THE RELATIONSHIP BETWEEN ATTENTION AND HYPNOSIS WITH IMPLICATION FOR THE ROLES OF ANXIETY AND BRAIN ASYMMETRY

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ABSTRACT

THE RELATIONSHIP BETWEEN ATTENTION AND HYPNOSIS WITH IMPLICATION FOR THE ROLES OF ANXIETY AND BRAIN ASYMMETRY

by

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The relationship between attention and hypnotic suggestibility was investigated in two experiments. Attention was measured by two auditory vigilance tasks, one of which required the subjects to indicate whenever they heard the hypnotist say the word "relax," which was embedded in a hypnotic induction and standard scale of hypnotic suggestibility. The other vigilance task required the subjects to indicate whenever they heard double digits, which were embedded in a series of single digits. The hypnotist's words and the digits were recorded on different channels of the same stereo tape and played back over stereo headphones so that half the subjects heard the hypnotist's words in their left ears, and half heard the words in their right ears. Attempts to manipulate attention by means of feedback (mild shock) and instructions failed; but the correlations in both experiments were significant and negative between performances on the vigilance tasks and hypnotic suggestibility, indicating the most suggestibile subjects were the least vigilant subjects during hypnosis. These findings contradict the widely held belief that

attention is concentrated on the words of the hypnotist during hypnosis, and support the hypothesis that attention is reduced during hypnosis. Differences also were found between good hypnotic subjects' and poor hypnotic subjects' temporal trends in attention during hypnosis, and the implications of these differences were discussed. State anxiety and hypnotic suggestibility were significantly correlated, indicating the most suggestible subjects were the least anxious subjects during hypnosis. It made no difference in suggestibility in which ear the subjects heard the hypnotist's words, even when the subjects were matched for sex, handedness, and eyedness.

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By

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Many theorists (e.g., Braid, 1843; Bernheim, 1906; Leuba, 1960; White, 1965; London, 1967) have speculated that the execution of hypnotic suggestions depends on the hypnotic subject paying close attention to the words of the hypnotist and ignoring all other environmental stimuli. This formulation will be referred to as the "Concentration Hypothesis". On the other hand, Hilgard (1965, p. 7) contends that good hypnotic subjects pay relatively little attention to all environmental stimuli, including the hypnotist's words. This formulation will be referred to as the "Reduction Hypothesis".

Although many studies (see Krippner & Bindler, 1974, for a review) have regarded attention as a dependent variable, only a handful have regarded attention as an independent variable and have studied its effect on hypnotic suggestibility. Das's (1964) study is one of the few. Since hypnosis is ordinarily induced through verbal suggestion, Das reasoned that auditory vigilance and verbal satiation (loss of word meaning) stood a good chance of being related to hypnotic suggestibility. He measured attention just prior to hypnosis by means of a thirty minute auditory vigilance task which consisted of a tape recorded series of odd and even numbers occurring at the rate of twenty per minute. The subjects were required to detect three odd numbers not interspersed with any even numbers. Das also obtained a measure of verbal satiation just prior to

hypnosis by continuously repeating words for forty seconds at the rate of 2-4 repetitions per second. He found that hypnotic suggestibility was significantly and negatively correlated (r=-.40) with the vigilance task, and significantly and negatively correlated (r=-.67) with verbal satiation scores. In other words, high suggestibility scores were associated with poor auditory vigilance (attention) and a low verbal satiation threshold. Other researchers (Mitchell, 1970; Evans, 1972) have failed to find any significant relationship between hypnotic suggestibility and attention measured outside of hypnosis.

Gur (1973; 1974) shed some light on the relationship between hypnotic suggestibility and attention, although this was not his intent. He found the hypnotic suggestibility of resistant hypnotic subjects could be significantly enhanced by what he called an "attention-controlled operant procedure". In this procedure, insusceptible subjects received an unpleasant electric shock (feedback) unless they pushed a button upon hearing the word "relax," which was interspersed throughout the induction. Gur reported significant positive correlations between performance on this auditory vigilance (attention) task and suggestibility; that is, those subjects who made the fewest errors (those who paid the closest attention to the words of the hypnotist) showed an increase in suggestibility, which seems to support the Concentration Hypothesis. However, it could be the subjects, who increased

in suggestibility, experienced a general increase in attention; that is, they increased the attention they paid not only to the hypnotist's words but to other environmental stimuli as well. This formulation is the opposite of the Reduction Hypothesis and will be referred to as the "Expansion Hypothesis". It could also be, as Gur opined, that the anxiety (fear of shock) generated in his subjects by the feedback procedure produced helplessness and associated dependency strivings; and that it was this psychodynamic process, acting as a moderating variable, that was responsible for the increase in suggestibility (Reyer & Pottinger, 1976; Wilson, 1974).

The main purpose of the present study was to investigate the relationship between attention and hypontic suggestibility. Two experiments were conducted, the second one being a replication and extension of the first. The following two opposed hypotheses were formulated as a first step in testing whether the concentration or reduction of attention is related to hypnotic susceptibility.

> H1. Attention concentration: When an individual receives an alerting, nonnoxious stimulus upon the utterance of a particular word by the hypnotist, a) he/she <u>attends more</u> to the words of the hypnotist than does an individual not receiving such feedback, and b) his/her ability to attend to background auditory stimuli (digits) <u>is less</u> than that for an individual not receiving such feedback.

H2. Attention reduction: When an individual receives an alerting, nonnoxious stimulus upon the utterance of a particular word by the hypnotist, a) he/she attends less to the words of the hypnotist than does an individual who does not receive such feedback, and b) his/her ability to attend to background auditory stimuli (digits) is less than an individual not receiving such feedback.

The following two hypotheses relate attention concentration and reduction to hypnotic suggestibility:

H3. Hypnotic susceptibility is a function of attention concentration.

H4. Hypnotic susceptibility is a function of attention reduction.

In addition, anxiety and hypnotic susceptibility were examined as possible moderating variables.

Experiment 1

Method

Subjects. Twenty college students volunteered for research involving hypnosis in order to obtain credits for an introductory psychology course they were taking. They were given the Harvard Group Scale of Hypnotic Susceptibility (Shor & Orne, 1962), and they were randomly assigned to either a high ability or low ability group on the basis of a median split on the Harvard Group Scale of Hypnotic Susceptibility (HGSHS). Then subjects in these two groups were randomly assigned to either a Feedback Group (mild shock) or the No Feedback Group (no shock).

Materials. The subject was seated in a large, comfortable chair with his right foot placed on a Sony, FS-6, foot-pedal. The pedal activated a small light which, when depressed, could be seen by the experimenter but not by the subject. A shock apparatus provided pulses of 150 microseconds duration that were varied in intensity and administered via silver disk electrodes that were held snugly against the subject's left ankle by an adjustable elastic band. Speilberger, Gorsuch, and Lushene's (1968) State-Trait Anxiety Inventory (STAI) was used to assess the subjects' anxiety during the experiment (state anxiety), as well as their general levels of anxiety (trait anxiety), to determine

if the shocks increased the anxiety of those subjects receiving them.

A hypnotic induction incorporating numerous suggestions of relaxation/sleep/and drowsiness followed by a modified version of the Standard Hypnotic Susceptibility Scale (SHSS), Form C, (Hilgard, 1965) were recorded on one channel of a stereo tape. The SHSS was modified slightly to allow the scale to be administered by tape, and to allow suggestions of relaxation to be given between the executions of the twelve suggestions that comprise the SHSS. A series of single digits were recorded on the other channel of the stereo tape. Approximately 1.5 seconds separated the single digits from each other. The words "relax," "relaxing," and "relaxation" were embedded in the induction and the SHSS a total of 50 times; and 50 double digits were embedded in the series of single digits. A double digit was simply two single digits that were separated in time by about .1 seconds. The double digits and the "relaxes" were relatively evenly distributed throughout the tape, with neither signal occurring within two seconds of the other signal. In addition, the double digits and "relaxes" occurred in the induction and between the giving of the suggestions; but they never occurred during the giving of the suggestions or during the time allotted for their execution. This was done to avoid competition between the signals, and to preclude these stimuli from interfering with other motor responses and sensory experiences that might be necessary for the execution

of the suggestions.

The tape was played on a Wollensak, Model 9517, stereo tape recorder with the volume set so subjects heard the induction and SHSS at a normal conversational level. The volume of the digits was set well below normal conversational level, but high enough for subjects to hear without straining. The subjects and the experimenter all heard the tape played over Vanco, HF-1, stereo headphones. A transcript of the tape highlighting where the double digits and the "relaxes" occured allowed the experimenter to anticipate the occurrence of the signals, thus making easier his task of monitoring the subjects' responses to the signals (activation of the light).

Procedure. The subjects filled out the trait anxiety portion of the STAI shortly after entering the experimental room, and then they were read a set of instructions which informed them they would be participating in an experiment that was investigating the relationship between hypnosis and motor performance. The subjects were told that their first and foremost task was to allow themselves to become hypnotized by listening to the hypnotist and doing those things requested of them, such as relaxing muscles and noticing various sensations in their bodies. The subjects were told also they would be given two motor tasks to perform while being hypnotized. The two tasks were described as being equally important, and the subjects were encouraged to do as well as they could on both. Then the nature

of the tasks was explained; and the subjects were told to press the footpedal quickly with their right foot whenever they heard the double digits, and whenever they heard the "relaxes".

Subjects assigned to the Feedback Group were told they would receive a very mild electric shock whenever they failed to press the pedal following a "relax". They were told the shock would serve as "sort of a reminder" whenever they missed a "relax," and thus would help them in their performance of the Words-Task. To preclude anxiety from being aroused, each feedback subject set his own level of shock after being told to make the shock intense enough that he wouldn't overlook it, but mild enough that it was not in any way unpleasant or painful. Five practice shocks were given the feedback subjects to accustom them to the shock.

Following these instructions, all subjects were given practice in performing the Words-Task and the Digits-Task. "Relax" and words containing "relax" were embedded 7 times in a 1 1/2 minute taped discussion of the role of relaxation is psychotherapy. The tape was repeated for two subjects who initially failed to respond correctly to all 7 signals. Then the subjects were given some practice on the Digits-Task. Seven double digits were embedded in a taped series of single digits lasting 1 1/2 minutes. This tape was repeated for one subject who initially did not respond correctly to all 7 signals.

At the conclusion of the practice session the subjects were asked to paraphrase the instructions to insure they correctly understood them; then the experiment proper was begun. All subjects heard the hypnotist's words in their right ears and the digits in their left ears. The subjects were debriefed after they filled out the state anxiety portion of the STAI at the conclusion of the experiment.

Testing the Concentration and Reduction Hypotheses. The Concentration and Reduction Hypotheses were to be tested as follows: (1) Concentration Hypothesis. Should the attention-controlling procedure (feedback) cause a concentration of attention, then the Concentration Hypothesis would be supported if the Feedback Group was more suggestible than the No Feedback Group. Additional support for the Concentration Hypothesis would be found if hypnotic suggestibility was significantly and positively correlated with performance of the Words-Task, and significantly and negatively correlated with performance on the Digits-Task. (2) Reduction Hypothesis. Should the attention-controlling procedure (feedback) cause a reduction in attention, then the Reduction Hypothesis would be supported if the Feedback Group was more suggestible than the No Feedback Group. Additional support for the Reduction Hypothesis would be found if hypnotic suggestibility was significantly and negatively correlated with performances on both vigilance tasks.

Scoring. Performance scores on the Words-Task and the

Digits-Task were simply the number of times the subject pressed the footpedal within 2 seconds of the appropriate signal. Late responses and false positives were too infrequent to be submitted to statistical analysis. Hypnotic suggestibility was scored according to the conventional criteria established for the SHSS, Form C. The STAI was scored according to Speilberger, Gorsuch, and Lushene's (1968) manual.

Results

Attention: Concentration and Reduction (H1 and H2). The intent of the electric shock to produce painless feedback was considered to be successful on the basis of the failure of state anxiety scores to differentiate between the Feedback (shock) and No Feedback (no shock) Groups.

The results of two fixed design analyses of variance (Tables 1 and 2) show that feedback had no effect on attention (pressing foot pedal) with respect to either the Words or Digits Tasks. The means and standard deviations for the Feedback and No Feedback Groups on the Words Task were $\bar{X}$=36, σ=7.4 and $\bar{X}$=29, σ=9.5, respectively.

Insert Tables 1 and 2 about here.

The corresponding statistics for the two groups on the Digits Task were $\bar{X}$=29, σ=12.7 and $\bar{X}$=30, σ=12.3, respectively. Consequently, H1 and H2 were rejected.

Feedback and hypnotic susceptibility in relation to

suggestibility. The failure of the attempt to manipulate attention notwithstanding, a 2 X 2 (Feedback X Hypnotic Ability) fixed design analyses of variance was performed with hypnotic suggestibility as the dependent variable. As shown in Table 3, both feedback and hypnotic ability

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Insert Table 3 about here

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significantly (.05 level) influenced suggestibility; but the later finding is a trivial one, since HGSHS scores and SHSS, Form C, scores are known to correlate with each other at about .60 (Weitzenhoffer & Hilgard, 1962). Just how feedback, the manipulated variable, could have influenced suggestibility without having had affected attention is puzzling. Enhanced arousal as an inevitable response to the feedback (shock) per se, is one possible explanation.

Anxiety and suggestibility. The obtained correlation (Pearson) between state anxiety and suggestibility was -.45, which is significant at the .05 level, whereas the correlation between trait anxiety and suggestibility was only .02. Thus, suggestibility decreased as anxiety increased during the induction of hypnosis. This is consistent with the findings of Reyher and Wilson (1973) concerning suggestibility and GSR frequency during the induction of hypnosis and with those of Green and Reyher (1972) concerning suggested anesthesia and state anxiety during the "established"

hypnotic state. The nonsignificant obtained correlation between trait anxiety and suggestibility also is consistent with the findings of Greene and Reyher.

Suggestibility: the Concentration and Reduction Hypotheses (H3 and H4). Having failed to manipulate attention, the Concentration and Reduction Hypotheses were evaluated by examining the relationship between hypnotic suggestibility and performance (pressing foot pedal) on the two vigilance tasks, without regard to hypnotic ability or feedback. Suggestibility was found to be significantly (.01 level) correlated with performance on both the Words-Task (r=-.56) and the Digits-Task (r=-.68), with their multiple correlation being .74. Attending to both tasks simultaneously (divided attention) also was significantly (.01 level) correlated (r=-.69) with suggestibility. In other words, highly suggestible subjects paid less attention both to the hypnotist's words and to the digits, singly or together, which clearly supports only the Reduction Hypothesis.

Item Analyses. To determine if the execution of every SHSS suggestion was associated with reduced attention, point-biserial correlations were computed between the twelve suggestions comprising the SHSS and the subjects' divided attention scores. As shown in Table 4, four of the correlations reached significance (.05 level) and seven did not. Auditory hallucination was indeterminate because only one subject executed this suggestion.

Insert Table 4 about here

Temporal trends in attention. The significant negative correlations found between suggestibility and both tasks indicates that good hypnotic subjects differed from poor hypnotic subjects in attention during hypnosis, but these correlations do not indicate when these differences in attention arose. Did good hypnotic subjects and poor hypnotic subjects differ in attention from the very beginning of the induction, or did the differences in attention gradually develop over time? To answer these questions, subjects were classified as being Good Hypnotic Subjects (SHSS scores 5 to 11, $n = 9$) or Poor Hypnotic Subjects (SHSS scores 0 to 4, $n = 11$); and the frequency with which subjects in these two groups detected each of the 50 "relaxes" was determined. These frequencies were summed for each group and a Chi-Square Test was performed to see if Good Subjects differed from Poor Subjects in the amount of attention they paid to the hypnotist's words during the entire hypnotic session. As expected, Good Hypnotic Subjects paid significantly less attention to the words of the hypnotist than did Poor Hypnotic Subjects when the entire hypnotic session was considered ($\chi^2 = 12.83$, $p = .01$).

To determine whether or not there was a temporal decay in attention, the detection frequencies for the first 25 "relaxes" were compared with the detection frequencies for

the last 25 "relaxes" by means of Chi-Square Tests for both groups of subjects. When the second half of the session was compared with the first half, Good Subjects were found to have significantly decreased in attention paid to the hypnotist's words (χ^2=9.35, p = .01), but not Poor Subjects (χ^2= .42).

To look at temporal trends in attention in more detail, the first 5 "relaxes" were placed in Time Period 1, the next 5 in Time Period 2, and so forth up to Time Period 10. Then 10 Chi-Square Tests were performed to see if Good and Poor subjects differed in the attention they paid to the hypnotist's words during each of the 10 time periods. The percentages of detection also were computed for both the Good Subjects and the Poor Subjects in each of the 10 time periods, and then these percentages were plotted against the 10 time periods to graphically depict the temporal trends in attention. The procedure for the digits was exactly the same as that for the "relaxes". When the time periods were considered individually (see Figure 1), Good Subjects were seen to have paid less attention to the hypnotist's words than Poor Subjects in all time periods, except for Time Period 1; however, these differences only reached significance (.05 level) in time periods 6, 8, and 9 (see Table 5). These results suggest that Good Subjects and Poor Subjects started out the hypnotic session paying about the same amount of attention to the words of the hypnotist; but Good Subjects became less attentive that Poor Subjects towards the end of the induction,

and they tended to remain relatively less attentive from then on. Inspection of Figure 1 reveals that the attention paid to the hypnotist's words by both Good and Poor subjects rebounded to about what it was at the beginning of the induction (Time Period 1) when the first of the SHSS suggestions were given (Time Period 7).

Also as expected, Good Hypnotic Subjects paid significantly less attention to the digits than did Poor Hypnotic Subjects when all 10 time periods were considered together (χ^2= 61.49, p = .01). Both Good Subjects (χ^2= 8.54, p = .01) and Poor Subjects (χ^2= 8.76, p = .01) evidenced a significant decrease in vigilance to the digits when the second half of the hypnotic session was compared with the first half. When the time periods were considered individually (see Figure 2). Good Subjects were seen to have paid consistently less attention to the digits than Poor Subjects from the very beginning of the hypnotic session; and these differences reached significance in all of the time periods, except for periods 4 and 7 (see Table 5).

Insert Figure 1, Figure 2, and Table 5 about here

Experiment 2

A second experiment was performed in an attempt to verify and extend the findings of the first experiment by replicating the procedures except for one modification: instructions were used to manipulate attention instead of electric shock. Even if the state anxiety scores did not distinguish between the shock and no shock groups, the intrinsic aversive nature of shock may have been disorganizing. The hypotheses were modified accordingly.

H1. Attention Concentration: When given instructions that emphasize the importance of attending to the words spoken by the hypnotist, a) an individual attends more closely to his words than an individual not given such instructions; and b) his ability to attend to background auditory stimuli (digits) is less than an individual not given such instructions.

H2. Attention Reduction: When given instructions that emphasize the importance of attending to the hypnotist's words, a) an individual attends less to the words spoken by the hypnotist than an individual not given such instructions; and b) his ability to attend to background stimuli (digits) also is less than an individual not given such instructions.

The hypotheses (H3 and H4) relating attention to hypnotic

suggestibility are the same as in Experiment 1. Hypnotic ability and anxiety once again were evaluated as possible moderating variables, as were source of input (left or right ear) and type of task (words or digits).

Method

Subjects. Eighty-five college students from an introductory psychology course who volunteered for research involving hypnosis for credit purposes were given the HGSHS. Those volunteers scoring from 0 to 4 on the HGSHS were classified as having Low Hypnotic Ability; those scoring from 5 to 8 were classified as having Moderate Hypnotic Ability; and those scoring 9 or more were classified as having High Hypnotic Ability. Twenty volunteers were randomly selected from each of the three classifications, and randomly assigned to either the Instructed Group or the Non-Instructed Group. Subjects in these two groups were then divided on a random basis into those receiving the hypnotist's words in their left ears, and those receiving the hypnotist's words in their right ears. Thus 60 subjects in all were matched on hypnotic ability, and then randomly assigned to 1 or 12 groups on the basis of instructions and the ear receiving the hypnotist's words.

Materials. The same stereo tape and stereo headphones used in the first experiment were used in this experiment. A Sony, TC252, stereo tape recorder was used to play back the tape. The STAI was used to measure anxiety, and Part A

of Humphrey's (1951) questionnaire was used to assess the subjects' handedness. Handedness was determined by the subject's response to the first question of Humphrey's questionnaire, which asked him whether he regarded himself as right-handed, left-handed, or ambidextrous, since there was relatively little variability in the subjects' responses to the other 20 questions comprising the questionnaire.

Subjects' eyedness was determined by having them hold a rolled up piece of paper over both of their eyes, and then having them look at the experimenter through the small hole in the end of the paper, which allowed the subjects to sight objects with only one of their eyes. Subjects were classified as either right-eyed or left-eyed depending on which eye they used to view the experimenter.

Procedure. The subjects filled out the trait anxiety portion of the STAI and Humphrey's handedness questionnaire shortly after entering the experimental room Then their eyedness was determined. following this, the subjects were read a set of instructions informing them they would be participating in an experiment investigating the relationship between hypnosis and motor performance. They were told their first and foremost task was to allow themselves to be hypnotized by listening to the hypnotist and doing those things requested of them, such as relaxing muscles and noticing various sensations in their bodies. They also were told they would be given two motor tasks to perform while being hypnotized, and then the nature of the tasks

was explained. The subjects were told to move their right foot quickly whenever they heard a double digit, or whenever they heard the hypnotist say the word "relax" or any word containing "relax". The footpedal was abandoned in this experiment because shorter subjects in the first experiment had difficulty reaching the pedal and still maintaining a comfortable position in the chair.

Subjects assigned to the Instructed Group were told that the Words-Task was more important than the Digits-Task. They also were encouraged to do as well as they could on both tasks, but they were told to be sure to get the "relaxes". Subjects assigned to the Non-Instructed Group were told that the Words-Task and the Digit-Task were equally important, and they were encouraged to do as well as they could on both tasks. Following these instructions, all subjects were given practice in performing the Words-Task and the Digits-Task in the same manner as in Experiment 1.

At the conclusion of the practice session, the subjects were asked to paraphrase the instructions to insure they were understood correctly; and then the experiment proper was begun. Half the subjects heard the hypnotist's words over the left earpiece of their headphone set, and the digits over the right earpiece; while the other half of the subjects heard the hypnotist's words in the right earpiece of their headphone set, and the digits over the left earpiece. The experimenter scored the subjects' responses to the SHSS and monitored their performance on

the two vigilance tasks by observing their right feet. The subjects were debriefed after filling out the state anxiety portion of the STAI at the conclusion of the experiment.

Testing the Concentration and Reduction Hypotheses. The procedures were the same as in Experiment 1.

Scoring. The scoring procedures and criteria of Experiment 1 were retained, with the exception that performance scores on the Words-Task and Digits-Task were the number of times a subject moved his right foot, rather than pedal pushed, within 2 seconds of the "relaxes" and double digits, respectively.

Results

Attention concentration and reduction (H1 and H2). Once again, the attempt to manipulate attention failed. The instructed subjects ($\bar{X}$ = 31, σ = 8.6) had no more foot responses on the Words-Task than did the non-instructed subjects ($\bar{X}$ = 28, σ = 7.6) and the Words-Task was not influenced by source of input or hypnotic ability, or by the interactions between the three independent variables. Also, the instructed

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Insert Table 6 about here

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subjects ($\bar{X}$ = 33, σ = 11.4) did not differ from the non-instructed subjects ($\bar{X}$ = 36, σ = 9.4) in their foot response performances of the Digits-Task. Neither source of input, hypnotic ability, or any of the interactions between the three independent variables had any effect on the Digits-Task.

Visual inspection of the means for both experiments reveal that they are comparable.

Insert Table 7 about here

Instructions, hemispheric input, and hypnotic susceptibility in relation to suggestibility. Again a 3-way analysis of variance (Instructions X Source X Hypnotic Ability) was performed with hypnotic suggestibility as the dependent variable, despite the fact that instructions failed to manipulate attention. As shown in Table 8, only hypnotic ability significantly (.05 level) influenced suggestibility but this is a trivial finding since HGSHS scores and SHSS scores are known to be significantly correlated.

Insert Table 8 about here

Anxiety and suggestibility. The results of Experiment 1 were fully replicated. Suggestibility was significantly (.05 level) correlated only with state anxiety (r = -.36), and uncorrelated (r = .01) with trait anxiety. State anxiety and performance on both tasks also were unrelated (r = .06), and scatter plot did not suggest a curvilinear relationship.

Insert Table 9 about here

Suggestibility: The Concentration and Reduction Hypotheses (H3 and H4). As in Experiment 1, the relationship between hypnotic suggestibility and the two dependent variables was examined without regard to instructions, source, or hypnotic ability. Suggestibility was found significantly (.01 level) and negatively correlated with foot responses (attention) on both the Words-Task (r = -.43) and the Digits-Task (r = -.35), with the multiple correlation being .47. Divided attention and suggestibility also were significantly (.01 level) correlated (r = -.44). Once again the findings support the Reduction Hypothesis.

Item analyses. This time eight of the eleven suggestions were negatively and significantly (.05 level) correlated with divided attention scores. Two of the three suggestions (dream, mosquito hallucination) that were not significantly correlated with divided attention in this experiment also were not significantly correlated in Experiment 1.

Insert Table 10 about here

Temporal trends in attention. Temporal trends in attention were investigated using the same procedure as in Experiment 1; and as expected, Good Hypnotic Subjects (SHSS scores 5 to 11, n = 25) paid significantly (.01 level) less attention to the hypnotist's words than did Poor Hypnotic Subjects (SHSS scores 0 to 4, n = 35) when the entire hypnotic session was considered (χ^2 = 74.11). When the time periods were con-

sidered individually, Good subjects were found to have paid less attention than Poor Subjects to the words of the hypnotist in each of the periods (see Figure 3); but these differences in attention were significant (.05 level) only in time periods 4, 5, 6, 7, 8, and 10 (see Table 5). Good subjects also evidenced a significant (.01 level) decrease in the amount of attention they paid to the hypnotist's words over time (χ^2= 18.49), but the Poor Subjects did not (χ^2= 5.32). These findings suggest that Good and Poor Subjects started out the hypnotic session essentially paying the same amount of attention to the words of the hypnotist; but Good Subjects became less attentive than the Poor Subjects about halfway through the induction and generally remained so from then on. Inspection of Figure 3 shows that both Good and Poor Subjects' attention to the hypnotist's words rebounded to about what it was at the beginning of the induction (Time Period 1) when the first SHSS suggestions were given them (Time Period 7). These results replicate those of Experiment 1, with the exception that Good Subjects became less attentive earlier in the induction in this study than they did in Experiment 1.

Also as expected, Good Hypnotic Subjects paid significantly (.01 level) less attention to the digits than did Poor Hypnotic Subjects when all 10 time periods were considered together (χ^2= 78.53); and Good Subjects evidenced a significant (.01 level) decrease in attention to the digits over time (χ^2= 20.39), as did the Poor Subjects (χ^2= 9.78). When the time periods were looked at individually (see Figure 4),

Good Subjects were found to have paid less attention to the digits than did Poor Subjects in every time period, with these differences reaching significance (.05 level) in all of the time periods but 2 and 3 (see Table 5). These findings replicate those of Experiment 1, and indicate that Good Subjects started out the hypnotic session paying less attention to the digits than Poor Subjects, and generally continued to pay less attention throughout the session.

Insert Figure 3 and Figure 4 about here

Ear input (Source). Point-biserial correlations, called treatment-effect correlations (Campbell, 1971), were computed between hypnotic suggestibility and the ear (source) in which the subjects heard the hypnotist's words, after dummy coding the ear (1 for the left ear, and 0 for the right ear). The treatment-effect correlation is closely related to the *t* ratio and determines the significance of the treatment effect; and like all measures of correlation, it also indicates the strength of the relationship. The correlation between hypnotic suggestibility and source was positive (r = .09); but it did not reach significance (.05 level), indicating subjects who heard the hypnotist's words in their left ears had slightly higher suggestibility scores than did subjects who heard the hypnotist's words in their right

ears. Additional correlations were computed to see if this correlation would reach significance (.05 level) when subjects were matched on sex, handedness, and eyedness. The correlation between suggestibility and ear was not significant for males (r = -.11, n = 28), nor was it significant for females (r = .10, n = 32). The correlation for right-handed males (r = -.19, n = 23) was not significant, nor was it for right-handed females (r = .21, n = 28). Similarly, the correlations for right-handed, right-eyed males (r = .02, n = 15), and right-handed, right-eyed females (r = .31, n = 23) were not significant. Correlations were not computed for left-handed or ambidextrous subjects because of the small number of these subjects in the sample..These results indicate it made little, if any, difference whether the subject heard the hypnotist's words in his right ear or in his left.

Discussion

Contrary to prediction, neither feedback or instructions affected the attention of the hypnotic subjects in this research. The failure of feedback to manipulate attention is particularly surprising in light of the numerous studies (see Kahneman, 1973; or Davies & Tune, 1970) in the area of cognitive psychology wherein auditory or visual feedback has effectively done so. Perhaps the aversive nature of the stimulus (mild shock) that was used to provide the subjects with feedback in this research was responsible. In any event, caution should be exercised when assuming, as did Gur (1973; 1974), that similar attention-controlling procedures influence attention during hypnosis.

Future research in the area could improve upon the present investigation by shifting to a within-subjects design, which should reduce the large within-groups (error) variance. Attention also might be influenced by manipulating subjects' motivation for performing the vigilance tasks by making reinforcement contingent upon their performance on the tasks, as did Gur (1973; 1974); but instead of negative reinforcers, positive reinforcers should be used, and they should be administered after hypnosis, rather than during hypnosis. By so doing, the possibility of anxiety or arousal confounding

the experiment is greatly reduced.

Attention and suggestibility (the Concentration and Reduction Hypotheses). The significant negative correlations found in both studies between hypnotic suggestibility scores and performance on both tasks cogently support the Reduction Hypothesis: good hypnotic subjects paid less attention than poor hypnotic subjects to both the hypnotist's words and to the digits.

That reduced attention was associated with high hypnotic suggestibility is clear; but the responsible mechanisms are not. In what way was attention reduced, and how did the reduction facilitate the execution of suggestions? Did the Good hypnotic Subjects simply ignore the hypnotist's words and the digits; or did they listen to them, but fail to discriminate between the signals ("relax," double digits) and the "noise" in which the signals were embedded? The latter is the more plausible explanation since Good Hypnotic Subjects must have listened to and comprehended the hypnotist's words in order to have executed the verbal suggestions given them; furthermore, their poor auditory vigilance could not have been due to drowsiness, since previous studies (Ravitz, 1950; O'Connell & Orne, 1962) have shown that good hypnotic subjects are awake during hypnosis. Apparently then, good hypnotic subjects adopted a waking attentional style, characterized by a low verbal satiation threshold and poor auditory vigilance, which allowed them to grasp the meaning of the hypnotist's verbal statements, but did not allow them to

discriminate between the words making up the statements, or between background auditory stimuli. Such an attentional style could have resulted in the good subjects interpreting the hypnotist's verbal statements as if they were true (Reyher, 1963). It might also be assumed that information normally contradicting such interpretations was not processed, due to the reduction in auditory discrimination. Several others (Kubie & Margolin, 1944; Gill & Brenman, 1959) have proposed much the same thing. Das's (1964) results support such speculations for he found hypnotic suggestibility possitively associated with poor auditory vigilance and low verbal satiation. Kroger and Schneider's (1959) and Engstrom, London, and Hart's (1970) findings also can be construed as supportive for they found hypnotic suggestibility could be enhanced by increasing subjects' electroencephologram alpha waves, which are associated with what might be called passive, or non-vigilant wakefulness.

Significant differences in the temporal courses of attention may have been the effect of a subject by treatment interaction, wherein some aspect of the induction procedure gradually caused the attention of good subjects to be reduced, but did not affect the attention of poor subjects; or since individuals are known to differ in the rates at which their auditory vigilance decays over time (see Davies and Tune, 1970), it is possible the gradient of the good hypnotic subjects' characteristic auditory vigilance decay curve was steeper than the gradient

of poor subjects'. The idea of a subject by treatment effect is consistent with the traditional view of hypnosis as a developmental process; however, there is a growing body of evidence which supports the hypothesis that good and poor hypnotic subjects characteristically differ in their cognitive or attentional styles. For instance, Das's (1964) finding that good and poor subjects differed on measures of auditory vigilance and verbal satiation prior to hypnosis supports this hypothesis, as does Morgan, McDonald, and Hilgard's (1974) finding that good hypnotic subjects not only produced more EEG alpha during hypnosis than poor subjects, but good subjects also produced more alpha while performing a variety of tasks outside of hypnosis. Still another line of research (Reyher, 1976) supports the idea of an instantaneous alteration in the cognitive functioning of good hypnotic subjects at the beginning of a hypnotic session. Since these explanations are not mutually exclusive, perhaps all three are correct.

Conclusions drawn from examining the temporal trends in attention across the 10 time periods, rather than within the time periods, should be viewed skeptically for their validity rests on the assumption that the signals ("relax," double digits) comprising each time period were equivalent. This probably was not the case since some signals appeared much easier to detect than others because of variation in the "noise" in which the signals were embedded; consequently some time periods may have had an many as five easy to detect signals, whereas others may have had all difficult to detect

signals. Thus the observed differences between time periods may reflect this variability in signal detection difficulty, rather than reflect temporal changes in attention. Keeping this potential source of error in mind, it is cautiously concluded that good hypnotic subjects experienced a progressive temporal decay in the attention they paid both to the hypnotist's words, and to the digits; while poor hypnotic subjects experienced a temporal decay in the attention they paid to the digits, but did not experience any decay in the attention they paid to the hypnotist's words. These findings support the traditional notion that hypnosis involves a developmental process; however the traditional notion that this developmental process is instigated by the hypnotic induction does not fare as well, for the rebound in attention to the hypnotist's words that good hypnotic subjects experienced when they were given the first of the SHSS suggestions following the induction, indicates the induction had no lasting effect on the attention good subjects paid to the hypnotist's words. If the induction had any value, it probably was in giving good hypnotic subjects the time necessary for their auditory vigilance to environmental stimuli, other than the hypnotist's words, to decay.

Anxiety and suggestibility. The significant negative correlations found in both Experiments 1 and 2 between state anxiety and suggestibility indicate that suggestibility decreased as anxiety during hypnosis increased, which is consistent with clinical lore, and the findings of Reyher

and Wilson (1973). Gur's (1973, 1974) results, however, seem to be inconsistent with these findings, for he enhanced the hypnotic suggestibility of poor hypnotic subjects by exposing them to an attention-controlling procedure in which painful electric shocks, which presumably increased anxiety, were given whenever they failed to attend to a key word ("relax") in the induction procedure. It is of particular interest that enhancement in Gur's study occurred when the experimenter was physically present, but not when he was absent. Reyher and Pottinger (1976) also found that low hypnotic susceptibility was associated with an experimenter absent condition, and they concluded that a passive-receptive attitude in an interpersonal situation may be a critical factor in the degree of susceptibility experienced during the induction of hypnosis. However, there was no shock or feedback given to a key word in their study; the hypnotist either was present or absent as the subject listened to a taped induction. Gur's investigation also is susceptible to this type of transferential interpretation. Fluctuations in attention insured that all of his subjects received at least a few shocks, and it is likely that some subjects felt that being shocked was inevitable, producing a feeling of helplessness, vulnerability and passivity. Those subjects who did not react defensively against these feelings ought to have increased in suggestibility (Reyher and Pottinger, 1976; Reyher and Wilson, 1973; Wilson, 1974). In other words, Gur's attention controlling pro-

cedure may have enhanced suggestibility, not so much because of its effect on attention or anxiety, but because of its impact on the interpersonal relationship of the hypnotist and subject. This argument is supported by the fact that the attention controlling procedure of Experiment 1 significantly decreased suggestibility, rather than increased it, even though the procedure used was much the same as that employed by Gur. The only real difference between the two was Gur's employed intense shock, whereas Experiment 1 employed mild shock.

Although the present investigations included the physical presence of the experimenter (hypnotist), the possibility of these emotional reactions should be considered. Even though the shock of Experiment 1 was not deemed to be painful, the inevitability of feedback (mild shock) might produce the same feelings of helplessness or feelings of frustration and anger. Those subjects experiencing the exacerbation of dependency strivings and the intropunitive (turning against self) management of anger can be characterized as having been in a positive transference whereas those subjects experiencing extrapunitive (turning against others) management of anger can be characterized as having been in negative transference. The former should have high hypnotic susceptibility whereas the latter should have low susceptibility. Those subjects experiencing the impunitive (repression) of anger should be between the positive and negative transference subjects in susceptibility.

Since there was no feedback in Experiment 2, it would appear that the possible significance of these emotional reactions to hypnotic susceptibility can be rejected out of hand. However, it should not be overlooked that the different transferential possibilities of reacting to feedback may not be a function of feedback at all. These are extremely stable dimensions of personality that are correlated with suggestibility and which predispose the subject to respond in a given way regardless of type of feedback or even whether feedback is given at all. That is, those subjects who enter into a positive transference with the experimenter respond to the intent of his suggestion without being vigilant for specific words. They also happen to be highly suggestible and experience relatively little anxiety. This is consistent with the innovative investigations of Sheehan (Sheehan & Bowman, 1973; Sheehan, 1973) which show that hypnotically susceptibile subjects respond to the intent of the experimenter's instructions, not previously communicated specific expectations which are discrepant from his intent. Just the reverse is true for insusceptible simulators.

The psychodynamic implications for susceptibility are further complicated by whether the source of the anxiety is internal to hypnosis, such as a threat to the subject's autonomy, or whether the source is external to hypnosis and the interpersonal relationship, such as pain (Wilson, 1974; Reyher & Pottinger, 1976). In the case of attention control-

led shock the anxiety may arise from the hypnosis per se, from the procedure, or from both. Future research must separate these two potential influencing variables. In any case, final word on all the foregoing psychodynamic effects must await an investigation that will concurrently control and manipulate them.

Brain asymmetry and suggestibility. It can be argued that the good hypnotic subjects' poor auditory vigilance and apparent low verbal satiation in the present research resulted from their adoption of a global attentional style, which allowed them to grasp the meaning of the hypnotist's statements (the whole), but did not allow them to discriminate between the hypnotist's individual words, or between the digits (the parts); and the poor hypnotic subjects relatively good auditory vigilance resulted from their adoption of an analytical attentional style, which enabled them to discriminate between the hypnotist's individual words, and between the digits. Construed in this manner, the results of this research support the hypothesis that hypnosis is mediated by the right cerebral hemisphere (Gur & Gur, 1974; Gur & Reyher, 1973), since the right hemisphere is described as having a global attentional style (Benton, 1972; Bogen, 1969; Levy, 1969), and the left hemisphere as having an analytical attentional style (Levy, 1969; Galin, 1974, Levy, Trevarthen, & Sperry, 1972).

Regardless of whether or not good hypnotic subjects used their right hemispheres during hypnosis, they must

have employed their left hemispheres in order to have engaged in the propositional speech that was required for the execution of several suggestions, since the left hemisphere alone has the capacity for propositional speech (Bogen, 1969; Gazzaniga & Hillyard, 1971). Thus, good hypnotic subjects may use their right hemispheres for comprehending the hypnotist's verbalizations, and then shift to left hemisphere functioning whenever a suggestion requires speech for its execution; poor subjects may have difficulty using their right hemisphere for speech comprehension, or they may lack the facility required to shift from right to left hemispheric functioning as the situation warrants.

TABLE 1

Analysis of Variance with Performance on the Words-Task as the Dependent Variable: Experiment 1

Source	SS	df	MS	F
Feedback	253	1	253	3.66
Hypnotic Ability	175	1	175	2.53
Interaction	35	1	35	.51
Error	1,100	16	69	

TABLE 2

Analysis of Variance with Performance on the Digits-Task as the Dependent Variable: Experiment 1

Source	SS	df	MS	F
Feedback	3	1	3	.02
Hypnotic Ability	115	1	115	.82
Interaction	461	1	461	3.30
Error	2,243	16	140	

TABLE 3

Analysis of Variance with SHSS Scores as the Dependent Variable: Experiment 1

Source	SS	df	MS	F
Feedback	15	1	15	5.58*
Hypnotic Ability	61	1	61	22.68*
Interaction	4	1	4	1.49
Error	43	16	2.69	

*Significant ($p < .05$)

TABLE 4

Percentage of Suggestions Passed and Point-Biserial Correlations between Divided Attention and the Suggestions: Experiment 1

Suggestion	Percent Passing	Correlation
1. Hand Lowering	80	-.49*
2. Hands Apart	55	-.31
3. Mosquito Hallucination	40	-.28
4. Taste Hallucination	10	-.42
5. R. Arm Rigidity	65	-.49*
6. Dream	45	-.12
7. Age Regression	30	-.34
8. L. Arm Immobilization	50	-.11
9. Anosmia to Ammonia	45	-.46*
10. Hallucinated Voice	05	.02
11. Visual Hallucination	05	-.18
12. Post-Hypnotic Amnesia	25	-.53*

*Significant ($p < .05$)

TABLE 5

Chi-Square Values Resulting from the Comparison of Good Hypnotic Subjects' and Poor Hypnotic Subjects' Signal Detections on the Words-Task and on the Digits-Task

Time Periods	Experiment 1		Experiment 2	
	Words	Digits	Words	Digits
1	.19	10.98**	1.37	8.69**
2	.07	4.56*	1.16	1.02
3	.19	10.83**	.22	3.37
4	.68	1.04	14.81**	11.68**
5	.07	5.84**	9.54**	11.68**
6	5.83**	19.97**	10.87**	6.14**
7	2.06	1.62	16.48**	9.51**
8	4.66*	8.03**	15.90**	16.73**
9	8.00**	6.32**	.88	9.44**
10	2.64	4.29*	21.99**	13.71**

*Significant ($p < .05$)
**Significant ($p < .01$)

TABLE 6

Analysis of Variance with Performance on the Words-Task as the Dependent Variable: Experiment 2

Source	SS	df	MS	F
Instructions (I)	184	1	184	3.13
Source (S)	28	1	28	.48
Hypnotic Ability (A)	453	2	226.5	3.86
I X A	96	2	48	.82
I X S	31	1	31	.53
A X S	266	2	133	2.27
I X S X A	2,817	48	58.7	

TABLE 7

Analysis of Variance with Performance on the Digits-Task as the Dependent Variable: Experiment 2

Source	SS	df	MS	F
Instructions (I)	236	1	236	2.12
Source (S)	228	1	228	2.04
Hypnotic Ability (A)	297	2	148.5	1.33
I X A	187	2	93.5	.84
I X S	66	1	66	.59
A X S	181	2	90.5	.81
I X S X A	5,353	48	111.5	

TABLE 8

Analysis of Variance with SHSS Scores

as the Dependent Variable:

Experiment 2

Source	SS	df	MS	F
Instructions (I)	5	1	5	.82
Source (S)	7	1	7	1.15
Hypnotic Ability (A)	217	2	108.5	17.79*
I X A	4	2	2	.32
A X S	0	2	0	.00
I X S	1	1	1	.16
I X S X A	4	2	2	.32
Error	292	48	6.1	

*Significant ($p < .01$)

TABLE 9

Correlations between Hypnotic Suggestibility and the Words-Task, Digits-Task, Divided Attention State Anxiety, and Trait Anxiety

Variable	Experiment 1	Experiment 2
Words-Task (WT)	-.56**	-.43**
Digits-Task (DT)	-.68**	-.35**
WT and DT (multiple r)	.74**	.47**
Divided Attention (WT + DT)	-.69**	-.44**
State Anxiety	-.45*	-.36*
Trait Anxiety	.02	.01

*Significant ($p < .05$)

**Significant ($p < .01$)

TABLE 10

Percentage of Suggestions Passed and Point-biserial Correlations between Divided Attention and the Suggestions: Experiment 2

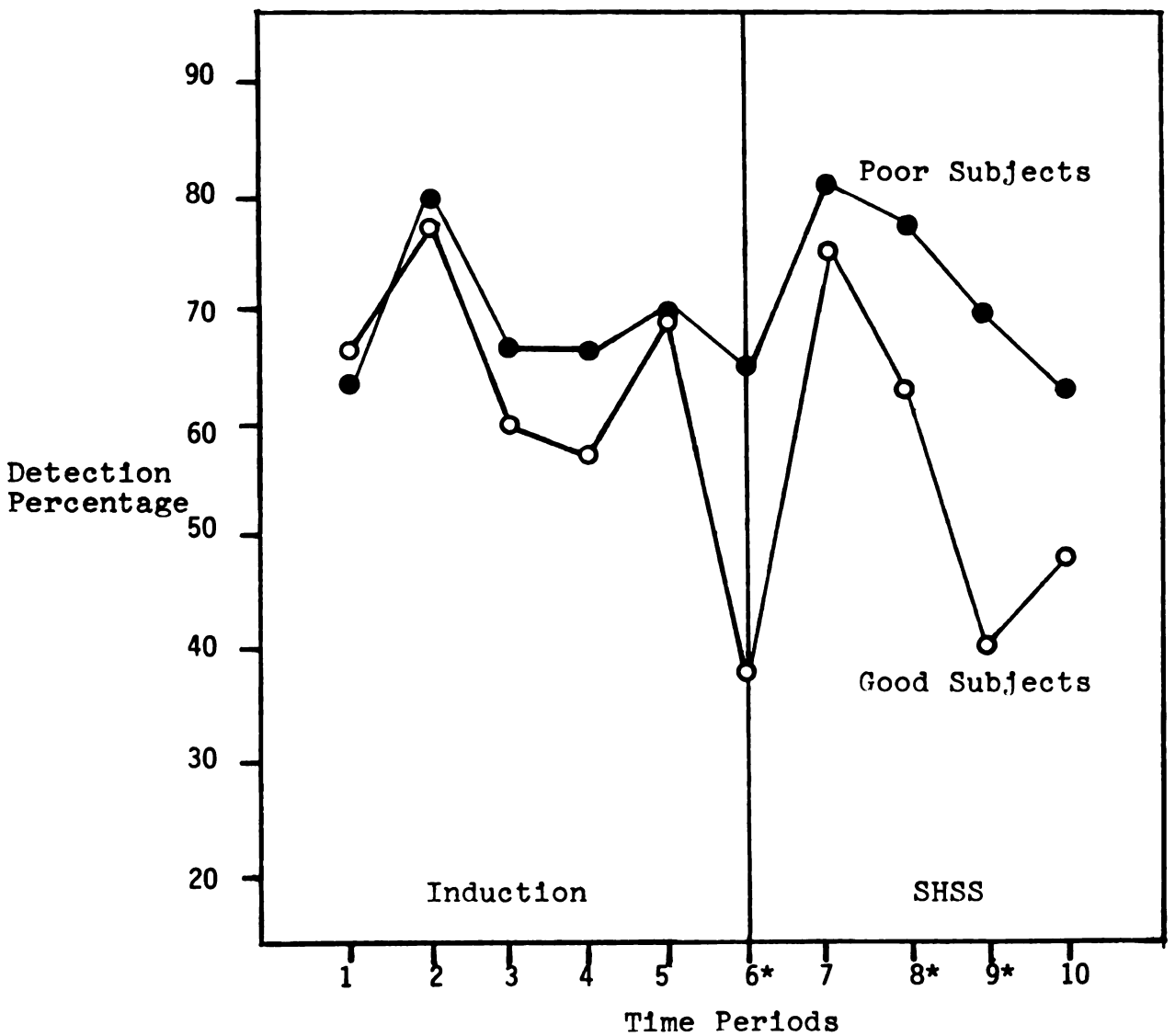
Suggestion	Percent Passing	Correlation
1. Hand Lowering	81	-.08
2. Hands Apart	58	-.28*
3. Mosquito Hallucination	55	-.23
4. Taste Hallucination	25	-.31*
5. R. Arm Rigidity	47	-.26*
6. Dream	27	-.08
7. Age Regression	43	-.27*
8. L. Arm Immobilization	48	-.34**
9. Anosmia to Ammonia	30	-.29*
10. Hallucinated Voice	2	.05
11. Visual Hallucination	22	-.39**
12. Post-Hypnotic Amnesia	23	-.42**

*Significant ($p < .05$)

**Significant ($p < .01$)

FIGURE 1

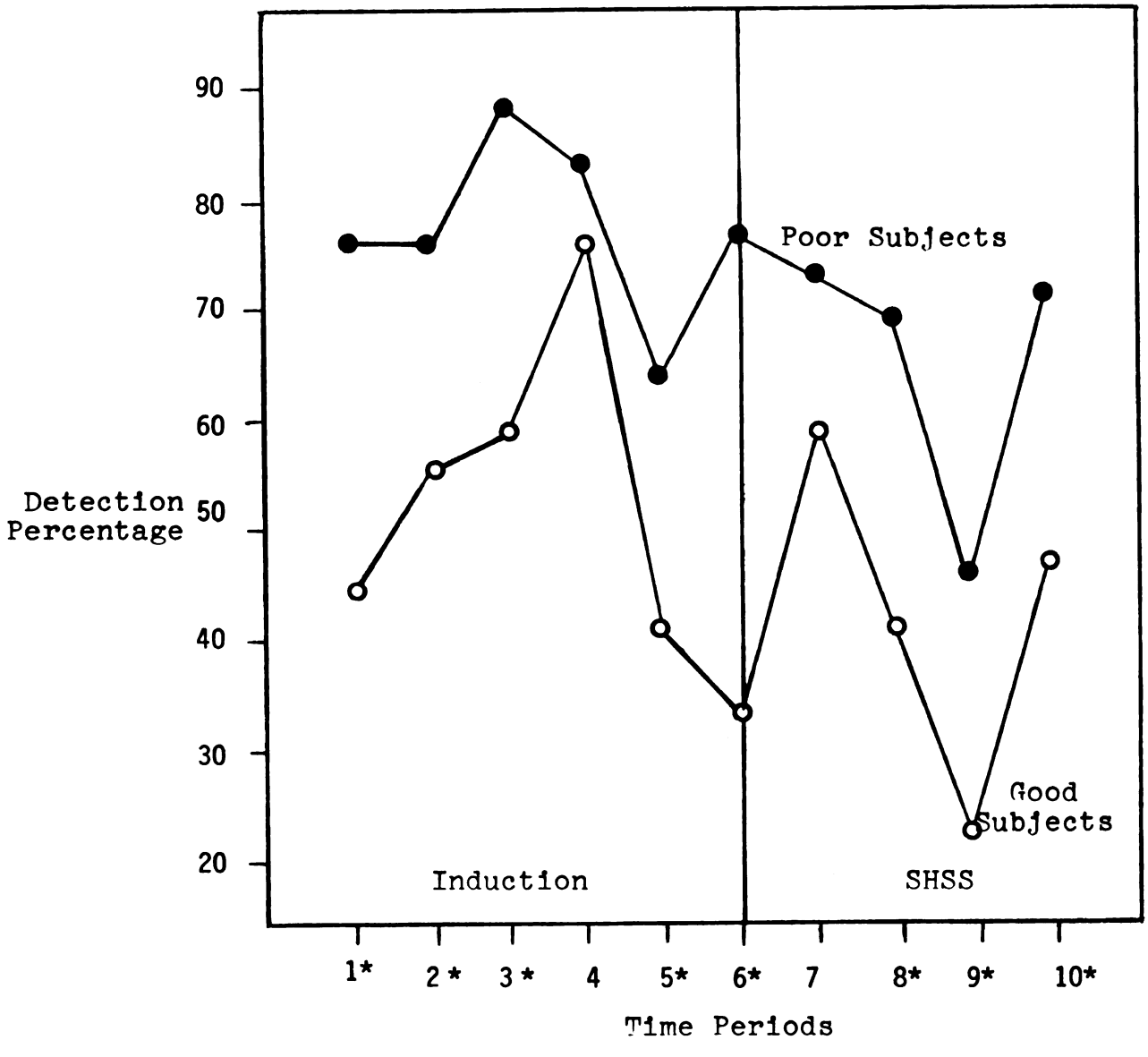
Good Hypnotic Subjects' and Poor Hypnotic Subjects' Temporal Trends in Attention to the Words of the Hypnotist: Experiment 1



*Periods in which Good and Poor subjects significantly ($p < .05$) differed in signal detections

FIGURE 2

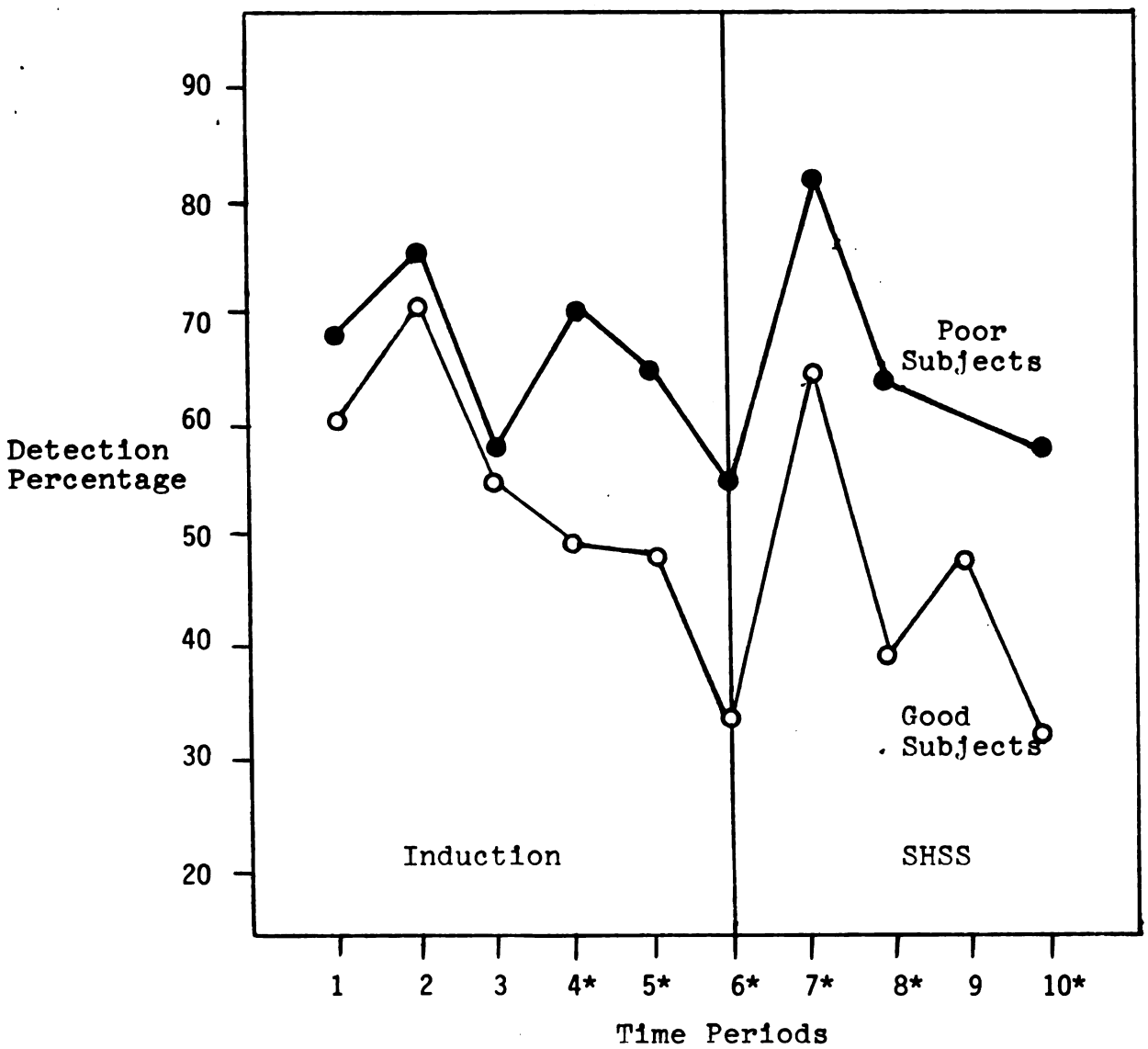
Good Hypnotic Subjects' and Poor Hypnotic Subjects' Temporal Trends in Attention to the Digits: Experiment 1



*Periods in which Good and Poor subjects significantly ($p < .05$) differed in signal detections

FIGURE 3

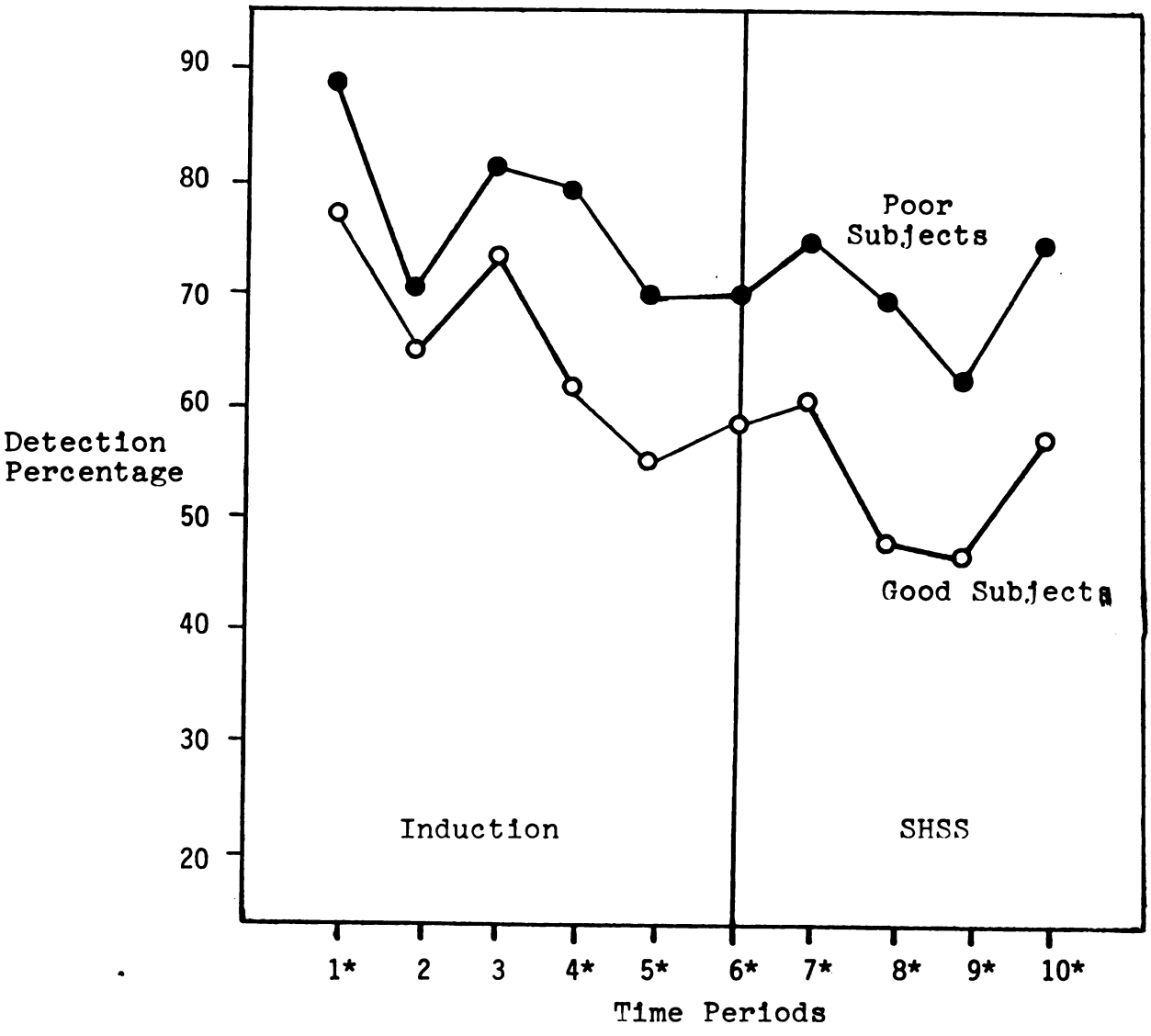
Good Hypnotic Subjects' and Poor Hypnotic Subjects' Temporal Trends in Attention to the Words of the Hypnotist: Experiment 2



*Periods in which Good and Poor subjects significantly ($p < .05$) differed in signal detections

FIGURE 4

Good Hypnotic Subjects' and Poor Hypnotic Subjects' Temporal Trends in Attention to the Digits: Experiment 2



*Periods in which Good and Poor subjects significantly ($p < .05$) differed in signal detections

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APPENDIX A

APPENDIX A

Attention and Hypnosis: A Review

It seems that nearly every hypnotic theorist from Berheim (1906) to Weitzenhoffer (1969) has speculated about attentional processes during hypnosis; even Barber (1960; Spanos & Barber, 1974), the self-styled arch antagonist of state theorists, has speculated in this regard. Unfortunately, these various theorists and the researchers who have investigated attention during hypnosis all employ different models of attention and use a bewildering array of terms to describe attention that make their theoretical speculations and empirical findings difficult to compare and contrast. So before beginning this review of the empirical literature, a model of attention quite similar to that employed by several contemporary cognitive psychologists (Kahneman, 1973; Hernandez-Peon, 1964) and its attendent terms are specified so as to minimize the confusion that would otherwise arise.

For purposes of this review, attention is conceptualized as being analogous to a beam of light having the dimensions of width, intensity, flexibility and capacity. Attention that is wide or diffuse allows the subject to perceive as many as six or seven objects at a time, whereas a constricted or narrow attentional beam forces the subject to attend to only one object at a time. If a subject's

attentional beam is intense or focused, then it becomes easy for him to discriminate between the objects perceived by discerning their attributes; an attentional beam low in intensity or unfocused makes it difficult for such discrimination to occur. A flexible attentional beam allows the subject to shift his attention volitionally from one set of objects to another; and if he shifts his attention in accordance with the demands of a particular task, then his attention is described as being sustained with respect to that task. An unflexible or unsustained attentional beam implies that a subject has difficulty shifting his attentional beam volitionally because his attention is rigid and he is unable to shift it, or because he is distractible and his attention shifts nonvolitionally. Attentive capacity reflects the amount of cognitive work a subject can perform, and it is believed to be largely a function of his arousal level (Kahneman, 1973). That is, a subject can perform more cognitive work with a 100 watt attentional beam (high arousal) than with a 50 watt beam (low arousal).

In summary, a subject's capacity for mental work varies as a function of his arousal level; and the actual form that his attentional beam takes when he performs various mental activities is described three-dimensionally in terms of width, intensity, and flexibility. The adequacy of an individual's performance on a particular task

depends on him having sufficient attentive capacity to perform the task and an attentional style appropriate for the task. For instance, some tasks (e.g., complex intellectual tasks) are best performed with a constricted, focused, and flexible style; whereas other tasks (e.g., spatial tasks) may be performed better with a relatively diffuse, unfocused, and unflexible style,

The majority of hypnotic theorists (e.g., Barber, 1960; White, 1965) hypothesize that during hypnosis a subject's attention becomes constricted and sustained, concentrated in other words, on the words of the hypnotist or to whatever the hypnotist directs the subject's attention. Most of these theorists also hypothesize this concentration of attention is unfocused, while others are not particularly clear in this respect. Although these theorists disagree as to the causes of the concentration of attention, they all agree that it facilitates hypnotic suggestibility because a hypnotic subject's reality temporily becomes limited to the words and suggestions of the hypnotist; and as a consequence, subjects interpret the suggestions as if they were reality and behave accordingly. This theoretical position henceforth will be referred to as the "concentration hypothesis".

Hilgard (1965), on the other hand, describes hypnotic subjects' attention during hypnosis as being diffuse, unfocused, and unsustained; and he contends that subjects reduce the amount of attention (attentive capacity) they

pay to all environmental stimuli, including the hypnotist's words. He goes on to argue that the attentive functions under the control of the hypnotist are residual ones, and the apparent concentration of attention is illusionary--the result of a subject's relative lack of interest in other environmental stimuli; and he goes on to imply that this hypothetical reduction in attentive capacity facilitates suggestibility by reducing the subject's reality testing. Hilgard's position will be referred to as the "reduction hypothesis".

For the purpose of this review, empirical studies dealing with attention and hypnosis are divided into two groups--those dealing with attention during hypnosis and those attempting to correlate attention outside of hypnosis with hypnotic susceptibility or suggestibility. Both types, in turn, are divided into those measuring attention by behavioral means, and those measuring attention by physiological means; and then the studies are reviewed with the following questions in mind: 1) Do good hypnotic subjects (subjects who score high on conventional scales of hypnotic suggestibility) and poor hypnotic subjects (low scores) differ in attention; and if so, 2) are the differences consistent with the concentration or with the reduction hypothesis?

Attention during Hypnosis

Studies employing behavioral measures of attention. Fehr and Stern (1967) used 24 female college students in their study of attention during hypnosis. Subjects were matched on hypnotic ability as measured by the Harvard Group Scale of Hypnotic Susceptibility (HGSHS) and equally divided into a hypnosis and a waking-control group. Individuals in the hypnosis group were given a standard hypnotic induction and were assumed to be hypnotized as a consequence; while the control subjects listened to a tape-recorded message concerning economic status and social mobility for an equal period of time. Following this, all subjects' attention was measured behaviorally by means of their reaction times on a visual vigilance task, which required the subjects to lift their fingers from a telegraph key whenever the brighter of two lights was momentarily flashed. Attention to extraneous auditory stimuli (a buzzer of 60 or 70 db) also was measured by means of the amplitude of subjects' electrodermal and heart rate responses. The buzzer was considered extraneous because subjects were not given any instructions to attend to it, nor were they alerted to it beforehand.

Fehr and Stern found that the hypnotized and control subjects did not differ in their resting skin resistence

or heart rates, which suggests that hypnotic subjects' attentive capacity was not reduced during hypnosis. This is consistent with several other studies (Davis & Kanton, 1935; Ravitz, 1950, 1951; O'Connell & Orne, 1962; Levine, 1930) that have found hypnotic subjects were as aroused, if not more so, than waking control. Fehr and Stern also found that hypnotized subjects' reaction time on the vigilance task was significantly greater than that of the controls, suggesting that either the lethargic motility that often times accompanies hypnosis slowed down their responding (Ham & Edmonston, 1971), or hypnotic subjects required more time to process the information than did the controls, possibly because their attention was not focused. Finally, control subjects' reaction time on the vigilance task was found to have decreased during periods of extraneous auditory stimulation over what it was during periods free of such stimulation, which is consistent with a number of non-hypnotic studies (Mackworth, 1950; McGrath, 1960; Zuercher, 1965) wherein extraneous stimuli were found to facilitate vigilance performance presumably by alerting the subjects; but hypnotized subjects' reaction time was increased during periods of extraneous stimulation, indicating the extraneous stimuli had a distracting effect for them. This could be accounted for by differences in the flexibility of subjects' attention. Control subjects' attention may have quickly shifted back to the vigilance task after the

extraneous auditory stimuli briefly captured their attention, whereas hypnotic subjects' attention may have been less flexible or more "sluggish," as Hilgard (1965, p.7) would have it, which caused them an excessively long delay in the shifting of their attention back to the vigilance task thereby increasing reaction times on the task.

In summary, Fehr and Stern's results suggest attentive capacity during hypnosis is not reduced, and attention is less focused, or it is less flexible than it is when awake. The latter two possibilities are consistent with the reduction hypnothesis; however, these conclusions, or any based on the Fehr and Sterns data, rest on the assumption that subjects in the hypnotic group were in fact hypnotized, which may be unwarranted since it is doubtful that the induction succeeded in hypnotizing poor hypnotic subjects (as defined by their HGSHS scores) apparently included the hypnotic group, and it also is possible that the experimental procedures such as the distracting buzzer "dehypnotized" some subjects. An improved experimental design is one that would have allowed attention and hypnosis to be measured simultaneously, so that if the instrument used to measure attention had interfered with hypnosis such interference would have been detected.

Gur's (1974) study is one of the few in which attention and hypnosis were measured simultaneously. Gur randomly divided 64 college students who were poor hypnotic subjects

(low scores on the HGSHS) into an experimental group and a control group. The experimental group was exposed to what Gur called "an attention-controlled operant procedure" intended to enhance their hypnotic suggestibility. In this procedure, experimental subjects were given an aversive electric shock unless they quickly pushed a button whenever they heard the hypnotist say the word "relax," which was embedded in the words of a standard scale of hypnotic suggestibility. Gur found that this procedure did, in fact, significantly enhance the suggestibility of the experimental subjects relative to the control subjects, who simply received a traditional induction and scale of suggestibility. He also found that the number of shocks the experimental subjects received was significantly correlated ($r = -.52$, $p = .01$) with the subjects suggestibility for the session, indicating that the more attentive a subject was to the hypnotist's words during hypnosis, the fewer shocks he received and the more suggestible he was. This would seem to be consistent with the concentration hypothesis; but Gur's procedure probably not only constricted and sustained the experimental subjects' attention to the words of the hypnotist, but the threat of the shock also may have increased both the experimental subjects' arousal level (attentive capacity) and their anxiety. The anxiety, in turn, may have increased the subjects' dependency/compliance vis-a-vis the hypnotist; and this increased

dependency may have been responsible for the increased suggestibility, rather than the presumed concentration of attention.

Studies which have examined learning during hypnosis would seem to offer some insight into what attention is like during hypnosis, since nearly all learning depends in part on attentional processes; but unfortunately, none of these studies measured learning and hypnosis simultaneously, and as Uhr (1958) points out in his excellent review of the literature, nearly all of them are hopelessly confounded by their failure to control for such things as demand characteristics, hypnotic ability, intelligence, and motivation. In light of these methodological flaws and previous reviews by Uhr (1958) and by Krippner and Bindler (1974), there seems little point in reviewing them again here.

Studies employing physiological measures of attention. Amadeo and Shagass (1963) contended that rapid eye movements (REM's) were nonspecific concomitants of attentive activity, and they presented experimental findings to support their contention. Then in a second study they used eye movements to measure 20 college students' attention during hypnosis that were recorded by means of electro-oculographic changes in the cornea-retinal potential with respect to two fixed electrodes near the eyes. Eye movements were compared in the hypnotized and waking states under three sets of conditions; eyes open, eyes closed,

mental arithmetic (with eyes closed). In addition, the subjects were given instructions while awake to keep their eyes as still as they could and then their eye movements were measured a second time in the waking state under the same three sets of conditions. This procedure was introduced to ascertain to what extent the predicted reduction in REM's in hypnosis was in response to unintended cues (demand characteristics) to hold the eyes immobile.

Amadeo and Shagass found that the subjects' frequency of REM's was significantly less in all conditions under hypnosis when compared to the waking state, indicating attentive activity was reduced during hypnosis. During performance of the arithmetic task (the doubling of single digits spoken every 2 seconds), the reduction in REM rate under hypnosis was not as great as under the other two conditions, but it was still significantly less. Amadeo and Shagass noted that 7 of the 20 subjects were unable to carry out the arithmetic task under hypnosis, although none had any difficulty when awake. Some of those who could not perform the task stated afterwards that the rate of number administration was too fast for them to follow. The instructions to control eye movements while awake reduced REM rates in all three conditions, respective to the uninstructed waking state; but the REM rates in the hypnotized conditions still were significantly less than those in the instructed waking state. Amadeo and Shagass concluded on the basis of these results that atten-

tive activity is reduced during hypnosis, and that there is antagonism between hypnosis and attentive performance.

Amadeo and Shagass's conclusions seem valid ones if it is assumed that their subjects were hypnotized, which again may not have been the case since attention and suggestibility were not assessed simultaneously; and it also is not clear in what way attentive activity was reduced. It would seem that the reduction likely reflects some change in the form the subjects' attentional beams took during hypnosis, relative to the form taken in the waking state, since previous research has consistently shown that attentive capacity is not reduced during hypnosis. The attentional beam postulated by the reduction hypothesis (diffuse, unfocused, unsustained) seems better able to account for the reduction in attentive activity than that postulated by the concentration hypothesis (sustained, constricted) since some of the hypnotized subjects were unable to perform the arithmetic task which requires attention to be focused and sustained.

Like Amadeo and Shagass, Weitzenhoffer (1969) measured attention during hypnosis using eye movements (blink rates with eyes open) recorded as electro-oculographic tracings; and in addition, Weitzenhoffer measured hypnosis by means of a standard scale of hypnotic suggestibility. Unfor-

tunately, attention and hypnotic suggestibility were assessed sequentially within the same experimental session, rather than simutaneously as would have been more desirable. Nineteen college students served as subjects, and each subject's blink rate was sampled over 1-minute periods on each of three occasions: 1) prior to the induction of hypnosis, 2) during hypnosis after some testing of subjects' suggestibility, and 3) during hypnosis while a simple opthalmological examination was performed. Good hypnotic subjects (high scores on the scale of suggestibility) were found to have a marked and statistically significant reduction to blink rates in both periods during hypnosis, relative to their blink rates prior to the hypnotic induction; whereas poor hypnotic subjects (low scorers) did not demonstrate a significant decrement in their blink rates. Weitzenhoffer speculated that this reduction in blink rates reflected attention being directed towards internal stimuli, as opposed to environmental stimuli; but he did not offer any empirical evidence to support his argument. Although Weitzenhoffer's contention may be correct, it seems insufficient to explain the reduction in eye blink rates during hypnosis, since dreaming (see Kales, 1969; or Faulkes, 1966, for a review) and mental arithmetic (Amadeo & Shagass, 1963; Lorens & Darrow, 1962) are two activities requiring the inward turning of attention, both

of which have been associated with increased rather than decreased eye movements; an alteration in one or more of the four dimensions of attention still seems to be required. Since eye movements appear to increase when attention is intense and sustained (Amadeo & Shagass, 1963), these findings seem more consistent with the reduction hypothesis than with the concentration hypothesis.

Many studies (see Evans, 1972, for a review) that have employed the electroencephalogram (EEG) to measure attentional or cognitive processes during hypnosis have found that hypnotic subjects' EEG's are dissimilar to EEG's taken when asleep, which contradicts the traditional notion that hypnosis and sleep somnambulism (sleeptalking and sleepwalking) share many of the same parameters. Recently there has been renewed interest in the EEG alpha rhythm (7-13 Hz) after several investigators (Engstrom, London, & Hart, 1970; Nowlis & Rhead, 1968) found that hypnotic suggestibility apparently could be enhanced through the operant shaping of subjects' alpha rhythm (see Small, 1973, for a critique of these studies). Alpha rhythm seems to be related to attentional processes in an inverted U-shaped fashion, since it desynchronizes with both drowsiness and with heightened arousal or difficult cognitive tasks; and it generally is regarded as indicating the presence of passive or non-vigilant wakefulness. Kamiya (1969) reported that his subjects described their subjective experiences

when producing high alpha as a general feeling of pleasantness associated with "some kind of relaxation of the mental apparatus--where you stop being critical about everything, including the experiment" (p. 514). Similarly, Brown (1970, p. 449) reported that subjects who felt "dissolved into the environment tended to have higher levels of alpha whereas subjects who remain aware of the environment were those with the lowest levels of alpha activity in the EEG." Nowlis and Kamiya (1970) presented evidence suggesting that "relaxation" and "not focusing the eyes" (when eyes are open) were their subjects' most frequently reported methods of increasing alpha duration while "being alert and vigilant" and "visual attentiveness" (when eyes are open) were the most frequently reported methods of decreasing alpha. Thus in terms of the attentional model employed herein, alpha seems likely to reflect moderate attentive capacity plus an unfocused and/or diffuse attentional style.

In a well controlled EEG study, Morgan, McDonald, and Hilgard (1974) recorded occipital EEG alpha in both cerebral hemispheres of 26 right-handed subjects while they performed a hypnotic susceptibility scale, analytic (verbal and numerical) tasks, and spatial (imagery) tasks, that were not equated for difficulty. Good hypnotic subjects showed significantly more alpha activity than did poor hypnotic subjects in all conditions (both inside and outside of hypnosis); and all tasks, whether analytic or spatial, depressed alpha amplitude. Also, significantly more of

the total alpha came from the right hemisphere during the analytic than during the spatial tasks which is consistent with several other studies (Morgan, McDonald, & McDonald, 1971; Galin & Ornstein, 1972), suggesting that either analytic tasks are processed primarily in the left hemisphere and spatial tasks in the right, or those tasks requiring more cognitive work are processed in the left hemisphere and easier tasks in the right. The experimenters concluded that alpha production did not appear to be a function of hypnosis; but rather, it seemed that alpha activity characterized a cognitive style of good hypnotic subjects both inside and outside of hypnosis. In terms of the attentional model being employed, good hypnotic subjects characteristically seem to have moderate attentive capacity plus a less focused style than poor hypnotic subjects.

Evans (1972) in his review of the literature reported the findings of a previously unpublished study of his in which the mean frequency, amplitude, and density (percentage) of alpha for hypnotized and simulating subjects tested by a blind examiner were compared. Simulating subjects (poor hypnotic subjects instructed to simulate hypnosis in order to fool the examiner) generated significantly more alpha than hypnotized subjects both when awake and when simulating hypnosis; and all subjects generated less alpha during hypnosis, or its simulation, than during waking. These findings contradict those of Morgan, McDonald,

and Hilgard (1974), and they suggest that hypnotic subjects are either more drowsy or more aroused, and/or they have a more focused/less diffuse style during hypnosis than subjects simulating hypnosis. These results are suspect, however, because Evans failed to mention whether or not the hypnotic susceptibility of his hypnotized subjects was assessed, and because of the many problems inherent in the use of simulating subjects as controls (Reyher, 1967; 1968; 1969).

Conclusions. Numerous studies (Davis & Kanton, 1935; Ravitz, 1950, 1951; O'Connell & Orne, 1962 Levine, 1930; Fehr & Stern, 1967) have found that the arousal of good hypnotic subjects during hypnosis is either the same or greater than that of poor hypnotic subjects or waking controls, indicating that good hypnotic subjects' attentive capacity is not reduced during hypnosis and contradicting one aspect of Hilgard's reduction hypothesis. Other aspects, however, are supported by studies (Fehr & Stern, 1967; Amadeo & Shagass, 1963; Weitzenhoffer, 1969; Morgan, McDonald, & Hilgard, 1974) suggesting good hypnotic subjects' attention during hypnosis is more diffuse, less focused, and/or less sustained than that of poor hypnotic subjects or waking controls. Certainly much more research is needed before any definite conclusions can be reached, however, particularly since one study (Gur, 1974) found that the hypnotic suggestibility of poor hypnotic subjects was

enhanced seemingly by forcing the subjects to concentrate (focus and sustain) their attention, and another study (Evans, 1972) found no significant differences in the attention of good and poor hypnotic subjects. Future research would do well to: 1) employ less global measures of attention than have been employed in the past, so that each of the four dimensions of attention (width, intensity, flexibility, and capacity) can be individually assessed; 2) measure attention and suggestibility simultaneously, so that if the measuring of attention interferes with hypnosis such interference can be detected; and 3) control for hypnotic susceptibility.

Assuming that the reviewed studies had demonstrated unequivocally that a relationship exists between suggestibility and attention during hypnosis, and also assuming that this relationship is a causal one, let us turn to the question of how the hypothesized attentional style (diffuse, unfocused, and/or unsustained) of good hypnotic subjects might facilitate their execution of suggestions. The answer may lie in the unfocused or relatively non-discriminating nature of their attention, which should tend to blur the distinction between "real" stimuli and imaginal stimuli evoked by the hypnotist's verbal suggestions, thereby making it easy for good hypnotic subjects to mistake the latter for the former. In other words, good hypnotic subjects may respond to imaginal stimuli "as if" they

were real stimuli because of the unfocused nature of their attention during hypnosis. Such an explanation is consistent with numerous theoretical speculations, (Shor, 1970; Hilgard, 1965; Gill & Brenman, 1959; Kubie & Morgolin, 1944) phrased in various semantic guises, postulating that hypnotic suggestibility is in part a function of a temporary reduction in "reality testing". This explanation also is consistent with a line of research (Spanos, 1971; Spanos & Ham, 1973; Spanos & McPeak, 1974; Spanos & Barber, 1972) coming out of Barber's laboratory that has demonstrated hypnotic subjects often translate verbal suggestions into their imaginal counterparts in such a way that if the images were in fact real, they would cause the suggested behavior to occur. Subjects who produced such images executed more suggestions, and more frequently experienced the executions as non-volitional than did subjects unable to imagine in such a manner. For example one subject stated, (Spanos, 1971) "I imagined that there were all kinds of weights tied to my arm. It felt heavy and I could feel it going down," after passing a suggestion calling for him to experience his arm as growing heavy and falling. Another subject said, "I imagined that my arm was hollow and somebody was putting air into it," when told that his arm was getting lighter and was rising. Similar imaginings were found in subjects who passed suggestions for amnesia. One subject who was told to forget the number 4 reported,

"I kept on picturing my numbers in front of me and there was 1, 2, 3, 4, 5, on up to 10,--like they (the numbers) are all on blocks--and I pictured taking it (the number 4) out, and like it traveled real slowly in an arc, and went to the back of my head. I could just picture in front of me the blocks 1, 2, 3, 5, 6 and up, and there was just a blank box there (in the space for 4), and I knew that there wasn't, there just wasn't anything there. I just knew it was 1, 2, 3, 5, 6, up." The testimony of subjects who failed suggestions varied considerably; but it indicated that an external force was not imagined that could bring about the desired behavior, or the subject continued to discriminate between real and imagined stimuli. For instance, one subject who stood up when told that she would be unable to stand, stated that she imagined herself made of stone; but then she said, "I guess I came back, I came out of my imagination... I imagined it, and had a picture in my mind, but didn't feel involved. I tried to imagine myself being like the picture, but I realized it was impossible to do."

It should be noted that Barber and his co-workers, as well as most other theorists with the exception of Hilgard, imply that attention is concentrated (constricted and sustained) on the images in addition to it being unfocused, which of course is not consistent with the attentional style suggested by the studies reviewed herein.

Attention Outside Hypnosis

If it is assumed that the attention of good and poor hypnotic subjects differs during hypnosis, then studies which have examined their attention outside of hypnosis should help in understanding the cause of these differences. That is, it would seem reasonable to conclude that the differences in attention during hypnosis are due to a subject variable if good and poor hypnotic subjects' attention differs outside of hypnosis in the same manner that it does during hypnosis. However, if their attention does not differ outside of hypnosis, or if it differs in a way not found during hypnosis, then it would be safe to conclude that the differences in attention during hypnosis are a function of a subject by treatment interaction.

Studies employing behavioral measures of attention. Das (1964) hypnotized 62 postgraduate bilingual Indian students and measured their suggestibility by means of a nonstandardized scale of suggestibility, and he also obtained their scores on a test of auditory vigilance performed outside of hypnosis. Apparently the subjects were not aware that they had volunteered for research involving hypnosis since some of them became resistant once the nature of the experiment became obvious, and consequently they were not given all the suggestions. The auditory vigilance task consisted of a 30-minute tape recorded series of odd and even numbers between 1 and 9, which

occurred at the rate of approximately 20 per minute. Subjects were required to detect combinations of three odd numbers (called a signal) not interspersed with even numbers. The biserial correlation between vigilance scores (continuous) and suggestibility (dichotomized by a median split) was significant (r = -.38, p = .05), indicating that poor auditory vigilance outside of hypnosis was associated with hypnotic susceptibility. These results suggest that either good hypnotic subjects' attention was relatively less focused than was the poor subjects', hence they had difficulty discriminating between the signals (odd numbers) and the noise (even numbers); or more likely, good hypnotic subjects were less able to sustain their attention to the task than were poor subjects. These conclusions should be viewed sceptically, however, because of the atypical nature of the individuals employed as subjects, because of the use of a non-standardized scale of suggestibility, and because of the differential treatment afforded resistant subjects.

Mitchell (1970) selected 17 college males who scored the highest on the HGSHS and 17 who scored the lowest on the HGSHS to serve as subjects from a larger pool of 72 students who had volunteered for research involving hypnosis. He then examined the subjects' attentive performance under distracting conditions outside of hypnosis, with attention being measured by means of a visual vigilance task.

This task required subjects to keep a moving meter pointer as close to zero as they could be means of a hand-operated control stick. While performing the task, subjects were exposed to extraneous visual stimuli (a lab assistant moving about in subject's field of vision) and extraneous auditory stimuli (a tape recorded conversation played in an adjoining room). These stimuli were regarded as extraneous and as potentially distracting, since they occurred while subjects performed the visual vigilance task and since subjects were not advised of them beforehand.

Contrary to prediction, Mitchell did not find any significant differences between the total tracking performance of good and poor hypnotic subjects; but he did find significant differences in the temporal trends in vigilance performance, indicating that good hypnotic subjects gradually improved their tracking performance, while that of poor subjects gradually deteriorated. Since good hypnotic subjects were able to recount aspects of the distracting stimuli to the same extent as were the poor subjects, Mitchell concluded that good hypnotic subjects possess the ability to override the effects of distracting stimuli without ignoring the stimuli. Perhaps good hypnotic subjects' attention was more diffuse than that of poor subjects, which allowed them to simultaneously attend to both the tracking task and the

extraneous stimuli. Poor subjects' attention may have been more constricted, hence they were unable to simultaneously attend to the task and the extraneous stimuli; consequently, the extraneous stimuli gradually became distracting for them over time and impaired their performance on the tracking task.

Morgan (1972) attempted to relate the hypnotic suggestibility of 40 college males to four cognitive or attentional styles: 1) field dependence-independence (Witkin, Dyk, Faterson, Goodenough, & Karp, 1962), 2) leveling-sharpening (Klein, 1951), 3) repression-sensitization (Byrne, 1961), and 4) augmentation-reduction (Petrie, 1967). She found that performance on the Group Embedded Figures Test and the Rod-and-Frame Test, both considered measures of field dependence-independence, were the only measures of attention that were significantly correlated with suggestibility (-.38 and -.39 respectively), indicating that field independent men were better hypnotic subjects than field dependent men. Field independent individuals are described (Witkin, 1962) as better able to separate stimulus from ground, relative to those who are field dependent. In terms of the model of attention employed herein, this finding suggests that male subjects who characteristically have a highly focused (discriminating) waking attentional style make better hypnotic subjects than do male subjects who characteristically have less focused styles.

Roberts (1964) found that field independent subjects were significantly better hypnotic subjects than field dependent subjects, but unlike Morgan (1972), the relationship held for females (r = -.31) but not for males (r = -.16). Roberts also found significant correlations between female subjects' suggestibility and what she termed "tolerance for unrealistic experiences," measured by means of the number of figure-ground reversals subjects had when passively viewing the Schroeder "staircase" and the black or white windmill (r = .34, p = .05), and when actively trying to see only the dominant figure (r = .35, p = .05). The correlations for male subjects were not significant. Passively viewing the figures, thereby allowing numerous reversals to occur, would seem to require an attentional style much like that associated with the presence of alpha activity--a relatively diffuse, unfocused style. Assuming this to be true, then the correlations Roberts found indicate female subjects, who also were good hypnotic subjects, were better able to adopt and maintain a less focused and/or more diffuse attentional style than were female subjects who were poor hypnotic subjects.

Van Nuys (1973) also failed to find a significant correlation between field dependence-independence and hypnotic suggestibility for male subjects but he did find a significant correlation (r = -.42) between suggestibility and subjects' combined performances on two "meditation

exercises". One exercise consisted of subjects "passively gazing (not thinking about or analyzing the flame)" at a candle and reporting, by way of finger movements, whenever they noticed their attention wandering from the candle; and in the other exercise, subjects "passively focused" their attention on their breathing and reported the number of times their attention wandered. Both of these exercises seem to be calling for the subject to adopt a relatively diffuse and unfocused attentional style, and the number of intrusions a subject had probably reflected his ability to adopt and maintain such a style. Thus males who also are good hypnotic subjects seem better able to adopt and maintain a more diffuse and/or less focused attentional style than are males who are poor hypnotic subjects.

Studies employing physiological measures of attention. The earlier reviewed study by Morgan, McDonald, and Hilgard (1974) measured waking alpha during their 26 right-handed subjects' performances of analytic (verbal and numerical), spatial (imagery), and music tasks. Good hypnotic subjects, as defined by their SHSS:C scores, produced significantly more alpha when performing these tasks than poor hypnotic subjects, indicating good hypnotic subjects had moderate levels of arousal (attentive capacity) plus a less focused attentional style outside of hypnosis than poor hypnotic subjects.

London, Hart, and Leibovitz (1968) also found a significant difference between good and poor hypnotic subjects' alpha production. In their study, 125 volunteers were given the HGSHS and their alpha was measured one week later. Eight of the subjects who scored the maximum of 12 points on the HGSHS generated alpha for a mean of 42.3 seconds out of each minute during eyes-closed, awake, and resting periods; while 25 subjects who scored 4 or less on the HGSHS generated alpha for only a mean of 24 seconds per minute. This difference was significant ($p = .005$), again indicating that good hypnotic subjects' attentive capacity was more moderate than that of poor hypnotic subjects, plus their attention was less focused/more diffuse than that of poor subjects.

Similarly, Engstrom (1970) found that the hypnotic

suggestibility of a specially selected group of poor hypnotic subjects (subjects who scored low on the HGSHS and who also had less than 50% alpha in a 4-minute waking period) was significantly correlated (.56) with alpha density; but as Evans (1972) noted in his review, considerably more subjects should have met the stated selection criteria than actually did, given the approximately normal distribution of alpha in the general population. Thus some unknown variable must have influenced the selection of subjects making these results applicable only to some special and unknown subsample.

Hartnett, Nowlis, and Svorad (1969) found alpha density and hypnotic susceptibility (defined by SHSS:C scores) were not significantly correlated (-.27) when their entire sample of 28 subjects was used. However, a special subsample of 14 of the original 28 subjects had a significant correlation (.69) between alpha and their suggestibility scores. Unfortunately, the procedures used to select these 14 subjects were not specified, making these results difficult to interpret. A similar correlation (.70) was obtained by Nowlis and Rhead (1968) between waking alpha and hypnotic susceptibility (defined by combined scores on the HGSHS and SHSS:C); but the procedure used to select the 21 subjects was not specified, again making these results difficult to interpret.

Several other researchers have failed to find any significant relationship between alpha density and hypnotic susceptibility. In one study (Galbraith, London, Leibovitz, Cooper, & Hart, 1970), the HGSHS was administered to 80 subjects, 59 of whom returned two weeks later for a "study of brain waves" that they believed was independent of the hypnosis experiment. EEG's were obtained and submitted to a complex statistical analysis which found theta activity, but not alpha, was related to hypnotic susceptibility. Evans (1972) also reported in an unpublished study that waking alpha and hypnotic susceptibility were not significantly related.

Conclusions. The findings of a majority of the studies (Das, 1964; Mitchell, 1970; Roberts, 1964; Van Nuys, 1973; Morgan, McDonald, & Hilgard, 1974; Engstrom, 1970; Hartnett, Nowlis, & Svorad, 1969; Nowlis & Rhead, 1968) reviewed suggest that good hypnotic subjects' have moderate attentive capacity plus attention that is more diffuse and/or less focused outside of hypnosis than is the attention of poor hypnotic subjects. The fact that this relationship was found in studies whose methodologies were quite different can be viewed as an instance of hypothesis validation by covergent operations; but the fact that several of these studies had serious methodological flaws, and the fact that two other studies (Evans, 1972; Galbraith, London, Leibovitz, Cooper, & Hart,

1970) failed to find such a relationship makes it difficult to conclude with certainty that this relationship exists. Assuming for the moment that it does, it remains to be seen whether good hypnotic subjects chronically have an attentional style that is relatively diffuse and/or unfocused, or whether they simply have the ability to adopt and maintain such a style when it is called for. If the former possibility is correct, then the hypothetical attentional style (diffuse, unfocused, unsustained) of good hypnotic subjects during hypnosis must be the result of an attentional style that remains unchanged despite variations in environmental conditions, i.e., it is the result of a constant subject variable; whereas if the more plausible latter possibility is correct, then the attentional style of good hypnotic subjects during hypnosis must be the result of a subject by treatment interaction. In either case, however, the attentional style of good hypnotic subjects is not a style specific to hypnosis, but can be manifested outside of hypnosis as well. This is consistent with studies (e.g., Tellegen & Atkinson, 1974; Shor, 1970; Roberts & Tellegen, 1973) which have found the frequency of "hypnotic-like" experiences outside of hypnosis to be correlated with hypnotic susceptibility for these experiences all seem to have one thing in common--an unfocused attentional style.

Future research in this area could improve upon past research designs by: 1) employing measures of attention that would allow differentiation of the four dimensions of attention; 2) using unbiased subject selection procedures; 3) controlling for hypnotic susceptibility by using standard scales other than the HGSHS; and 4) controlling for sex, since several studies (Roberts, 1964; Morgan, 1972; Van Nuys, 1973) indicate sex may be a moderating variable in the relationship between attention and susceptibility.

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APPENDIX B

APPENDIX B

Instructions Given the Subjects:
Experiment 1

Instruction given all subjects (experiment 1).

"This experiment is interested in the relationship between hypnosis and motor performance. I cannot tell you the specific hypotheses being tested, for providing subjects with such knowledge sometimes biases the way the subjects respond. However, a meeting will be held to explain the purposes and the results of this research after all subjects have been run. If you are interested, please attend this meeting which will be announced on the same bulletin board where you singned-up for this research. One other thing, please do not discuss this session with other subjects until the completion of this study. Okay, now for the instructions for this session. During this experiment, you will be given a standard hypnotic induction followed by a standard scale of hypnotic induction followed by a standard scale of hypnotic suggestibility, which consists of a variety of hypnotic suggestions. While receiving the induction and scale of suggestibility, you also will be expected to perform two motor tasks. One task requires you to quickly push a footpedal whenever you hear the word 'relax' or any words containing 'relax', e.g. 'relaxing, 'relaxed'. Once again, you should quickly press a footpedal whenever you hear the words 'relax' or words containing 'relax'. The word 'relax' is embedded in the verbalizations of the hypnotist, which you will hear over one earpiece of your headphone set. The other motor task requires you to quickly push a footpedal whenever you hear double digits, which are embedded in a series of single digits. A double digit is nothing more than 2 single digits which occur close together in time. For instance, you might hear, ' 5.....7.....2.....4,1.....6.....9'. In this case, you should have pressed the footpedal immediately after hearing the double digit '4,1'. You will hear the digits over one ear piece of your headphone set, while you simultaneously receive the hypnotist's words over the other ear piece. In other words, you will be listening to digits with one ear, and listening to the hypnotist's words with your other ear; and you are to quickly press the footpedal whenever you hear a double digit and whenever you hear the word 'relax', or words containing 'relax'."

Instructions given NoFeedback subjects (experiment 1).

"Now listen carefully. Your first and foremost task is to let yourself be hypnotized by listening to what the hypnotist says and doing those things he requests of you. For instance, he will tell you to relax your arms and legs, to notice various sensations, to sink back into the chair, etc. You should attempt to do these things. While doing this, you should perform the two motor tasks. Both tasks are equally important so strive to do as well as you can on both. However, do not get upset if you miss some 'relaxes' or double digits for no one is expected to get them all."

Instructions given the Feedback subjects (experimentl).

"Now listen carefully. Your first and foremost task is to let yourself be hypnotized by listening to what the hypnotist says and doing those things he requests of you. For instance, he will tell you to relax your arms and legs, to notice various sensations, to sink back into the chair, etc. You should attempt to do these things. While doing this, you should perform the two motor tasks. The 'relax-task' is more important than the 'digit-task', so you should try first to get the 'relaxes' and words containing 'relax', and then get as many double digits as you can. That is, try to do both, but make sure you get the 'relaxes'. To help you perform the relax-task better, you will be given a mild electric shock whenever you fail to push the pedal in response to the word 'relax'. The mild shock, the intensity of which you yourself will set, will serve as sort of a reminder whenever you miss a 'relax', and thus it sould help you perform the relax-task better."

Instructions Given the Subjects: Experiment 2

Instructions given all subjects (experiment 2).

"This experiment is interested in the relationship between hypnosis and motor performance. I cannot tell you the specific hypotheses being tested, for providing subjects with such knowledge sometimes biases the way the subjects respond. However, a meeting will be held to explain the purposes and the results of this research after all subjects have been run. If you are interested, please attend this meeting which will be announced on the same bulletin board where you signed-up for this research. One other thing, please do not discuss this session with other subjects until the completion of this study. Okay, now for the instructions for this session. During this experiment, you will be given a standard hypnotic induction followed by a standard scale of hypnotic suggestibility, which consists of a variety of hypnotic suggestions. While receiving the induction and scale of suggestibility, you also will be expected to perform two motor tasks. One task requires you to quickly move your foot whenever you hear the word 'relax' or any words containing 'relax', e.g. 'relaxing', 'relaxed'. The word 'relax' is embedded in the words of the hypnotist, which you will hear over one ear piece of your headphone set. The other motor task requires you to quickly move your foot whenever you hear double digits, which are embedded in a series of single digits. A double digit is nothing more than 2 single digits which occur close together in time. For instance, you might hear, '5.....7.....2.....4,1.....6.....9'. In this case, you should have moved your foot immediately after hearing the double digit '4,1'. You will hear the digits over one ear piece of your headphone set, while you simultaneously receive the hypnotist's words over the other ear piece. In other words, you will be listening to the hypnotist's words over one earpiece, and listening to the digits in the other ear; and you are to quickly move your foot whenever you hear a double digit and whenever you hear the word 'relax' or words containing 'relax'."

Instructions given Non-Instructed subjects (experiment 2).

"Now listen carefully. Your first and foremost task is to let yourself be hypnotized by listening to what the hypnotist says and doing those things he requests of you. For instance, he will tell you to relax your arms and legs, to notice various sensations, to sink back into the chair, etc. You should attempt to do these things. While doing this, you should perform the two motor tasks. Both tasks are equally important so strive to do as well as you can on both. However, do not get upset if you miss some 'relaxes' or double digits for no one is expected to get them all."

Instructions given Instructed subjects (experiment 2).

"Now listen carefully. Your first and foremost task is to let yourself be hypnotized by listening to what the hypnotist says and doing those things he requests of you. For instance, he will tell you to relax your arms and legs, to notice various sensations, to sink back into the chair, etc. You should attempt to do these things. While doing this, you should perform the two motor tasks. The relax-task is more important than the digits-task, so you should try first to get the 'relaxes' and words containing 'relax', and then get as many double digits as you can. That is, try to do both, but make sure you get the 'relaxes'. However, do not get upset if you miss some 'relaxes' or double digits for no one is expected to get them all."

APPENDIX C

APPENDIX C

The Hypnotic Induction and Susceptibility Scale

with the Embedded Signals (Relax, Double Digits) Highlighted

Please close you eyes and settle back into the chair. Please close your eyes and settle into the chair. Your eyes should be closed. Your eyes should be closed (Digit 1). Keep your eyes closed until I tell you to open them, or to wake up. Now take it easy and just let yourself RELAX (1). Don't be tense, just listen carefully to my voice. Sometimes my voice may seem to change or sound as if it were coming from far off. That's O.K. If you begin to get sleepier, that will be fine too. Whatever happens, accept it and just keep listening to my voice and become more and more RELAXED (2). Just sit back and listen. Whatever you feel is happening, just let it happen. As you think of RELAXING (3) your muscles will RELAX (4). Starting with your right foot, loosen the muscles in your right foot and leg. Concentrate (Digit 2) on those muscles in your right foot and leg. Your foot, your calf, and your thigh; just let those muscles go limp, limp and RELAXED (5). Let those muscles become loose and concentrate on letting all the tension drain out of those muscles as you sink back into the comfortable, comfortable chair. Now the muscles of your left (Digit 3) foot and leg. Concentrate on them. Concentrate on your left foot, your calf muscle and your left thigh. Think about these muscles and let them RELAX (6). Let all the tension drain out of those muscles. Let (Digit4) all the tension drain out of these muscles as you listen to my voice and sink back into the chair. Sink back into the comfortable chair. Now think about your right hand; your right hand and forearm. Concentrate on these muscles. Think about these muscles. Feel them beginning to RELAX (7) more, and more. More and more, think about RELAXING (8) them. Let all the tension, let all (Digit 5) the tension drain out of these muscles; your right hand and forearm. Feel them resting on the arms of the chair. Feel (Digit 6) them resting on the arms of the chair, letting all the tension drain out of these muscles. RELAX (9). And now your upper right arm, bicep, and shoulder. Let the muscles (Digit 7) in your shoulder and upper arm; let all the tension drain out of those muscles (Digit 8). Let all the tension drain out of those muscles. Feel yourself sinking back into the chair now; back into the

(Digit 9) comfortable chair. RELAXING (10), further and further. And now your left hand and forearm, think about your left hand and forearm. Concentrate on my voice, you're now RELAXING (11) your left hand and forearm. Feel all the tension, all the tension going out of your hand (Digit 10) and forearm. Feel them resting comfortably on the arm of the chair, as you sink back into the comfortable and RELAXING (12) chair. And now your upper arm and shoulder. Feel them, feel the sensations in them, as (Digit 11) as they too become more and more RELAXED (13); as you concentrate on my voice; as you concentrate on my voice, you feel yourself sinking, sinking back into this comfortable, comfortable and RELAXING (14) chair. And now your neck muscles; think about your neck muscles. Feel your head against the back of the chair. Let your neck muscles RELAX(15). Let your neck and your chest muscles go limp. More and more RELAXED (16). Feel all the tension drain out of your body now, as you listen to my voice and sink back (Digit 12) into the comfortable chair. As you become RELAXED (17), your body will feel sort of heavy, perhaps numb. You will begin to have this feeling of numbness or heaviness in your legs and feet; in your hands and arms, throughout your body. Feel yourself settling deep, deep into the chair now. The chair is strong, it will hold your (Digit 13) body as it feels heavier and heavier. Heavier and heavier. You're beginning to feel drowsy and sleepy; drowsy, sleepy. You are breathing freely and deeply; freely and deeply. You are getting (Digit 14) more and more drowsy. Your whole body is becoming more and more tired and heavy. Heavy and tired; tired and heavy. You are tired, very, very RELAXED(18). By letting yourself go, you can become even more RELAXED(19). You can reach a state of deeper, more complete RELAXATION(20). You are becoming increasingly more drowsy and sleepy. There is a pleasant feeling of numbness (Digit 15) and heaviness throughout your body. Feel that, that sensation of numbness or heaviness as it increases, as it becomes greater and greater. You're beginning to feel very, very tired and sleepy. Soon you will just listen sleepily to my voice as you become more and more deeply RELAXED(21). You are tired, heavy and very RELAXED(22). Your whole body is heavy, heavy, very heavy. You feel a pleasant, warm tingling throughout your body as you get more and more tired and sleepy. Sleepy, drowsy; drowsy and sleepy. Keep your (Digit 16) thoughts on what I am saying. Listen to my voice. It may sound strange at times, as though it comes to you in a dream, as you sink deeper into this (Digit 17) numbness; into this heaviness of deep, deep RELAXATION (23). Heavy and tired. Deeply RELAXED (24). Deeper, deeper, deeper. You feel pleasantly drowsy and sleepy as you continue (Digit 18) to listen to my voice. Just keep your thoughts on what I am saying (Digit 19). You're going to get much more drowsy

(Digit 20) and sleepy. Soon you will be deep asleep, but you will have no trouble hearing me. You will not wake up until I tell you to. Soon, I shall begin to count from 1 to 20. As I count, you will feel yourself going down (Digit 21) farther and farther, into a deep, deep restful sleep. But you will be able to do all sorts of things I ask you to do without waking up. One, you are going to go more (Digit 22) deeply asleep. Two, down, down, down to a deep, sound, RELAXING (25) sleep. Three, four, more and more asleep. Five, six, seven. You are sinking into a deep, deep sleep. You are finding it (Digit 23) easy to listen to the things I am telling you. Eight, nine, ten. Half way there. Always deeper asleep, deeper and deeper asleep. Eleven, twelve, thirteen, fourteen, fifteen. Although (Digit 24) deep, deep asleep you can hear me clearly. You will always hear me distinctly, no matter how deeply asleep you feel you are. RELAX (26). Sixtten, seventeen, eighteen. Deep asleep. Fast asleep. Nothing will disturb you. You're going (Digit 25) to experience many things that I will tell you to experience. Nineteen, twenty. Deep, deep asleep. You will not wake up until I tell you to. You will wish to sleep comfortably and to have the experiences I will describe to you. I want you (Digit 26) to realize that you will be able to speak, to move and even open your eyes if I ask you to do so, and still remain just as RELAXED (27) and hypnotized as you are now. No matter what you do (Digit 27), you will remain hypnotized until I tell you otherwise. Now hold your right arm out at shoulder height. Hold your right arm out at shoulder height with the palm of your hand up. Attend carefully to this hand. Notice the sensations in it. Notice whether or not it is a little numb or tingly, and the slight effort it takes to keep from bending your wrist. Pay close attention to your hand. Imagine that you are holding something heavy in your hand; perhaps a heavy baseball or a billiard ball, something heavy; something heavy. Shape your hands around it. Shape your hand around this imagined object as if you were holding it in your hand. Shape your hands around it, shape your fingers around it as if you were holding this imagined object in your hands. Now the hand and arm feel heavy, heavy; as if the weight were pushing down, pressing down. And as it feels heavier and heavier, the hand and arm begin to move down, down as if forced down. Moving down, down, more and more down. Heavy, heavy and tired. The arm is more and more tired and strained. Down, slowly but surely down, down. More and more down. The weight is so great; the hand is so heavy, you feel the weight more and more. The arm is too heavy to hold back; too heavy. It goes down, down, down. More and more down. (10 second pause). That's good. Now let your hand go back to it's original position on the arm of the chair and RELAX (28). You probably experienced (Digit 28) much more heaviness and tiredness in your arm than you would have if you had not concentrated on it, and had not

imagined (Digit 29) something trying to force it down. Now just RELAX (29). Your hand and arm are now as they were. Not feeling tired or strained. They are back to normal. All right, just RELAX (30). Now extend your arms ahead of you with the palms facing each other. Please extend your arms straight ahead of you with your palms facing each other. Your hands should be close together but not touching. I want you to imagine a force acting on your hands to push them apart, as though one hand were repelling the other. Your are thinking of our hands being forced apart. And they begin to move apart; separating, separating, moving apart, wider apart; repelling one another. Feel your hands pushing pushing away from one another, more and more away from each other. Further and further apart, separating more and more. (10 second pause) That's fine. Just put your hands back on (Digits 30) the arms of the chair and RELAX (31). You have been listening to me (Digit 31) very carefully, paying close attention and RELAXING (32). You may not have noticed a mosquito that has been buzzing, buzzing, singing as mosquitoes do. Listen to it now, buzzing. Hear it's high pitched buzzing as it flies around your right hand. It is landing on your hand. Perhaps it tickles a little. There, it flies away again. You hear its high buzz. It is back on your hand, tickling, buzzing. It might bite you. You don't like this mosquito. You'd like to get rid of it. Go ahead, brush it off. Get rid of it if it bothers you. (10 second pause.) It's gone. That's a relief. You are no longer bothered with it. The mosquito has disappeared. Now RELAX (33) completely. I want you to (Digit 32) think of something sweet in your mouth. Imagine you have something sweet tasting in your mouth, like a cube of sugar or a piece of candy. A cube of sugar or a piece of candy. As you think about this sweet taste, you actually begin to experience a sweet taste. It may be faint at first, but it will grow and grow. Notice already the sweet taste that is beginning to develop in your mouth. As that cube of sugar, or candy melts, the sweet taste is increasing,sweeter and sweeter. Sweeter and sweeter. It is getting stronger and stronger. It often takes a few minutes for such a taste to reach its full strength. It is getting stronger , stronger, sweeter, sweeter, stronger and sweeter. There how strong is it now? How strong is that sweet taste? How strong is that sweet taste you are presently experiencing? Is it strong, moderate or weak? Please state out loud clearly and distinctly how sweet a taste it is that you are presently experiencing. Go ahead. (10 second pause.) Now notice something is happening to that taste. It's changing. You are now beginning to have a sour taste in your mouth; an acid taste, as if you have some lemon in your mouth, or vinegar. Lemon or vinegar. The taste in your mouth is getting more and more sour; more acid, more sour; more and more sour. How strong is that sour taste? How strong is it? Is it strong, moderate or weak? Please state out loud how strong

it is. Go ahead. (10 second pause.) What taste you did have is now fading away and your mouth is returning to normal. RELAX (34). Please hold your right arm straight out and your fingers straight out to. Hold your right arm straight out and your fingers straight out to. Think of your arm becoming stiffer and stiffer. Stiff, very, very stiff; your right arm is becoming stiffer and stiffer. Stiff, very, very stiff; your right arm is becoming stiffer and stiffer. As you think of it becoming stiff, you will feel it become stiff; more stiff and rigid, as though your arm were in a splint so that the elbow cannot bend. Stiff, held stiff, so stiff that it cannot bend. A tightly splinted arm cannot bend. Your arms feel stiff as if tightly splinted. Feel how tightly splinted your arm has become. So tightly splinted in fact, that it would be very difficult to bend your arm. Too tightly splinted, too tightly splinted. Go ahead and try to bend it. Go ahead and try. (10 second pause.) That's fine (Digit 33). You will have an opportunity to experience many things. You've probably noticed how your arm stiffened (Digit 34) as you thought of it as stiff and how much effort it took to bend it. Your arm is no longer at all stiff, place it back in position and RELAX (35). We are very much interested in finding out what hypnosis and being hypnotized means to people. One of the best ways of finding out is through the dreams that people have while they are hypnotized. Some people dream directly about the meaning of hypnosis while others dream about this meaning in an indirect way. Now neither you nor I know what sort of a dream (Digit 35) you are going to have, but I am going to allow you to RELAX (36) for awhile and you are going to have a dream, a real dream. Just like the kind you have when you are (Digit 36) asleep at night. When I stop talking to you very shortly, you will begin to dream. You will have a dream of hypnosis, you will dream about what hypnosis means, now you are falling asleep, deeper and deeper asleep, very much like when you sleep at night. Soon you will be deep asleep. Soundly asleep, as soon as I stop talking you will begin to dream, when I speak to you again you will stop dreaming, and you will listen to me just as you have been. If you stop dreaming before I speak to you again, just remain pleasantly and deeply asleep. Now sleep and dream, deep, deep asleep. (Allow 2 minutes for dreaming) The dream is over, if you have had a dream, you can remember every detail clearly, very clearly. You will not feel (Digit 37) particularly sleepy or different from the way you felt before I told you to fall asleep and to dream, and you continue to remain deeply RELAXED (37). Whatever you dreamed, you can remember quite clearly, and I (Digit 38) want you to describe it out loud from the beginning. Now tell about your dream right from the beginning. Go ahead. (30 second pause.) Continue to go deeper and deeper into this pleasant and RELAXED (38) sleep-like state. You are to be

given a pad and a pencil, please hold out the hand you normally write with so that the pencil can be placed in it. Please hold out the hand you normally write with, so that a pencil (Digit 39) can be placed in it. Now hold out your other hand, so that a pad can be placed in it. Now hold out your other hand so that the pad can be placed in it. RELAX (39). Now please write your name on the pad with (Digit 40) the pencil, while you are at it why don't you also write your age and the date. That's your name, your age and the date on the pad. (pause 30 seconds) Keep the pad and pencil in your hands and listen to me. I would like you to RELAX (40) and think about when you were in the fifth grade of school. In a little while you will find yourself once again (Digit 41) a child, on a nice day, sitting in class in the fifth grade, writing or drawing on some paper. I shall now count to five and at the count of five you will be back in the fifth grade. One, you are going back into the past, it is no longer 1976, 1975, or 1974 but much earlier. Two, you are becoming increasingly younger and smaller. Presently, you will be back in the fifth grade on a very nice day. Three, getting younger and younger, smaller and smaller all the time. Soon you will be back in the fifth grade and you will feel and experience exactly as you did once before on a nice day when you were sitting in class, writing or drawing. Four, very soon you will be there, once again a child in a fifth grade class. You are nearly there now, in a few moments you will be right back there. Five, you are now a child in a classroom in a school, you have a pad of paper and are holding a pencil. I would like you to write your name on the pad with this pencil. Write your name on this pad with this pencil. (10 second pause.) And now please write down your age, and the date if you can also on the paper. (30 second pause.) Presently, you will no longer be in the fifth grade but you will be still y unger, back in the second grade. I shall count to two and then you will be back in the second grade. One, you are becoming smaller still and going back to a nice day in the second grade. Two, you are now in the second grade, sitting happily in school with some paper and pencil. You are in the second grade. Would please write your name on the paper. Please write your name on the paper, and also write down how old you are. Your name and how old your are, please write how old you are on the paper. (10 second pause.) That's fine. And now you can grow up again and come right back to 1976 in the Lansing, East Lansing area. You are no longer a child, but a grown up person, sitting in the chair deeply RELAXED (41). This is 1976 and you are in the Lansing, East Lansing are. Fine everything is back as it was. Now the (Digit 42) pad and pencil you have been holding will be removed. Just continue to be comfortably RELAXED (42). You are very comfortable with the feeling of heaviness throughout your body. I want you not to think about your left arm and hand. Your left arm and hand, pay close attention (Digit 43)

to them. They feel numb and heavy, very, very heavy. How heavy your left arm and hand feel. Notice the sensations of heaviness in your left arm and hand. Even as you think about how heavy they are they grow heavier and heavier, heavier and heavier. Your left arm and hand are getting heavier, heavy, heavy. Your hand is getting heavier, very heavy, very, very heavy. Feel how heavy it has become. It's like a piece of lead, feel how heavy your hand and arm have come to be. They are so heavy, so very, very heavy, so heavy in fact that you would find it very difficult to lift them, they're just too heavy, too heavy and tired. Feel how heavy a d tired they are, they are so tired and so heavy in fact, that you would have a great deal of difficulty in lifting them. Go ahead and try, go ahead and try lifting your hand up. (10 second pause.) That's fine. You see how it was harder to lift than usual because of the RELAXED (43) state you are in. Now place your hand back in position on the arm of the chair. Your hand and arm now feel normal again. They are no longer heavy, just RELAX (44) all over. In a moment you won't be able to smell anything, it will be like having a very bad cold. Even now you are becoming less and less able to smell odors. You can smell odors less and less, less and less. Very soon you will be unable to smell even the strongest of odors. Now you can no longer smell anytlhing at all. You can no longer smell any odors. Your nose is anesthesized. A bottle of odorous substance will be placed under your nose so that you can see for yourself that your sense of smell is completely gone. You can't smell anytlhing. Your nose is completely insensitive, see for yourself that your nose is anesthesized, incapable of smelling any odors. Now take a good sniff, take a good sniff. (5 second pause.) Did you smell anything just now? If so, what was it? Answer these questions out loud, go ahead. (10 second pause). Now your nose is returning to its normal state of smell. In a moment you will be able to smell as you always have been able to. Alright, everything is normal again. Your nose (Digit 45) have recovered its sense of smell. We are through with odors. Sit back and RELAX (45). In a moment you will hear (Digit 46) another voice asking you some questions, such as where you were born, how many brothers and sisters you have, and a few other factual questions. I hope you won't mind answering these questions. The questions will be asked over the head phones you are now wearing. The questions will begin a few seconds after I stop talking. There, there's the first question. (10 second pause.) Fine, let's go on to something else. In a little while (Digit 47) I am going to ask you to open your eyes and look at a table in front of you, but you will remain as hypnotized as you now are. Two boxes have been placed on the table, in fact, that's all that there is on the table, just two boxes, two small boxes and nothing else. Okay, now very slowly, I would like you to open your eyes and look at the two boxes. Open your

eyes slowly now and look at the two boxes. Do you see these boxes? Do you see anything else on the table? Answer these questions out loud please. Go ahead. (10 second pause.) Okay, now close your eyes and RELAX (46), just close your eyes and RELAX (47) and sink back into the chair. The table and the boxes are being taken away now. Stay completely asleep and listen to what I tell you next. In a little (Digit 48) while I shall begin counting backwards from 20 to 1, you'll awaken gradually as I do, but you will still be in your present state for most of the count. When I reach five you will open your eyes, but you will not be fully awake. When I get to one, you will be entirely roused up in your normal state of wakefulness. You'll have been so RELAXED (48) however, that you will have trouble recalling the things I've said to you and the things you did or experienced. It will (Digit 49) prove to cause so much effort to recall that you will prefer not to try. Just RELAX (49) now, it will be much easier to forget everything until the experimenter tells you that you can remember. You will forget all that has happened until the experimenter says to you, 'now you can remember everything.' You will not (digit 50) remember anything until then. RELAX (50) after you wake up you will feel refreshed and not have any pain or stiffness or other unpleasant after effects. I shall no count backwards from 20, and at 5, not sooner, you will open your eyes but not be fully aroused until I reach 1. At 1 you will be fully awake. Ready? 20, 19, 18, 17, 16, 15, 14, 13, 12, 11, 10, half way, 9, 8, 7, 6, 5, 4, 3, 2, and 1. Now you feel wide awake. Please remove your head phones now and state out loud everything you remember happened since you were told to close your eyes. Remove your headphones and state out lound everything you remember happening since you closed your eyes.