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Effect of Posthypnotic Suggestions on the Accuracy of Preemployment Polygraph Testing

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ABSTRACT: The efficacy of both a posthypnotic polygraph countermeasure suggestion and a posthypnotic ideomotor lie detection suggestion were examined within an analog preemployment screening context. Forty-five subjects were randomly assigned to one of three equal-sized groups, controlling for their performance on the Harvard Group Scale of Hypnotic Susceptibility: Form A. Subjects assigned to one of the groups received the posthypnotic suggestion that the subject's index finger would rise whenever he or she lied during the polygraph test; subjects in another group were given a posthypnotic countermeasure designed to help them appear innocent whenever they lied; and those in the third group were not given either hypnotic intervention. None of the subjects given the ideomotor suggestion raised his or her finger when he or she lied during the polygraph test. The countermeasure suggestion also was ineffective, as was demonstrated by its failure to produce significantly more false negative responses.

KEYWORDS: psychiatry, hypnosis, lie detection, posthypnotic suggestions, polygraph

Since the passage of the 1988 Employee Polygraph Protection Act, the use of polygraph preemployment screening is relatively rare in the United States. However, it is still used fairly frequently for certain types of "sensitive" positions (for example, law enforcement, intelligence, and certain security and drug-handling positions). In contrast to what one might expect, given the importance of screening out undesirable applicants within those spheres, comparatively little is known about the validity of this type of polygraph testing [*1*]. In addition to urging that further research be conducted to assess that procedure's validity, the U.S. Congress Office of Technology Assessment has recommended that studies also be conducted to determine how susceptible preemployment polygraph screening is to certain countermeasures.

This study examines the efficacy of both a posthypnotic polygraph countermeasure suggestion and a posthypnotic ideomotor lie detection suggestion within an analog preemployment screening context. Although there is a dearth of information concerning the efficacy of hypnosis as a polygraph countermeasure, a few studies have been conducted.

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However, it may be important to note certain limitations associated with that body of research.

All the findings reported in the literature were based on small sample sizes, many of which were largely anecdotal, with a single subject. In several of these studies, it was apparent that the polygraph examiner knew the ground truth at the time he was conducting the test, which was further compounded by the use of subjective methods to analyze the polygraph charts. In all but one of them [2], the only countermeasure used was hypnotically induced amnesia. While each of the studies reported using good hypnotic subjects, the hypnotic susceptibility of their subjects was not measured using a standardized hypnosis scale, nor were the effects of hypnosis countermeasures on a more general population of subjects examined. In addition, all of the testing situations involved either a mock crime or an information detection paradigm. Therefore, the results and conclusions reported in the following studies should be viewed taking into account those limitations.

One of the better hypnosis countermeasure studies was conducted by Germann [3]. His study involved five subjects who each attempted to deceive an examiner about names, places, and playing cards under three different conditions: (1) normal waking state, (2) hypnotized with suggested amnesia, and (3) waking state with posthypnotic suggestion for amnesia. In eight examinations, significant responses to the critical items (the questions on which the subjects lied) were found; in seven of the examinations, the results were inconclusive. Germann interpreted his results as supporting the hypotheses that hypnotically induced amnesia is not effective as a countermeasure; however, the relatively large number of inconclusives suggests that the hypnosis may, in fact, have decreased the detectability of the lies [2,4].

Cumley [5] reported a similar study involving two subjects who had been previously hypnotized on other occasions by the hypnotist involved in the experiment. The hypnotist gave the subjects a posthypnotic suggestion that they would be unable to remember the details of a mock crime. Cumley reported that guilt patterns were plainly present on the charts of both subjects; however, his report also indicated that the examiners knew the ground truth before the polygraph testing.

Tocchio [6] reported the results of a single-subject hypnosis countermeasure experiment. In that study, a female committed a mock crime and then was given a polygraph test regarding the incident while under hypnosis with the suggestion that "she would neither remember the offense nor the period of time in which it took place." Tocchio reported that the subject's polygraph charts indicated that she was guilty of the offense.

Bitterman and Marcuse [7] conducted another single-subject study, which also indicated that hypnotically induced amnesia is not an effective countermeasure. A female subject was selected for her ability to enter "deep trance" based on the Friedlander-Sarbin scale [8]. The subject was told a word under hypnosis, then told she would not remember it, no matter how hard she tried. The subject was later given a polygraph test, during which one of two examiners attempted to detect the word presented. The procedure was repeated with the same subject a total of eight times (four exams were administered by each examiner). During two of the eight trials, the subject was given the word in the waking state. On four of the six trials involving the hypnotically induced amnesia, the examiners correctly detected the word; on the other two, they chose it as their second choice.

Weinstein, Abrams, and Gibbons [2] conducted a study in which they examined the effect of hypnotically induced repression and guilt. They selected six college students on the basis of their ability to enter deep hypnotic states. The subjects were divided into two groups. The three members of the first group were told to enter an office and take one of three bills ($1, $5, or $20). Then, they were hypnotized and told that they would not recall taking the money. The second group of students did not take any money; however, they were told under hypnosis that they had stolen one of the bills and that

they would experience considerable guilt because of this. The examiner was completely misled by the three innocent students. In fact, he stated with certainty that each had taken the hypnotically suggested amount. The examiner was only partly convinced that the members of the guilty group had taken the money and identified the correct amount taken for only one of them.

Barland and Raskin [*4*] mention three additional experiments, which also examined the efficacy of hypnotically induced amnesia as a countermeasure. In one of the experiments, conducted by William J. Bryan in Miami in 1965, the examiners were able to interpret the charts correctly in spite of the subject's amnesia for the mock crime. However, in an experiment by William Mayer and Lt. Col. Joseph Ziglinski in Washington, DC, also with a single subject, hypnotically suggested amnesia was successful in misleading the examiner. Another informal experiment reported by Barland and Raskin in 1960 was conducted by the Lie Detector Committee of the U.S. Army Military Police School [*4*], which apparently concluded that hypnotically suggested amnesia could be an effective countermeasure. However, Matte's [*9*] description of an earlier draft of that report indicated that the procedure was rarely effective.

In addition to the possibility of using hypnosis as a polygraph countermeasure, certain people have advocated its use for detecting deception. For example, the use of ideomotor hypnotic questioning has been advocated in certain therapeutic situations involving clients who are resistant to providing information about their cases [*10–14*]. Arons [*15*] also advocates the use of the same technique as a form of "lie detector" in criminal cases and has trained law enforcement personnel to perform that technique.

Although the literature reflects the current applications of ideomotor questioning, it contains only one, relatively poorly designed, single-subject study [*6*], which has attempted to assess the validity of that technique. In that study, a secretary who was participating in a demonstration for television, complied with a posthypnotic suggestion that she scratch her ear whenever she lied about the details of a mock crime.

While there is little research on the extent to which hypnotized subjects will conform to suggestions that they make incriminating admissions or gestures, a few studies have examined subject compliance with antisocial or self-destructive suggestions in different contexts. In laboratory research, the following types of seemingly inappropriate behavior were reported after hypnotized subjects were directed to perform those acts: throwing what they were told was acid in a person's face and picking up what appeared to be a poisonous snake [*16–17*]; stealing, looking through a stranger's purse, verbalizing sexual fantasies in public [*18*]; stealing examination questions [*19*]; indecent exposure in public [*20*]; and, for military personnel, giving out military secrets and physically attacking superior officers or friends [*21–22*].

In real life, the following acts also have been alleged to have been committed by individuals who were reported to have been given hypnotic suggestions to perform them: criminal acts followed by shooting oneself [*23*]; committing a bank robbery in which innocent people were killed [*24*]; and heterosexual, pedophilia, and homosexual seductions [*25–27*]. While it is distressing that individuals complied with the requests to perform the aforementioned acts, it is important to consider the possible role of several other factors that may have contributed to those actions: (1) a close relationship present or desired between the subject and the hypnotist; (2) use of hypnosis to deny personal responsibility for voluntary acts; (3) feeling obligated to help the researcher; (4) desiring to perform as a "good subject"; (5) believing no one would actually be harmed, since the activity was part of an experiment being conducted by presumably responsible researchers; and (6) believing that those acts committed were not really that objectionable to the subjects [*19,28–37*]. Thus, while suggestions given under hypnosis may seem to be the principal cause of certain behaviors, the role of situational variables similar to those responsible for subject compliance in Milgram's studies on obedience must also be considered.

The present study is intended to examine the efficacy of both a posthypnotic polygraph countermeasure suggestion and a posthypnotic ideomotor lie detection suggestion within an analog preemployment screening context. As in almost all studies of detection of deception, the design employed reflects a trade-off between the certainty with which ground truth is established and the study's external validity. The author hopes that the mix associated with the design chosen will be able to generate information which is of value in resolving the practical and theoretical questions addressed by this study.

Method

Subjects

The subjects consisted of 45 volunteers enrolled in selected criminal justice classes at a large midwestern university. The courses from which the subjects were drawn were limited to those whose instructors agreed to permit their students to participate in the experiment for extra credit. To maintain consistency, the extra credit was standardized for all classes, at the fixed level of 3% of the total points for each class.

Prior to volunteering for the experiment, the subjects were informed of the purpose and design of the study. The subjects included 30 males and 15 females. Their ages ranged from 18 to 37 [mean (M) = 22.13; standard deviation (SD) = 3.109].

Apparatus

A Stoelting field polygraph (Model 122656) was used to record both the respiration and skin resistance response (SRR) of the subject. Respiration was recorded using a pneumatic tube positioned around the subject's thoracic area. The SRR was recorded from two stainless steel electrodes attached to the volar surface of the first and third fingers of the subject's right hand. All SRR recordings were made with the instrument in the automatic centering mode.

The instrument used to score respiration objectively was a Tektronix digitizer (Model 4662) interfaced with a Tektronix microcomputer (Model 4051) programed to measure the curvilinear distances between points on a sheet of paper. The subjects' left hands were videotaped using a Panasonic color video camera (Model WV-3110), connected to a Panasonic portable video cassette recorder (Model NV-8410), using ½-in. TDK brand super-avilyn high-output, high-resolution video recording tape.

Initial Testing

The first phase of this study involved the subjects completing the Harvard Group Scale of Hypnotic Susceptibility: Form A (HGSHS:A), selecting their subject number, and completing a questionnaire which addressed their prior criminal involvement. Fifteen misconduct questions were included on the questionnaire (for example, have you ever used LSD?). Next to each question the subjects were asked to identify both their degree of prior involvement in the matter addressed and their degree of concern that their being asked that question on a preemployment polygraph test might jeopardize their ability to secure employment with the criminal justice agencies and departments to which they were planning to apply.

Subjects were asked to indicate their degree of concern and involvement using two different five-point rating scales. The degree of concern options ranged from "not concerned at all about responding to that question on a polygraph test" (Point 1) to "I am extremely concerned about responding to that question on a polygraph test" (Point 5). The subjects' degree of involvement options consisted of the following: (1) "never did

it and never knew any friends, relatives, or acquaintances who did it; (2) never did it personally, but others I know have done it; (3) only did it once; (4) have done it, but only a few times; and (5) have frequently engaged in that activity.

The first phase of the experiment was conducted in a large (80-seat) auditorium on campus. Volunteers were given the opportunity to select one of three consecutive nights to complete that phase. They were required to be at the auditorium at the designated starting time and forewarned that, if they were late, they would not be permitted to enter the room or to participate in the study that evening.

Five minutes after the designated time, the auditorium door was locked to prevent late arrivals from entering the room and disturbing the other participants. The subjects were informed of the tasks to be completed that evening, told of the steps that would be taken to preserve their confidentiality throughout the experiment, and asked to fill out the forms they would be given later as honestly and completely as possible. Subjects were then told to disperse throughout the classroom in such a fashion that none of the subjects would be able to see what the others had written. Then, a box containing slips of paper with different subject numbers on them, ranging from 1 to 60, was passed around the room, and the subjects were told to select any one they desired. Next, each of the subjects was given a HGSHS:A test booklet and a copy of the questionnaire. Each was told to write his or her subject number on them, to put the slip of paper containing the subject number in his or her wallet, and to be certain not to lose it. The subjects were warned not to write their names on any of the documents, except for a card indicating the class to which they wanted the extra credit applied, and they were warned not to write their subject numbers on those cards.

The HGSHS:A was administered first. To help standardize that procedure, an audio tape recording of that test was used, which conformed to the specifications contained in the HGSHS:A manual prepared by Shor and Orne [*38*]. The same tape was played during each of the three evening sessions. After the subjects finished the HGSHS:A, they completed their misconduct questionnaires, then turned in those materials by placing them in a larger envelope, which was located on a desk away from where the investigator was standing.

Hypnotic Treatment Conditions

During the second phase of the experiment, 15 subjects were randomly assigned to each of three groups, controlling for their levels of hypnotic susceptibility. They were either assigned to the countermeasure condition, the ideomotor condition, or to the control group. A one-way analysis of variance (ANOVA) comparing the HGSHS:A means for the three groups indicated that none of those means significantly differed from the others [$F(2, 42) = 0.25$; $P = 0.778$].

Subjects from all three conditions were scheduled to meet with the investigator in his office. After they had been greeted, the subjects were informed of the polygraph procedure that would be followed during the next stage, the questions they would be asked, and the scoring procedure that would be employed. Any questions they had regarding those procedures were answered, and the subjects made their appointments for taking the polygraph test. Subjects assigned to the control group were then thanked for meeting with the investigator and dismissed.

Those assigned to both the countermeasure condition and the ideomotor condition were then informed that they would be hypnotized and were given a brief explanation about hypnosis and the procedure that would be used. After answering the subjects' questions concerning those matters, the investigator administered an eye-fixation hypnotic induction, followed by a deepening suggestion and a hand-closure suggestion. (For a description of each of these procedures see Weitzenhoffer [*39*]).

Subjects assigned to the countermeasure group were then given the following additional suggestions:

You have seen how by using your imagination, you could make your hands be drawn together. By using your imagination you will also be able to prepare yourself to pass the polygraph test. You will be prepared, so you will pass the test. Let's imagine together what will happen the day you take the polygraph test.

(Polygraph procedure reviewed).
You will hear a voice that sounds like mine on the tape. It might seem like it takes some time for the first question to be asked. Then you will hear the voice on the tape say "Are you presently attending _____University." When you hear that question you will say yes, but when you do, you will feel nervous, concerned, and guilty that you did say yes. You will feel your breathing become shallower, your hands perspire, and a tense feeling in your stomach. In fact, each time you say yes during the polygraph test you will feel that same way. You will feel nervous, concerned, and guilty about saying yes; you will feel your breathing become shallower, your hands perspire, and a tense feeling in your stomach. That feeling will stop as soon as you hear the next question. That feeling will stop as soon as you hear the next question. Whenever you say no, regardless of whether or not your statement is true, you will feel calm and relaxed, just as you do now. You will breathe nice and deeply and feel cool and relaxed, just as you feel now.

I am going to ask you a few questions now that will be on the polygraph test and I want you to respond like you will when you take the test and then to tell me how you feel.

(four questions reviewed, the first question, a relevant question, the control question, then another relevant question. After each question the subject is queried about feelings, desired responses are reinforced by saying "good, that is just the way you will feel when you actually take the polygraph test.")

I am going to count to three now. When I do, you will wake up. Even though you will be completely awake, you will remember what we said, and when you close your eyes to take the polygraph test, you will have the same feelings. You will feel tense, nervous, and guilty each time you say yes. This will last until you hear the next question. When you say yes, you will have a tense feeling in your stomach, you will breathe shallowly, and your hands will perspire. However, whenever you say no, you will always feel relaxed and calm. I'm going to count to three now; when I do you will feel wide awake and very good. I'm counting to three now . . . 1, . . . 2, . . . 3.

Subjects assigned to the ideomotor condition were given the following suggestions:

Just as your hands have been drawn together you will feel your index finger on your left hand rise up each time you tell a lie during the polygraph test. It will seem that the harder you try to keep it down, the more it is drawn upward. It will seem that the harder you try to keep it down, the more it is drawn upward. I am going to ask you a question now, and I want you to lie. I am going to ask you a question now, and I want you to tell me a lie. When you do lie, your index finger on your left hand, your left hand, will be drawn up. Here is the question; I want you to respond no and watch what happens? Is today (*the correct day of the week*)?

(If the subject's finger did not begin to rise after 10 s, he or she was told "It's starting to creep up, the harder you try to keep it from rising the more it wants to rise. The harder you fight to keep it from rising the more it wants to rise.")

I want you to lie also to this question and watch how automatically the finger rises this time. Is it the month of (*correct month*)? Good. The harder you try to keep it down each time you lie, the stronger it is drawn upward. When you take the polygraph test, each time you tell a lie your index finger on your left hand will automatically rise. When you tell the truth, it will stay down. When you lie, it will go up. When you tell the truth, it will stay down.

I'm going to wake you up now. I'm going to count to three and clap my hands. When I do, you will wake up feeling wide awake and refreshed. I am going to count to three now and clap my hands. When I do, you will be wide awake and refreshed; however, when you take the polygraph test, your index finger on your left hand will rise each time you lie. I'm counting to three now—1, . . . 2, . . . 3.

Polygraph Testing

Within three days after receiving their respective treatments, the subjects in all three groups reported individually to the polygraph testing room. The subjects met with the polygraph examiner, who was unaware of the treatment conditions or the subjects' responses on the misconduct questionnaire.

After the instructor had asked to see the subject's identification number, the subject was given a description of the equipment and the procedure that was to be used. None of the subjects was asked his or her name, and only the subject number was used for identification purposes. The subjects were shown the questions and reminded that the examiners' task was to "weed out unsuitable candidates applying for a position at a conservative criminal justice department, which feels that any applicant who either admits to or has a deceptive response to any of the infraction questions under investigation is unsuitable for the position." They were also reminded that their role was to pass the preemployment screening procedures and to be offered the position, regardless of their extent of previous misconduct. Subjects were also reminded that they should say yes only to those questions identified by the examiner (that is, the four irrelevant questions and one control question).

The subjects were then shown the videotaping equipment and informed that it was there to record whether certain subjects will subconsciously raise the index finger on their left hands each time they lie. After the polygraph attachments were connected to the subject, the camera zoomed in on the subject's left hand and focused. The examiner stated out loud the subject's identification number after starting the video recorder.

Next, the polygraph test was administered, which consisted of the following questions:

1. Are you presently attending _____ University?
2. Have you ever used heroin?
3. Have you ever smoked marijuana?
4. During the last three years, have you stolen merchandise from a retail store?
5. Have you ever taken LSD?
6. Are you enrolled in at least one Administration of Justice class this term?
7. In the last three years, have you driven while you were clearly drunk or under the influence of drugs?
8. Do you smoke marijuana on a fairly regular basis?
9. Have you ever sold drugs?
10. In the last three years, have you ever participated in a fistfight?
11. Do you presently reside somewhere in _____?
12. Have you ever purchased an item you thought was stolen?
13. In the last three years, have you been fired from a job?
14. Have you ever had your driver's license revoked or suspended?
15. Have you ever used cocaine?
16. Are you currently in _____ Hall?
17. Have you ever illegally used "speed" or another type of amphetamine?
18. Have you ever attempted to elude a police officer, either while on foot or in an automobile?
19. In the last three years, have you stolen something valued at more than $10 from an employer?
20. Are you worried that I might ask you some additional questions that you were not told about?

After Questions 1 through 20 were administered, the order was reversed and Questions 19 through 1 were repeated, followed by Question 20. To increase the standardization of the questioning procedure, the questions were tape recorded and asked at 20-s intervals. Subjects were told to keep their eyes closed during the testing.

After the polygraph test was over, the video recorder was stopped and the polygraph attachments were removed. The subjects were thanked and informed that they would be told later in the term how they did. No subjects were permitted to see their charts or to find out how well they did, since their feedback to other volunteers might have contaminated the study.

At the end of the term, the subjects were given the opportunity to find out which questions they appeared to have their greatest responses to, based upon a cursory examination of their charts. For each subject, a sheet containing his or her results and a letter of thanks for participating was placed in a sealed envelope with the subject's number written on the outside. Those envelopes were left with a receptionist, who was instructed to give them their feedback envelopes after they had shown her their subject number slips.

Before giving the subjects their envelopes, however, she gave each one another letter requesting that, prior to receiving his or her feedback, he or she complete the same misconduct questionnaire taken earlier and either place it in the investigator's mail box or send it to him using campus mail. They were informed that the reason for requesting them to complete the questionnaire a second time was that they were now certain that their responses would be confidential and that they had had more time to think about the questions.

Objective Scoring Procedures

The charts were analyzed by objectively scoring respiration, SRR amplitude, and SRR maximum height. With the field polygraph used, a rising SRR pattern on the polygraph chart indicated less electrical resistance, suggesting an emotional or cognitive reaction. In order to score both the respiration and the SRR responses, it was necessary to correct for the tangent errors, which resulted from the use of fixed-length pivoting polygraph pens. This was accomplished by making a tracing of the semicircle path of travel of the polygraph pen when the chart paper was stationary. This tracing was then placed over the polygraph chart and aligned with each question marker tick at the top of the chart. A line was then drawn intersecting the points on the SRR and respiration patterns where the constructed tangent error templates crossed them.

Respiration patterns were scored by measuring the curvilinear length of the pattern recorded by the polygraph respiration pen, beginning when each question was asked and ending 15 s later. The patterns associated with the 40 questions asked during the polygraph test were traced using a Tektronix digitizer.

The SRR amplitude was scored by measuring the vertical rise of the largest wave occurring between the onset of the stimulus question and 15 s later. The length of the vertical rise was measured from its lowest point before the wave began a positive slope to the highest point it reached within the 15-s period. When no positive SRR rise on the chart occurred during the 15-s period, a value of 0.1 mm was recorded, otherwise the actual values in mm were recorded.

The method used to analyze the charts is referred to as the adjacent question comparison method. The dependent measurement values for the questions immediately preceding and immediately following each relevant question were added together. That total was divided by two and compared with the value associated with the response in the middle. If the mean for the adjacent SRR amplitude values was lower than or equal to 0.5 times the value of the SRR response in the middle, the middle question was given an SRR amplitude score of 3. If it was greater than 0.5, but less than or equal to 0.7, it was given a score of 2; if it was greater than 0.7, but less than or equal to 1, it was given the score of 1. All values over 1 were scored at 0. Thus, the larger an SRR amplitude response was in comparison with those immediately surrounding it, the higher it was

scored. Respiration values were compared in a similar manner; however, different cutoff points were selected, and lower values, instead of higher values, were considered indicative of deception [*40,41*]. If the mean of the adjacent respiration values was greater than or equal to 1.15 times the value of the respiration response in the middle, the middle question was given a respiration score of 3. If it was less than 1.15, but greater than or equal to 1.05, it was given a score of 2; if it was less than 1.05, but greater than or equal to 1, it was given the score of 1. All values under 1 were scored as 0. Therefore, the smaller a respiration response was in comparison with those immediately surrounding it, the higher it was scored.

As previously noted, each question was asked twice during the polygraph test. The two SRR amplitude values for each question were added together, as were the two respiration values. If the sum of those two values was four or greater, it was classified as indicating possible guilt for that dependent measure under the low exclusion criterion; values of only three or greater were classified as suggesting deception using the high exclusion criterion. Thus, more applicants would be rejected in a real testing situation using the high exclusion criterion, than would be rejected under the low exclusion criterion.

In addition to analyzing the polygraph charts, the videotapes were also viewed and scored. An assistant, who worked independent of both the investigator and the polygraph examiner, and who was unaware of both the subjects' treatment groups and their responses on the questionnaire, viewed the tapes. That assistant was instructed to note any noticeable rise of the subjects' index fingers, as well as the questions on which those rises occurred.

Results

The assistant who viewed the tapes reported that none of the subjects' index fingers rose enough for him to detect any elevation during the testing. Therefore, the ideomotor treatment appears to have been unsuccessful with respect to producing the suggested effect during the questioning.

The number of admissions made by subjects on the questionnaires ranged from 0 to 10. The percentage of subjects responding affirmatively to each offense question contained on that instrument is presented in Table 1. The question producing the highest number of affirmative responses (82.2%) was the question asking whether they had ever smoked marijuana; while the question yielding the lowest number of affirmative responses (0%) was the question asking whether they had ever used heroin. The mean number of admissions made by the subjects in each group was 4.80, 4.93, and 4.40 for Groups 1, 2, and 3, respectively [F (42, 2) = 0.125; P = 0.88]. Therefore, it appears that the number of admissions made by the subjects was consistent across all three groups and that it should not be a major factor affecting the outcome of other analyses.

The number of questions correctly and incorrectly classified using the objective scoring method and two different exclusion levels is presented in Tables 2 and 3. None of the treatment conditions resulted in a significant effect on the mean number of false positive, false negative, true positive, or true negative responses attained by their respective subjects at the P = 0.05 level.

To help ascertain whether treatment effects were being masked by subjects with low hypnotic susceptibilities, four additional analyses were run using a field-oriented procedure excluding subjects who scored five or under on the HGSHS:A. None of those calculations yielded statistically significant differences either. However, the mean number of true positive responses using the low exclusion criterion was 0.33 for those in the countermeasure condition (n = 9), 0.56 for those in the control group (n = 9), and 1.0 for those in the ideomotor condition (n = 7) [F (2.22) = 1.9; P = 0.17]. Although the

TABLE 1—*Percentage of subjects responding affirmatively to the offense questions.*

% Responding Affirmatively	Offense Question
00.0	Have you ever used heroin?
82.2	Have you ever smoked marijuana?
20.0	During the last three years, have you stolen merchandise from a retail store?
13.3	Have you ever taken LSD?
60.0	In the last three years, have you driven while you were clearly drunk or under the influence of drugs?
55.6	Do you smoke marijuana on a fairly regular basis?
28.9	Have you ever sold drugs?
33.3	In the last three years, have you participated in a fist fight?
28.9	Have you ever purchased an item you thought was stolen?
11.1	In the last three years, have you been fired from a job?
8.9	Have you ever had your driver's license revoked or suspended?
33.3	Have you ever used cocaine?
51.1	Have you ever illegally used "speed" or another type of amphetamine?
26.7	Have you ever attempted to elude a police officer, either while on foot or in an automobile?
18.2	In the last three years, have you stolen something valued at more than $10 from an employer?

order of those means and their magnitude conform to what one might expect given the treatments, both the probability value attained and the number of tests conducted support the notion that those perceptible differences may have occurred simply by chance. The exclusion criteria affected the types of errors produced in the expected manner. The high exclusion criteria raised the level of true positives and false negatives at the expense of true negatives and false positives, while the opposite relationship held for the low exclusion criteria.

TABLE 2—*Mean number of questions correctly and incorrectly classified using the adjacent question comparison method and low exclusion criteria.*

Group	True Positive	True Negative	False Positive	False Negative
		SRR Amplitude[a]		
1	1.0	9.0	1.2	3.8
2	1.1	9.1	0.9	3.8
3	0.5	9.0	1.6	3.9
F (2, 42)	1.5	0.00	1.8	0.00
Probability	0.22	1.0	0.17	1.0
		Respiration[a]		
1	0.5	9.3	0.9	4.3
2	0.8	9.9	1.1	4.1
3	0.9	9.6	1.0	3.5
F (2, 42)	1.1	0.18	0.04	0.38
Probability	0.34	0.84	0.96	0.68

[a]SRR amplitude and respiration response scores of 4 or greater are classified as indicating possible guilt.

TABLE 3—*Mean number of questions correctly and incorrectly classified using the adjacent question comparison method and low exclusion criteria.*

Group	True Positive	True Negative	False Positive	False Negative
		SRR Amplitude[a]		
1	2.0	7.3	2.9	2.8
2	2.2	6.6	3.4	2.7
3	1.6	7.2	3.4	2.7
F (2, 42)	0.51	0.30	0.34	0.01
Probability	0.60	0.74	0.72	1.0
		Respiration[a]		
1	1.5	8.1	2.1	3.3
2	1.6	7.7	2.3	3.3
3	1.3	8.7	1.9	3.1
F (2, 42)	0.16	0.42	0.18	0.05
Probability	0.85	0.66	0.84	0.95

[a]SRR amplitude and respiration response scores of 3 or greater are classified as indicating possible guilt.

The type of error that occurred was also affected, as one might expect, by the number of admissions that were made. The mean number of responses correctly and incorrectly classified is presented in Tables 4 and 5. As the number of admissions increased, true positives and false negatives increased at the expense of the true negatives and false positives, which is also perfectly logical.

Another matter of interest was whether there were differences in the level of concern associated between false positives and true negatives and between true positives and false negatives, which might help account for the nature of the subjects' responses. To examine this possibility, a series of t tests was conducted using the field-oriented scoring system and the high exclusion criterion. As expected, the mean concern level of the true positive responses [mean (M) = 2.96] was higher than the mean associated with the false negatives (M = 2.65) for SRR amplitude; however, it did not reach statistical significance at the P = 0.05 level (t = 1.59; P = 0.06). Given the fact that the number of cases was lowered to 30 because of missing cases (subjects who either had no true positives or no false negatives) and that the relationship conformed to what one might expect, this hypothesis bears further consideration. However, it should also be noted that there were no differences in the level of concern with respect to the SRR amplitude false positives and true negatives (M_{fp} = 1.22; M_{tn} = 1.23; N = 39; P = 0.94).

Discussion

The failure of the posthypnotic suggestion given to subjects in the ideomotor condition to result in any of their fingers being elevated during the polygraph testing was somewhat of a surprise, given that virtually all of them raised their fingers during the treatment phase. This appears to support the notion that demand characteristics [*33,34*] play an important role in this type of situation, as perhaps do the potential consequences of their actions. It is also possible that more subjects in the ideomotor condition would have

TABLE 4—*Mean number of SRR amplitude responses correctly and incorrectly classified by the number of offenses committed.*

No. of Offenses	*n*	True Positive	True Negative	False Positive	False Negative
		High Exclusion[a]			
0	4	0.0	12.3	2.8	0.0
1	3	0.7	11.3	2.7	0.3
2	6	0.3	11.5	1.5	1.7
3	3	1.3	9.3	2.7	1.7
4	6	1.5	9.0	2.0	2.5
5	6	1.3	8.8	1.2	3.7
6	3	1.0	7.3	1.7	5.0
7	5	1.8	6.0	1.8	5.2
8	4	1.7	5.5	1.5	6.2
9	1	5.0	4.0	2.0	4.0
10	4	1.5	4.2	0.8	8.5
		Low Exclusion[b]			
0	4	0.0	13.8	1.3	0.0
1	3	0.3	12.7	1.3	0.7
2	6	0.0	12.2	0.8	2.0
3	3	0.3	10.7	1.3	2.7
4	6	1.5	10.0	1.0	2.5
5	6	12.0	9.5	0.5	4.0
6	3	1.0	8.3	0.7	5.0
7	5	1.2	7.2	0.6	5.8
8	4	0.8	6.0	1.0	7.2
9	1	3.0	5.0	1.0	6.0
10	4	0.5	4.5	0.5	9.5

[a]Sums of mean response comparison and adjacent question comparison values of 6 or greater are scored as indicating possible guilt.

[b]Sums of mean response comparison and adjacent question comparison values of 7 or greater are scored as indicating possible guilt.

been detected if a strain gage device had been attached to the subjects' index fingers; however, it would probably be more effective for detecting deception if used to determine when the subjects were pressing down in order to be certain that their fingers did not rise.

The results of the polygraph testing can be interpreted many different ways and undoubtedly will be shaped to some extent by one's ideological perspective. On the negative side, numerous false positives and negatives occurred. On the positive side, most of the responses were correctly classified. Also on a positive note, the scoring system could be adjusted to take into consideration the possible harm that might be cast upon a given organization and the number of good candidates applying for a position. Most people would probably support using different preemployment selection criteria for screening soldiers for a position in a nuclear missile silo, where false negatives might destroy humanity, as opposed to screening inventors, where false positives might result in the loss of many valuable contributions.

Numerous factors have undoubtedly affected the internal and external validity of this study. The use of criminal justice majors as subjects appears to have made the study more realistic, because many of them will be required in the future to take preemployment polygraph tests for the positions they desire. Differences between this study and standard

TABLE 5—*Mean number of respiration responses correctly and incorrectly classified by the number of offenses committed.*

No. of Offenses	*n*	True Positive	True Negative	False Positive	False Negative
		High Exclusion[a]			
0	4	0.0	13.8	1.3	0.0
1	3	0.3	10.3	3.7	0.7
2	6	0.2	11.5	1.5	1.8
3	3	0.7	10.3	1.7	2.3
4	6	1.7	9.5	1.5	2.3
5	6	1.3	7.8	2.2	3.7
6	3	2.3	7.3	1.7	3.7
7	5	1.8	6.0	1.8	5.8
8	4	1.3	6.0	1.0	6.7
9	1	1.0	6.0	0.0	8.0
10	4	2.8	4.5	0.5	7.2
		Low Exclusion[b]			
0	4	0.0	14.7	0.3	0.0
1	3	0.0	10.7	3.3	1.0
2	6	0.2	12.0	1.0	1.8
3	3	0.7	11.0	1.0	2.3
4	6	0.8	10.0	1.0	3.2
5	6	0.8	8.5	1.5	4.2
6	3	1.7	8.3	0.7	4.3
7	5	0.8	7.0	0.8	6.2
8	4	0.5	6.7	0.3	7.5
9	1	0.0	6.0	0.0	9.0
10	4	1.2	4.8	0.3	8.8

[a]Sums of mean response comparison and adjacent question comparison values of 6 or greater are scored as indicating possible guilt.

[b]Sums of mean response comparison and adjacent question comparison values of 7 or greater are scored as indicating possible guilt.

field practice with respect to the questioning procedure, choice of questions, scoring procedure, consequences of detections, and not using the questioning situation to solicit admissions detract from the study's external validity. However, the author believes that the study provides the initial state for the continued refinement of the scoring procedures described and appears to have shed some light upon several important practical and theoretical issues.

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