividness that it becomes temporarily almost reality for you? Or, actually seemed to become reality for you?

APPENDIX F

Preference for an Imagic Cognitive Style Test
(PICS)

PICS Release 2.6

Instructions to Subjects

The purpose of this questionnaire is to help determine your style of thinking and imagining. People differ greatly in the kind and amount of fantasy and imagery which engage them. We also differ in the role that these forms of imagination play in our lives. Most of us take our own thinking style for granted and only occasionally are made aware of it when we encounter a friend who seems to think quite differently. By working through this questionnaire you may become more attuned to the different ways in which people think and to your own style.

The first distinction to make is whether pictures or words trigger thought. A person who thinks with pictures generates mental images in solving problems, reading, and many other situations involving thought. People who do not think in pictures often describe their thought as more like hearing than seeing. They may experience their thoughts as an internal commentary. Some people do not experience either pictures or words and describe their thoughts as "just knowing".

People who do not think in pictures may still have pictures accompany their verbal thinking. That is, the pictures are there in addition to thinking. For people who think in pictures however, the thoughts are the pictures.

It is important to note that differences in thinking style are unrelated to general intelligence. Successful

artists tend to think in pictures, while lawyers tend to think in words. There is evidence that Einstein thought in pictures. Sherlock Holmes is an example of a word thinker. In many fields it is possible to be successful using either style of thinking and of course many people have a mixture of styles.

The difference in thinking style is also unrelated to your verbal ability. No matter what your thinking style, the output of that thinking can be expressed equally well by both types in speaking or writing. Performance does not depend on thinking style, but rather on how efficiently you use your preferred style. Poets and descriptive writers tend to think in pictures while other writers tend to think in words.

The next distinction to make concerns the clarity or vividness of mental images. In the rating scales you will be asked to use, we describe images as ranging from "vague" to "fairly clear", "quite clear" up to "so clear that it was almost real". In deciding how to rate your image, consider such things as your awareness of the relative positions of parts in your image; the detail present -- for example the detail of a person's facial expression or clothing or postures. Many people have images which are very vague in detail and are mainly composed of outlines or "cloudy" shapes that are positioned in space relative to each other. Other people are aware of much more detail and their images are more three-dimensional.

We have separate rating scales for the verbal and image parts of your thinking. But we also consider separately the degree to which you become involved or absorbed in your thinking. Some people may at times have had the experience of being so involved in a daydream as to be unaware of someone entering the room or even calling your name.

Absorption refers to the amount of "shutting out" of other thoughts or perceptions while being involved in something.

Okay. You are now going to have several minutes during which I would like you to recall some experience from your own life which has had great personal significance for you. This experience may be entirely personal and private. You will not be asked about its content. I would like you to choose an experience which had a strong positive emotional impact on you. Just take a few moments now to close your eyes and think privately about this experience.

>> WAIT 2 MINUTES <<

Now please turn to the next page of your response forms and answer the questions about your thinking style based on the recall you have just done.

Notice that the first question is followed by a blank line. I would like you to enter here your estimate of how much time has passed from when you closed your eyes.

>> WAIT FOR COMPLETION <<

Next I would like you to think about a situation as I describe it to you:

You are walking alone in a meadow. It is early morning, about 6 o'clock or 6:30. Think about your experience there and what might happen.

>> PAUSE <<

Close your eyes now and just let this situation develop

in your mind.

>> WAIT 1 MINUTE <<

Now please turn to the next page and fill out the section on the Meadow.

>> WAIT FOR COMPLETION >>

I am now going to pass around some folders, each of which contains a picture. Please take one and pass the rest along. When you have a folder, check the label on the cover to make sure you have it right side up but DO NOT OPEN THE FOLDER YET. In a moment, I am going to ask you to open it and look at the picture for a short time. You will then have some time to relax and experience what it brings to mind.

Please open the folder and look at the picture.

>> SHOW PICTURE FOR 15 SECONDS >>

Okay, close the folder ... now close your eyes and relax.

>> WAIT 1 MINUTE <<

Now please fill out the section on the Picture.

STYLE OF THINKING QUESTIONNAIRE

NAME: _____

RECALL OF EMOTIONAL EXPERIENCE

1. _____

2. While recollecting this experience, how did you feel?

A. Positive, happy

B. Neutral

C. Negative, sad

3. How intense was your original experience?

Neutral 1 2 3 4 5 6 7 Very intense

4. How intense was your feeling while recollecting?

Neutral 1 2 3 4 5 6 7 Very intense

5. Which part of your recollection held most of the feelings for you?

A. The images that came to mind while recalling.

B. The things I heard or said to myself while recalling.

C. Both equally carried the feelings.

PLEASE GO ON TO THE NEXT PAGE

6. Which description best characterizes the verbal part of your recollection?
- A. No words or language was involved.
 - B. Vaguely aware of some words or inner speech.
 - C. Fairly clear inner speech.
 - D. Quite clear inner speech.
 - E. Inner speech was so clear that it was almost like hearing it.
7. Which description best characterizes the imagery part of your recollection?
- A. No image.
 - B. Vague image.
 - C. Fairly clear.
 - D. Quite clear.
 - E. So clear that it was almost real.
8. Which description best matches your degree of absorption in your recollection?
- A. High absorption. Always involved with no extraneous thoughts.
 - B. Mostly involved with my recollection; few other thoughts.
 - C. Fairly involved; but also found my mind wandering.
 - D. Only occasionally absorbed in my recollection.
 - E. Many distractions. I lost contact with my recollection much of the time.
9. Which description best matches your thinking?
- A. It just popped into mind. No effort was needed to choose it.
 - B. I had to think a little at first before knowing what to recall.
 - C. It took quite a bit of searching around before I decided on what to recall.

- D. It took quite a bit of searching around and I was still somewhat unsure.
- E. I considered many possibilities and had difficulty deciding on one.

WAIT HERE FOR FURTHER INSTRUCTIONS

MEADOW

1. Which description best characterizes the verbal part of your inner experience?
 - A. No words or language was involved.
 - B. Vaguely aware of some words or inner speech.
 - C. Fairly clear inner speech.
 - D. Quite clear inner speech.
 - E. Inner speech was so clear that it was almost like hearing it!
2. Which description best characterizes the imagery part of your inner experience?
 - A. No image.
 - B. Vague image.
 - C. Fairly clear.
 - D. Quite clear.
 - E. So clear that it was almost real.
3. Which best describes your level of absorption?
 - A. High absorption. Always attentive with no extraneous thoughts.
 - B. Mostly involved with the experience; few other thoughts.
 - C. Fairly involved; but also found my mind wandering.
 - D. Only occasionally absorbed in my experience.
 - E. Many distractions. I lost contact with my experience of the meadow much of the time.
4. Which best describes the flow of your thoughts after you closed your eyes?
 - A. My thoughts flowed easily without any conscious decision about where to make them go.
 - B. I had to make a few initial decisions and then my thoughts flowed from there.

C. I had to make several decisions at various points about how to proceed.

D. I made decisions for each step of my thoughts, sort of carefully planning the situation and considering alternatives.

WAIT HERE FOR FURTHER INSTRUCTIONS

PICTURE

These questions apply to your thinking after the picture was removed.

1. Which description best characterizes the verbal part of your inner experience?
 - A. No words or language was involved.
 - B. Vaguely aware of some words or inner speech.
 - C. Fairly clear inner speech.
 - D. Quite clear inner speech.
 - E. Inner speech was so clear that it was almost like hearing it.
2. Which description best characterizes the imagery part of your inner experience?
 - A. No image.
 - B. Vague image.
 - C. Fairly clear.
 - D. Quite clear.
 - E. So clear that it was almost real.
3. Which description best characterizes your level of absorption?
 - A. High absorption. Always attentive with no extraneous thoughts.
 - B. Mostly involved with my experience; few other thoughts.
 - C. Fairly involved; but also found my mind wandering.
 - D. Only occasionally absorbed in my experience.
 - E. Many distractions. I lost contact with my experience of the picture most of the time.

4. Which best describes the flow of your thoughts after you closed your eyes?

- A. My thoughts flowed easily without any conscious decision about where to make them go.
- B. I had to make a few initial decisions and then my thoughts flowed from there.
- C. I had to make several decisions at various points about how to proceed.
- D. I made decisions for each step of my thoughts, sort of carefully planning the experience and considering alternatives.

Scoring of PICS

Scoring was done on pages 2, 3, & 4 of this booklet.

The first, second, and fourth questions on each page were scored as follows:

A = 1 B = 2 C = 3 D = 4 E = 5

Because of the wording of the third question, it was scored thus:

A = 5 B = 4 C = 3 D = 2 E = 1

The first question on each page rated verbal thinking (V); the second, imagery (I); the third, absorption (A); and the fourth, effort (E). To obtain the final score, verbal and effort were subtracted from imagery and absorption as shown in the following equation:

$$I + A - V + E = \text{PICS Score}$$

APPENDIX G
Variable List
and
Correlation Matrix

Variable List

1. Preference for an Imagic Cognitive Style (PICS)
2. PICS Imagery subscale
3. PICS Absorption subscale
4. PICS Verbal subscale
5. PICS Effort subscale
6. Tellegen Absorption Scale
7. Personal Experiences Questionnaire (PEQ)
8. PEQ Controlled Absorption Subscale
9. PEQ Automatic Absorption Subscale
10. Stanford Hypnotic Susceptibility Scale, Form C

| Variable Number | 1 | 2 | 3 | 4 | 5 | 6 |
|--------------------|------|------|------|------|------|-----|
| 1 | - | | | | | |
| 2 | .84 | - | | | | |
| 3 | .59 | .56 | - | | | |
| 4 | -.67 | -.31 | -.01 | - | | |
| 5 | -.56 | -.47 | -.32 | .04 | - | |
| 6 | .42 | .56 | .44 | .06 | -.40 | - |
| 7 | .21 | .38 | .21 | .10 | -.20 | .84 |
| 8 | .01 | .21 | .10 | .19 | -.02 | .66 |
| 9 | .22 | .34 | .19 | .03 | -.17 | .69 |
| 10 | .50 | .56 | .28 | -.19 | -.39 | .64 |

| Variable Number | 7 | 8 | 9 | 10 |
|--------------------|-----|-----|-----|----|
| 7 | - | | | |
| 8 | .90 | - | | |
| 9 | .80 | .62 | - | |
| 10 | .56 | .43 | .38 | - |

APPENDIX H -

Source Tables for Analyses of Variance on
Facts, Rationalizations, and Verbal Hedges,
with Hypnotizability as the Grouping Variable

Hypnotizability by Facts

| Source | DF | MS | F | p |
|-----------------|----|-------|------|-----|
| Hypnotizability | 2 | 73.6 | 1.28 | .29 |
| Error | 27 | 57.6 | | |
| Time | 1 | 105.7 | 7.21 | .01 |
| Hypn X Time | 2 | 32.5 | 2.22 | .12 |
| Error | 27 | 14.6 | | |

Hypnotizability by Rationalizations

| Source | DF | MS | F | p |
|-----------------|----|-----|------|-----|
| Hypnotizability | 2 | .09 | .54 | |
| Error | 27 | .18 | | |
| Time | 1 | .82 | 3.96 | .05 |
| Hypn X Time | 2 | .02 | .09 | |
| Error | 27 | .20 | | |

Hypnotizability by Verbal Hedges

| Source | DF | MS | F | p |
|--------------------------|----|------|------|-----|
| Hypnotizability | 2 | 2.53 | 2.40 | .10 |
| Error | 27 | 1.02 | | |
| Time | 1 | 2.67 | 5.31 | .02 |
| Hypn ^o X Time | 2 | .67 | 1.33 | .28 |
| Error | 27 | .50 | | |

APPENDIX I

Measures of Central Tendency for Facts, Rationalizations
and Verbal Hedges Pre and During Hypnosis,
with Hypnotizability as the Grouping Variable

| | Hypnotizability | | | | | |
|-------------------|-----------------|----------------|----------------|-----------------|----------------|------------------|
| | Low | | High-Medium | | High | |
| Time ^a | Pre | During | Pre | During | Pre | During |
| F | 6.00 (4.16) | 5.85 (2.11) | 7.91 (3.55) | 11.25 (5.65) | 6.54 (4.41) | 11.54 (10.65) |
| R | 0.28 (0.75) | 0.00 (0.00) | 0.16 (0.38) | 0.00 (0.00) | 0.36 (0.67) | 0.09 (0.30) |
| V-H | 0.42 (0.78) | 0.42 (0.78) | 1.33 (1.23) | 0.66 (0.88) | 0.63 (0.92) | 0.00 (0.00) |

Note. F = Facts, R = Rationalization, V-H = Verbal Hedges.

Note. Group means are indicated first; standard deviations are indicated in parentheses.

APPENDIX J

/ Source Tables for Analyses of Variance on
Facts, Rationalizations and Verbal Hedges
with Memory Creation as the Grouping Variable

Memory Creation by Facts

| Source | DF | MS | F | p |
|-----------------|----|--------|------|------|
| Memory Creation | 1 | 11.40 | .19 | |
| Error | 28 | 59.69 | | |
| Time | 1 | 138.67 | 8.59 | .006 |
| MC X Time | 1 | 1.00 | .06 | |
| Error | 28 | 16.13 | | |

Memory Creation by Rationalizations

| Source | DF | MS | F | p |
|-----------------|----|-----|------|-----|
| Memory Creation | 1 | .30 | 1.73 | .19 |
| Error | 28 | .17 | | |
| Time | 1 | .53 | 2.69 | .10 |
| MC X Time | 1 | .13 | .67 | |
| Error | 28 | .19 | | |

Memory Creation by Verbal Hedges

| Source | DF | MS | F | p |
|-----------------|----|------|------|-----|
| Memory Creation | 1 | .20 | .17 | |
| Error | 28 | 1.19 | | |
| Time | 1 | 3.00 | 5.73 | .02 |
| MC X Time | 1 | .07 | .14 | |
| Error | 28 | .52 | | |

APPENDIX K

Measures of Central Tendency for Facts, Rationalizations
and Verbal Hedges Pre and During Hypnosis,
with Memory Creation as the Grouping Variable

Memory Creation

| Time | Pass | | Fail | |
|------|----------------|-----------------|----------------|----------------|
| | Pre | During | Pre | During |
| F | 7.40 (3.68) | 10.89 (6.43) | 6.75 (4.17) | 9.69 (8.25) |
| R | 0.10 (0.31) | 0.00 (0.00) | 0.35 (0.67) | 0.05 (0.22) |
| V-H | 0.90 (1.28) | 0.50 (0.97) | 0.85 (0.98) | 0.30 (0.57) |

Note. F = Facts, R = Rationalizations, V-H = Verbal Hedges

Note. Group means are indicated first; standard deviations are indicated in parentheses.

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APPENDIX L

Source Tables for One-Way Analyses of Covariance
on Facts, Rationalizations, and Verbal Hedges
Stated during the EAT, with Hypnotizability
as the Grouping Variable

Hypnotizability by Facts

| Source | DF | MS | F | p |
|-----------------|----|------|------|-----|
| Hypnotizability | 2 | 7.26 | 2.27 | .12 |
| Error | 26 | 3.19 | | |

Hypnotizability by Rationalization

| Source | DF | MS | F | p |
|-----------------|----|------|------|-----|
| Hypnotizability | 2 | 1.26 | 1.19 | .31 |
| Error | 26 | 1.05 | | |

Hypnotizability by Verbal Hedges

| Source | DF | MS | F | p |
|-----------------|----|------|------|-----|
| Hypnotizability | 2 | 2.03 | 1.92 | .16 |
| Error | 26 | 1.06 | | |

APPENDIX M

Measures of Central Tendency for Facts, Rationalizations
and Verbal Hedges Stated during the EAT,
with Hypnotizability as the Grouping Variable

| | Hypnotizability | | |
|-----|-----------------|----------------|----------------|
| | Low | High-Medium | High |
| F | 5.52 (1.49) | 4.70 (2.93) | 6.46 (1.92) |
| R | 0.55 (0.48) | 1.07 (0.96) | 1.35 (1.36) |
| V-H | 0.76 (0.48) | 1.11 (1.67) | 0.19 (0.67) |

Note. F = Facts, R = Rationalizations, V-H = Verbal Hedges

Note. Group means are indicated first; standard deviations are indicated in parentheses.

APPENDIX N

Source Tables for Facts, Rationalizations,
and Verbal Hedges Stated during the EAT,
with Memory Creation as the Grouping Variable

Memory Creation by Facts

| Source | DF | MS | F | p |
|-----------------|----|------|------|-------|
| Memory Creation | 1 | 0.03 | .009 | > .10 |
| Error | 27 | 3.72 | | |

Memory Creation by Rationalizations

| Source | DF | MS | F | p |
|-----------------|----|------|-------|------|
| Memory Creation | 1 | 8.36 | 10.49 | .003 |
| Error | 27 | 0.78 | | |

Memory Creation by Verbal Hedges

| Source | DF | MS | F | p |
|-----------------|----|------|-------|-------|
| Memory Creation | 1 | 0.19 | 0.165 | > .10 |
| Error | 27 | 1.19 | | |

Appendix O

Measures of Central Tendency for Facts, Rationalizations
and Verbal Hedges, Stated during the EAT,
with Memory Creation as the Grouping Variable

Memory Creation

| | Pass | Fail |
|-----|----------------|----------------|
| F | 6.00 (2.10) | 6.09 (2.42) |
| R | 2.03 (1.10) | 0.66 (0.75) |
| V-H | 1.03 (1.50) | 0.81 (0.99) |

Note. F = Facts, R = Rationalizations, V-H = Verbal Hedges

Note. Group means are indicated first; standard deviations are indicated in parentheses.