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THE ACCURACY OF PHYSIOLOGICAL DETECTION OF DECEPTION FOR SUBJECTS WITH PRIOR KNOWLEDGE

By

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Abstract

The effects of detailed information and practice on the effectiveness of the control question technique for physiological detection of deception were studied in a mock theft situation. A mock theft was committed by 36 of the subjects, and 36 subjects were simply informed about the theft. All subjects were instructed to deny having committed the theft when they were administered a polygraph examination which utilized measures of skin conductance, blood pressure, respiration, and digital vasomotor activity. All subjects were offered a $10 bonus for producing an innocent outcome on the polygraph test. Prior to the test, guilty and innocent subjects received either no information (STD), or detailed information about the CQ test and suggestions about methods to appear innocent (INFO), or the detailed information and suggestions plus two practice polygraph tests (INFO+PRAC). Each subject was then given a CQ polygraph test by an examiner who was blind regarding the subject's guilt or innocence or the treatment administered. The polygraph charts were numerically evaluated blindly by a third experimenter whose scores provided the basis for decisions concerning guilt or innocence. Accuracy of decisions was 95% for the STD group, 95% for the INFO group, and 71% for the INFO+PRAC group. There was significant discrimination between guilty and innocent subjects, but the innocent subjects in the INFO+PRAC group were less easily identified. Further analyses showed significant discrimination between guilty and innocent subjects with measures of skin conductance, respiration, blood pressure, and vasomotor activity. Objective quantitative analyses of the physiological measures generally confirmed the numerical scoring. The results indicated a high degree of effectivenes of the control question technique even when subjects were given detailed information about the test and ways to defeat it. However, the combination of information and practice significantly weakened the effectiveness of the technique with innocent subjects. It is important that field examiners realize that sophisticiated, trained subjects may be more likely than others to produce erroneous outcomes on their tests. Examiners might wish to attempt to determine whether their subjects have received training in physiological detection of deception techniques.

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INTRODUCTION

The physiological detection of deception (PDD) has proven to be a highly valid and reliable method of inferring a person's truthfulness or deception about specific past events or acts (Podlesny & Raskin, 1977). This is particularly true of control-question (CQ) tests which are evaluated by a numerical scoring system (Raskin, Barland & Podlesny, 1978).

It can be reasonably anticipated that the results of recent PDD research will provide additional justification and impetus for increased confidence and continued use of polygraph examinations in law enforcement investigations and legal proceedings. Some members of the legal community strongly advocate the use of the results of polygraph examinations as evidence and feel that this evidence is often more appropriate and valid than other traditional forms of evidence (Ennis & Litwack, 1974; Tarlow, 1975). There is recent scientific evidence which supports this view (Buckout, 1974; Widacki & Horvath, 1978).

In addition to reports and articles in scientific and professional publications, the popular press has recently focused a good deal of attention on "lie detection" in its various forms. As polygraph examinations become more commonplace in investigations and legal proceedings and public interest in the detection of deception continues to grow, it is likely that criminal suspects will have greater access to information and materials concerning the details of PDD techniques. That situation increases the importance of obtaining data concerning the effects that the possession of such information will have on the outcome of polygraph examinations.

It is possible that subjects' knowledge of the CQ theory, test structure, and evaluation rules would result in lower numerical scores and a greater number of false negative errors and inconclusive results. Guilty subjects may attempt to produce responses to the control questions by using mental or physical countermeasures. Furthermore, that knowledge might reduce the psychological impact of the control questions for innocent subjects, resulting in diminished autonomic responsiveness to the control questions and more false positive errors and inconclusive results. It is likely that these effects will be enhanced if subjects are given practice polygraph examinations in addition to receiving information about PDD techniques. Thus, the main purpose of this study was to assess the effects of prior information and practice on the accuracy of CQ techniques. The study also sought to confirm previous findings regarding the nature of guilty and innocent subjects' physiological responses to relevant and

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control questions and to determine whether there are systematic differences between the responses of sophisticated and naive subjects.

METHOD

Subjects

Eighty-four male subjects were recruited from the local community by means of a classified newspaper advertisement which offered $7.50 and a possible $10 bonus for participation in a psychophysiological experiment. This method of subject recruitment has been used previously in PDD research (Podlesny & Raskin, 1978) and seems to provide a representative cross-section of the population.

When a person responded by telephone to the advertisement, he was told by a secretary that the study was a lie detection experiment. He was then asked if he had ever taken a lie detector exam and if he had any knowledge of the present experiment. Callers who answered both of those questions negatively and chose to participate in the study were used as subjects. Twelve of these subjects either disqualified themselves or were unable to participate due to other factors. After hearing the instructions concerning the mock crime 4 subjects refused to participate in the study because they had moral objections to stealing, 2 subjects expressed anxiety about the mock crime and disqualified themselves, 1 subject was concerned about "getting in trouble," 1 lacked confidence in his ability to deceive the examiner, and 1 subject confessed the mock crime to the polygraph examiner during the pretest interview. Three other subjects had to be eliminated from the study due to procedural errors: in one case the examiner had become aware of the subject's participation in the mock theft, another subject failed to follow his instructions properly, and another was not able to locate the ring which was to be stolen. The age of the remaining 72 subjects ranged from 17 to 54 years, with a median age of 25. Education ranged from 9 to 20 years, with a median of 13 years.

Procedure

Subjects who responded to the newspaper advertisement and who met the necessary qualifications were told to report at a specified time to a room in the Behavioral Sciences Building at the University of Utah, where they would find an envelope with their name on it taped to the door. Inside the envelope was the subject's preliminary instructions which directed him to another room in which there was a cassette tape recorder containing further instructions. The subject was instructed to operate the tape recorder and listen to his instructions using headphones.

Half of the subjects were instructed to commit a mock crime (the theft of a ring), and the other half were innocent of that crime. These guilty and innocent subjects were subdivided into three treatment groups (see below). Subjects were assigned in order of their arrival to the next condition/treatment combination from a randomized running order. The taped instructions were inserted into the tape recorder by the only one of three experimenters who was aware of the subject's treatment combination. The other two experimenters did not know the guilt or innocence of the subject or his treatment group until all of his data had been obtained and

a decision had been made regarding his guilt or innocence.

Subjects in the guilty condition committed the mock theft according to their taped instructions. They went to a secretary's office on a different floor of the building and asked the secretary where they could find the office of Dr. Mitchell. The secretary had previously been informed that subjects would ask about a Dr. Mitchell, and she answered, "There is no Dr. Mitchell in this department." The subject then left her office and covertly watched until the secretary left about 3 minutes later. The subject then entered her office and searched the secretary's desk for a gray metal cashbox. From the cashbox he took an envelope and removed the ring from the envelope. He then concealed the ring on his person, destroyed the envelope, and returned to the room in which he had heard the taped instructions. Guilty subjects were also instructed to prepare an alibi to use if they were questioned during the theft and to return in exactly 15 minutes.

Innocent subjects heard a tape which contained a brief general description of the crime, without any of the details. They simply left the floor, waited minutes and then returned. All subjects had been instructed that they would be given a "lie detector" test and that they should deny any involvement in the crime or any knowledge of its details. A $10 bonus was offered to both guilty and innocent subjects for appearing truthful on the polygraph test.

After the subject returned, an experimenter took him to another room. Subjects who had been randomly assigned to the Standard (STD) group simply waited in that room with the experimenter for a 40-min. period. Newspapers and magazines were available if the subject chose to read them. Some subjects in the STD group conversed with the experimenter, but the experimenter did not answer any questions pertaining to the study or PDD in general.

Subjects in the Information (INFO) group were given specific, detailed information about the CQ test. The information was prepared in a looseleaf notebook and explained the theory underlying the CQ test, types of physiological responses which the examiner would use to make his decisions (including photographic examples of those responses), and a variety of physical and mental countermeasures which might be utilized to produce physiological responses at a given time so as to produce a truthful outcome. In addition, this information was recorded on a cassette tape, and the tape was played while the subject read the booklet. The tape played for 10.75 minutes, and for the remainder of the 40-min. period the subject was free to ask questions of the experimenter, have the tape replayed, or examine the information booklet.

Subjects in the Information and Practice (INFO+PRAC) group were given the same information as subjects in the INFO group. After receiving that information they were attached to a Lafayette Model 76163 portable polygraph which recorded respiration, skin resistance, relative blood pressure, and finger vasomotor activity, and they were given two practice polygraph tests. The question sequence of those tests was as follows:

1. Is your first name _____?

2. Are you in Salt Lake City?
3. Is today _____?
4. Before today have you ever stolen anything?
5. Were you involved in stealing a ring from the office at the University?
6. Are you sitting down?
7. Before you were 18, did you ever lie about something important to get out of trouble?
8. Did you steal a ring from an office at the University of Utah?

These practice tests gave the subject two opportunities to attempt to produce reactions using countermeasures if he desired, and provided him with feedback concerning the nature of his physiological responses. After each test the subject was allowed to examine the polygraph charts and to discuss them with the experimenter to get an assessment of how well he had performed on the practice test.

Following the treatment period the subject was escorted to another room where the formal polygraph examination took place. Present in that room were a second experimenter who acted as the polygraph examiner and a laboratory assistant whose job it was to operate the instrumentation and audio tape recorders. Subjects were directed into a shielded chamber and sat in an upholstered armchair. After collecting some background information about the subject, the test questions were reviewed. Subjects were told that each question must be answered either "Yes" or "No." The wording of the control questions was adjusted so that each control question elicited a "No" answer. A typical question sequence was as follows:

1. Is your last name _____?
2. Regarding whether you took that ring, do you intend to answer truthfully each question about that?
3. Do you understand that I will ask only questions that we have discussed?
4. During the first 18 years of your life did you ever take something which didn't belong to you?
5. Did you take that ring?
6. Between the ages of 18 and 23 did you ever take something which didn't belong to you?
7. Did you take that ring from the desk?
8. Were you born in the United States?
9. Other than what you told me, prior to 1975 did you ever deceive someone?
10. Do you have that ring with you now?

The sensors were then attached to the subject, and he was given a brief explanation of the polygraph, the autonomic nervous system, and a rationale for lie detection. The subject was then given a number test in which he was instructed to choose a number between "3" and "6", to tell the examiner which number he chose, and then to answer "No" to all of a series of questions about numbers including the number that he chose, which was written on a piece of paper posted in front of him. This procedure allowed the subject to become accustomed to the testing situation and helped to ensure adequate recordings. In order to increase guilty subjects' concern about relevant questions and innocent subjects' concern

about control questions, at the completion of the number test all subjects were told that they had produced large physiological responses when they lied about the chosen number and comparatively small responses to the other numbers.

The CQ test was then administered. A minimum of three charts (three times through the questions) was given to each subject. After each chart the experimenter discussed with the subject any problems or concerns he might have expressed with regard to the questions. The experimenter also reviewed the control questions again in order to draw the subject's attention to them so as to increase their salience. That procedure seems to increase the accuracy of the test by reducing false positive errors (Raskin & Hare, 1978). If the examiner could not make a decision based on a numerical evaluation of those three charts, additional charts were administered to a maximum total of five. However, only the first three charts were used for the statistical analyses of the numerical scores and the objective quantification.

When the testing procedure was completed and the experimenter had finished scoring the charts numerically, he removed the sensors from the subject. Before the experimenter informed him of his decision, the subject was asked to complete a short questionnaire. The purposes of this questionnaire were to obtain the subject's impression regarding the outcome of the test, to ascertain that subjects in the INFO and INFO+PRAC groups had been able to identify control and relevant questions, and to determine which, if any, countermeasures had been used by the subject. This was also used to determine the extent to which subjects in the INFO and INFO+PRAC groups understood and remembered the information they received during the treatment period.

Upon completion of the questionnaire, subjects were informed of the examiner's decision and were released. The payment for their participation was mailed to their homes. Some time after the subjects' departure the charts were scored blind by a third experimenter.

Apparatus

The pretest interviews and polygraph examinations were conducted in an Industrial Accoustics Company shielded chamber with the door closed. Physiological recordings were made on a Beckman Type R Dynograph located outside the chamber. During pretest interviews the experimenter sat inside the chamber with the subject, but the experimenter left the chamber during the polygraph tests and communicated with the subjects by means of an intercom.

Skin conductance (SC) was recorded from Beckman 10mm Biopotential Ag-AgCl electrodes filled with .05m NaCl in a Unibase medium (Schneider & Fowles, 1978) placed on the palmar surface of the middle phalanx of the 4th and 5th fingers of the left hand, which had been cleaned with 70% ethanol. A Beckman 9844 skin conductance coupler applied a constant potential of .5V, and SC was recorded DC with an upper frequency cutoff of 6Hz.

Respiration recordings were obtained from two mercury strain gauge

transducers and two Beckman 9875B Hg Gauge couplers recorded DC with an upper frequency cutoff of 30 Hz. One strain gauge was placed around the upper thorax and the other around the abdomen just below the rib cage and secured with Velcro fasteners.

Heart rate was recorded from EKG lead II using a Beckman 9857 Cardiotachometer coupler which provided beat-by-beat heart rate and a square-wave pulse for each R-wave.

The photoplethysmograph pickup was strapped with Velcro over the palmar surface of the distal phalanx of the left index finger. It consisted of a Clairex CL703L CdSe photoconductive cell and a General Electric 683 miniature tungsten lamp mounted in a block of black phenolic plastic. Kodak Wratten Gelatin infrared filter No. 87C was placed over the photocell, and the lamp was activated with a potential of 3V. A Beckman 9853A Voltage/Pulse/Pressure coupler contained the bridge circuitry and was used to record FPA with a time constant of .1 sec and an upper frequency cutoff of 30Hz on one channel. The unfiltered output of the bridge was also connected to a Beckman 9806A AC-DC coupler which was modified to record FBV with a time constant of 25 sec on a second channel with an upper frequency cutoff of 30Hz.

A Stoelting wet Cardio Activity Monitor (CAM) was strapped with Velcro over the radial artery of the left wrist. A Beckman 9853A Voltage/-Pulse/Pressure coupler was used, and recordings were made DC with an upper frequency cutoff of 30Hz.

The outputs of the shaped pulse from the cardiotachometer, the short- and long-term-constant plethysmograph, cardio, CAM, and SC channels and time marks were recorded on Scotch 211 magnetic tape using two Hewlett-Packard 3960 Instrumentation Tape Recorders. Analog-to-digital conversion and preliminary data reduction were accomplished with a Digital Equipment Corporation PDP-12 computer. Further data reduction and analyses were performed on a Univac 1108 computer.

Data Reduction

Numerical Evaluations

The polygraph charts were scored blind by an independent evaluator who had not been present during the tests. He had no information regarding the subjects' guilt or innocence or their treatment groups. The scoring criteria were those described by Raskin and Hare (1978) and Podlesny and Raskin (1978). The measures evaluated were SCR, respiration, cardio, and plethysmograph, and the following characteristics were utilized to assess the strength of the responses: SCR - amplitude; respiration - decrease in amplitude, slowing of respiration rate, and baseline increase; cardio - increase in systolic and diastolic levels; plethysmograph - decrease in amplitude (FPA) and decrease in diastolic level (FBV). Each control-relevant pair of questions was assigned a score from -3 to +3 for each of the four physiological components, depending on the magnitude of the difference between the responses. Positive scores were assigned when responses to control questions were stronger, and negative scores were assigned when responses to relevant questions were stronger. Total scores

of +6 or higher were considered truthful outcomes, and scores of -6 or lower were considered deceptive outcomes. Scores of less than 6 in either direction were considered inconclusive. If the score was less than 6 after the first three charts were numerically evaluated, a maximum of two additional charts was run, and the scores were accumulated in an attempt to obtain a decision.

When no inconclusive zone was used, accuracy was assessed by numerically evaluating only the first three charts for all subjects. Total scores in the negative direction were considered deceptive. The data were also analyzed using inconclusive zones ranging from zero to +/- 12.

Objective Quantification

Objective measurements were made by computer and by persons who had no knowledge of the field evaluations or treatments administered to the subjects. Measurements were made on the responses to each of the three control and three relevant questions on the first three charts for each subject. Analyses were based on mean values for control and relevant questions for each chart. The following measurements were obtained:

Skin conductance response (SCR) amplitude. Increase in SCR was measured in mm of chart deflection from the onset of the first upward change in slope at least .5 sec after the beginning of the question to the highest level reached within 5 sec following the subject's answer.

Thoracic respiration amplitude (TRA) response. The amplitude in mm of the last complete inspiration prior to the onset of the question was subtracted from the amplitude of each of the first five complete inspirations following the question onset to yield a TRA difference response. The amplitudes of the poststimulus inspirations were also divided by the amplitude of the prestimulus inspiration to yield a proportional TRA response. The above comparisons were also made for the prestimulus inspiration and the first complete inspiration following a subject's answer.

Thoracic respiration baseline (TRB) response. The difference in mm between the lowest point of the last complete expiration prior to the onset of the question and the lowest points of each of the first five complete expirations following the question onset were calculated to yield a TRB difference response. The difference between the lowest point of the prestimulus expiration and the lowest point of the first complete expiration following the subject's answer was also calculated.

Thoracic respiration cycle time (TRCT) response. The time in seconds between the last two points of maximum inspiration prior to the onset of the question was subtracted from the time in seconds between the two points of maximum inspiration for each successive pair of the first five inspirations following the question onset to yield a TRCT difference response. The poststimulus times were also divided by the prestimulus time to yield a proportional TRCT response. The above comparisons were also made for the prestimulus time and the time in seconds between the two points of maximum inspiration following the subject's answer.

Abdominal respiration amplitude (ARA) response. The ARA response was obtained in the same manner as the TRA response.

Abdominal respiration baseline (ARB) response. The ARB response was obtained in the same manner as the TRB response.

Abdominal respiration cycle time (ARCT) response. The ARCT response was obtained in the same manner as the TRCT response.

Heart rate (HR) response. Intervals between successive R waves in the EKG were converted to sec-by-sec HR in beats per minutes. The value obtained for each second was the sum of weighted rates for all pairs of R waves which overlapped any portion of that second. The rates for pairs of R waves were multiplied by the proportion of the second covered by each pair and them summed. Values were obtained for 3 sec prior to the question and 19 sec following the question onset. Deviations from prestimulus rates were obtained by subtracting the mean of the three prestimulus seconds from the rates for each of the 19 poststimulus seconds.

Finger blood volume (FBV) response. The decrease in the diastolic level of the recording obtained from the photoplethysmograph channel with the 25-sec time-constant was analyzed on a sec-by-sec basis. Values for diastolic levels were obtained for the period beginning 3 sec before question onset and ending 18 sec after the question onset. A mean was obtained for each successive pair of diastolic levels which overlapped any portion of the second. Each mean was multiplied by the proportion of the second covered by that pair. The resulting diastolic levels were summed for each second. The values for each of the 18 poststimulus sec were subtracted from the mean level of the 3 prestimulus sec to yield an FBV response. The values obtained were corrected to a common gain because of the wide range of gain settings among the subjects.

Finger pulse amplitude (FPA) response. The .1-sec time-constant photoplethysmograph recordings were analyzed on a sec-by-sec basis. Each systolic and diastolic point was characterized by a relative level and a time of occurrence with respect to question onset. Sec-by-sec values for systolic and diastolic levels were obtained for the period beginning 3 sec prior to question onset and ending 18 sec after question onset. A mean was obtained for each successive pair of systolic or diastolic levels which overlapped any portion of the second. Each mean was multiplied by the proportion of the second covered by that pair. The resulting systolic and diastolic levels were summed separately for each second. The difference between systolic and diastolic levels was obtained for each second, and the FPA response was expressed as a proportion of the 3-sec prestimulus mean.

Cardio pulse amplitude (CPA) response. The cardio recordings were measured in the same manner employed for FPA.

Cardio systolic (CS) response. The systolic second-by-second levels were obtained as described for FPA. CS responses were expressed as deviations from the mean of the 3-sec prestimulus level.

Cardio diastolic (CD) response. The CD response was obtained in the same manner as the CS response using the diastolic levels.

CAM pulse amplitude (CMPA) response. The CMPA response was obtained

from the CAM recordings in the same manner used for FPA response.

CAM systolic (CMS) response. The CMS response was measured in the same manner used for the CS response.

CAM diastolic (CMD) response. The CMD response was measured in the same manner used for the CD response.

Objective quantitative analyses were performed for all 72 subjects for the SCR and respiration measures. However, due to a malfunction in the recording apparatus the cardiovascular measures were not recorded for the last 16 subjects who were run. In order to equalize the number of subjects in each cell for the objective analyses, the records of 2 additional subjects were randomly chosen and discarded. Thus, the objective quantitative analyses for cardiovascular measures were performed for 54 subjects.

RESULTS

Numerical Field Evaluations*

Accuracy of Decisions

The results of field evaluations were based on the assigned scores and decisions by the independent blind evaluator who has no contact with the subjects. Rates of accurate decisions were computed for the first 3 charts without an inconclusive zone (Table 1). Under those conditions, decisions for the STD and INFO groups were 91.5% correct and 8.3% wrong. For the INFO+PRAC group those decisions were 70.8% correct and 29.2% wrong. An inconclusive zone of +/- 5 was also utilized when making those decisions, and the outcomes were assessed on the basis of the total score for all charts. Table 1 contains those evaluations. For the STD group and the INFO group the decisions were 87.5% correct, 4.2% wrong, and 8.3% inconclusive. For the INFO+PRAC group, 62.5% were correctly categorized, 25% were wrong, and 12.5% were inconclusive. Excluding inconclusives, the accuracy rate was 95.5% for both the STD and INFO groups, and 71.4% for the INFO+PRAC group.

When the inconclusive zone of +/- 5 was utilized in making decisions, only one error was made in each of the STD and INFO groups, and both of those errors were false positives (e.g., innocent subjects who appeared deceptive). It should be noted that no guilty subject in either of those groups was able to produce a truthful outcome. In the INFO+PRAC group six errors occurred, three false positives and three false negatives.

Using the total score for the first three charts, the percentages of accurate decisions and inconclusives were calculated for each treatment group for inconclusive regions ranging from zero to +/- 12. The results of this post facto manipulation are shown in Figure 1. When the inconclusive zone was limited to scores of zero, 91.7% of the subjects in the STD and INFO group, and 70.8% of the INFO+PRAC group were correctly categorized. As the inconclusive boundaries were extended, there was a

* All statistical tests employed a .05 rejection region, 2-tailed.

Table 1

Independent Rater Decisions Based on Numerical Evaluations
With and Without an Inconclusive Zone

Treatments	Rater Decisions							
	First Three Charts Without Inconclusive Zone			All Charts With Inconclusive Zone				
	% Correct	% False Positive	% False Negative	% Correct	% False Positive	% False Negative	% Incon-clusive	% Correct Decisions
STD	91.7	4.2	4.2	87.5	4.2	0	8.3	95.5
INFO	91.7	4.2	4.2	87.5	4.2	0	8.3	95.5
INFO + PRAC	70.8	12.5	16.7	62.5	12.5	12.5	12.5	71.4

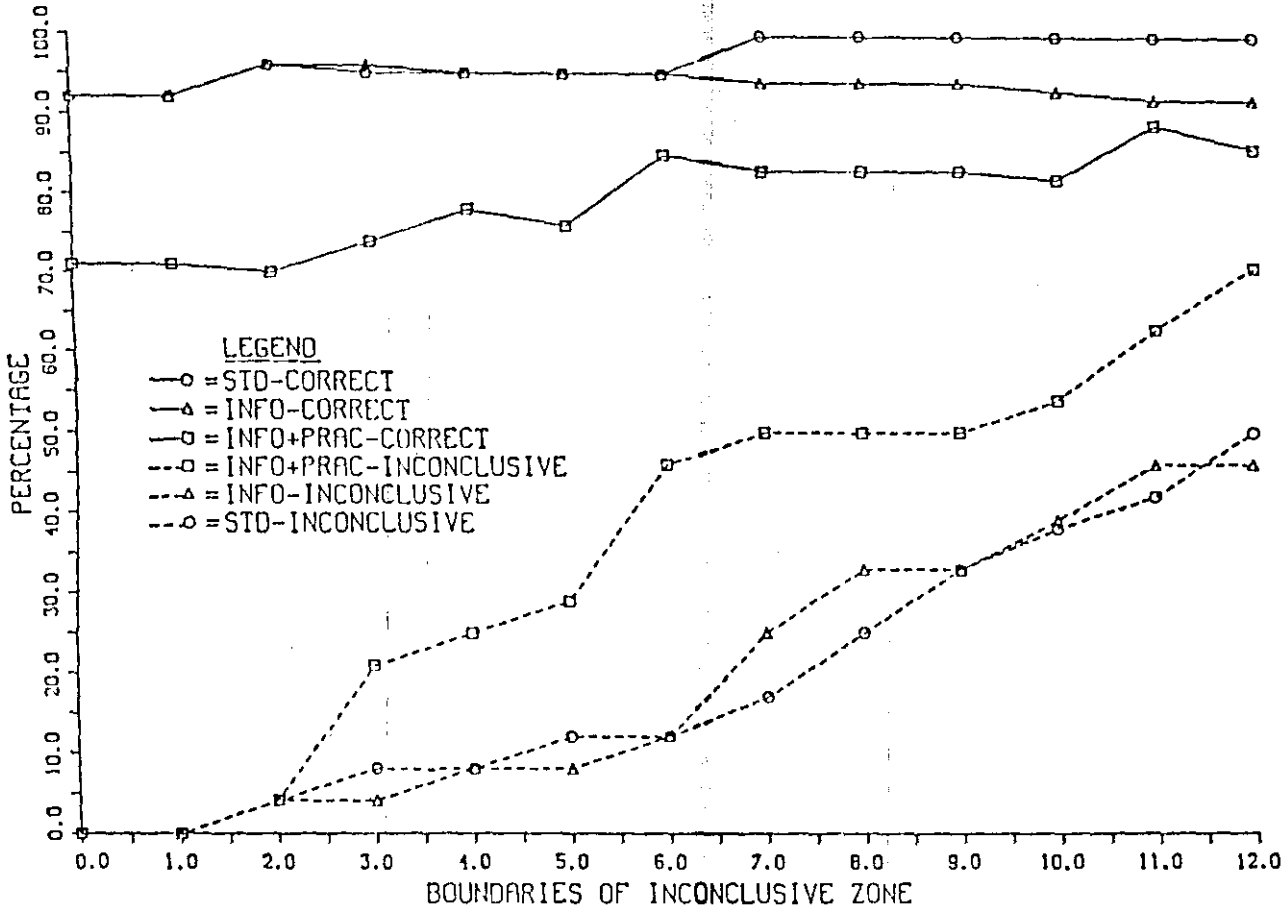

Figure 1. Accuracy of Decisions and Percent Inconclusives for Different Inconclusive Regions.

slight increase in the degree of accuracy of decisions. Inconclusive regions of +/- 7 and greater led to 100% accuracy in the STD group and accuracy rates of 83% to 89% in the INFO+PRAC group. The accuracy rates for the INFO group remained relatively stable throughout the various inconclusive zones. Predictably, the rate of inconclusives rose as the size of the inconclusive region increases. However, there was very little difference between the accuracy rates between inconclusive zones of zero and +/- 5, the region that was used in the field evaluations. Because of the concurrent increase in inconclusive outcomes between the boundaries of zero and +/- 5, fewer subjects were correctly identified at the wider zone.

Evaluator Agreement

The decisions based on the numerical evaluations by the polygraph examiner and the independent evaluator were compared. The examiner and the independent evaluator made definite decisions (e.g., truthful or deceptive) in 93% and 90% of the cases, respectively. When both made definite decisions on the same subjects, they were in agreement in 95% of those cases. As a further test of interrater reliability, the numerical scores assigned by the examiner and the independent evaluator on the first three charts for all subjects were compared. The correlation between the two sets of scores was extremely high, $r(70) = +.97$.

Effectiveness of Numerical Scores

The total score for each subject's first three charts was compared for guilty and innocent subjects in the three treatment groups. The mean 3-chart totals are presented in Table 2. Analysis of variance revealed a significant difference between the scores of guilty and innocent subjects, $F(1/66) = 72.25$, $MSe = 128.0$, but no significant differences among the three treatments ($F < 1$). There was a significant Guilt X Treatment interaction, $F(2/66) = 4.83$, $MSe = 128.0$. A Newman-Keuls test showed that the scores of innocent subjects in the INFO+PRAC group were significantly lower than those of the other two innocent groups, but there was no significant difference among the three treatments when the scores of guilty subjects were compared. Additional comparisons revealed significant discrimination between guilty and innocent subjects in the STD group, $t(22) = 6.22$, in the INFO group, $t(22) = 5.43$, and in the INFO+PRAC group $t(22) = 2.76$.

In order to determine whether there was a difference in the magnitude of scores for guilty and innocent subjects, an analysis of variance was performed with the signs reversed for the scores of the guilty subjects. There was no significant difference between the magnitude of mean scores for guilty and innocent subjects, $F(1/66) = 1.46$, $MSe = 128.0$, nor was there a significant Guilt X Treatment interaction, $F < 1$. However, there was a significant treatment effect, $F(2/66) = 4.83$, $MSe = 128.0$. A Newman-Keuls test revealed that the magnitude of subjects' scores in the INFO+PRAC group was significant lower than for the other two groups.

Effectiveness of Physiological Components

In order to assess the effectiveness of each of the four components which were evaluated by numerical field scoring, the mean 3-chart total

Table 2

Mean Numerical Field Scores for Each Component and Total Scores for the First Three Charts

Treatments		Mean Numerical Component Scores				
		Skin Conductance	Plethysmograph	Cardio	Respiration	Total
STD	Guilty	-6.6[a]	-2.9[f]	-1.8	-1.3	-12.6
	Innocent	+6.0[b]	+2.0	+6.3[g]	+3.8[j]	+18.1
INFO	Guilty	-5.6[c]	-1.9	-2.1	-1.3	-10.9
	Innocent	+5.4[d]	+2.1	+5.0[h]	+2.7[k]	+15.2
INFO + PRAC	Guilty	-5.5[e]	-0.5	-0.1	+0.4	- 5.7
	Innocent	+0.6	+1.2	+2.3[i]	+1.5	+ 5.6

[a] $t(11) = 4.87$, SE = 1.36

[b] $t(11) = 3.17$, SE = 1.90

[c] $t(11) = 3.87$, SE = 1.45

[d] $t(11) = 2.66$, SE = 2.04

[e] $t(11) = 3.27$, SE = 1.69

[f] $t(11) = 5.12$, SE = 0.58

[g] $t(11) = 5.74$, SE = 1.11

[h] $t(11) = 3.69$, SE = 1.39

[i] $t(11) = 3.84$, SE = 0.61

[j] $t(11) = 3.61$, SE = 1.04

[k] $t(11) = 5.36$, SE = 0.50

was calculated for each component separately. Those means are presented in Table 2. When all four of the measures were considered simultaneously in a multivariate analysis of variance, a significant discrimination was revealed between guilty and innocent subjects, $F(4/63) = 17.81$. There was no significant difference among the treatments, $F(8/126) = 0.78$, nor was there a significant interaction, $F(8/126) = 1.23$.

Analyses of variance were performed on each of the four physiological measures separately. All of the measures discriminated significantly between guilty and innocent subjects: plethysmograph, $F(1/66) = 22.09$; respiration, $F(1/66) = 21.79$; skin conductance, $F(1/66) = 54.47$; cardio, $F(1/66) = 44.98$. There was no significant difference among the treatments for any of the components. There was a significant Guilt X Treatment interaction for the cardio measure, $F(2/66) = 3.99$, $MSe = 13.75$. A Newman-Keuls test of the cardio scores indicated that cardio scores were significantly lower for innocent subjects in the INFO+PRAC treatment than in the STD group, and there was not a significant difference between guilty and innocent subjects in the INFO+PRAC group, $t(22) = 1.99$. No significant Guilt X Treatment interactions were found for the other three measures.

Additional tests of the means against zero for each of the components were performed for guilty and innocent subjects in each treatment group (Table 2). The results of these tests indicated that the plethysmograph scores did not significantly identify guilty subjects, and they significantly identified innocent subjects only in the STD group. The respiration scores significantly identified only innocent subjects in the STD and INFO groups. The skin conductance scores significantly discriminated subjects in all of the groups except for innocent subjects in the INFO+PRAC treatment. Cardio scores significantly identified innocent subjects in all three groups, but not guilty subjects.

Questionnaire Data

The majority of the subjects (64%) felt that they would be correctly identified as being innocent or guilty, 14% of the subjects felt that they would be incorrectly identified, and 22% thought that the examiner would fail to reach a conclusive decision. None of the subjects in the STD group thought that they would be incorrectly identified. Three guilty subjects in the INFO group and four guilty subjects in the INFO+PRAC group thought that they would be considered innocent by the examiner, but only one of those subjects (INFO+PRAC group) was scored as truthful. Two innocent subjects in the INFO group and one in the INFO+PRAC group thought that they would be found deceptive. In both of those groups, one of these subjects was incorrectly identified.

Only 2 subjects in the STD group were able to identify the control and relevant questions. In the INFO group 16 subjects made the correct identification of control and relevant questions, and 15 subjects in the INFO+PRAC group correctly identified the two types of questions.

The use of countermeasures was reported almost exclusively by guilty subjects (Table 3). The most common attempted countermeasures were controlled breathing, rationalization, and relaxation. Of the guilty subjects who used countermeasures, 6 were in the STD group, 8 were in the

Table 3

Number of Subjects Who Reported Employing

Various Countermeasures

	STD		INFO		INFO + PRAC	
Countermeasures	G	I	G	I	G	I
Controlled Breathing	1	0	5	0	6	1
Rationalization	1	0	2	1	5	0
Relaxation	2	2	1	0	5	0
Muscular	1	0	1	0	1	0
Concentration	1	0	2	0	1	0
Deliberately Lied to Control Questions	0	0	0	1	1	0
Total Subjects Who Used Countermeasures	6	2	8	2	11	1

INFO group, and 11 were in the INFO+PRAC group. Only 5 innocent subjects used countermeasures, 2 in each of the STD and INFO groups, and one in the INFO+PRAC group. Of the 3 guilty subjects in the INFO+PRAC group who produced truthful outcomes on the polygraph test, one reported the use of breathing and rationalization countermeasures, one employed controlled breathing and relaxation, and the third used relaxation, rationalization, and deliberately lied to the control questions. These countermeasures were among the most common employed by subjects, and were ineffective for all but the three subjects described above. Only one of the innocent subjects who used countermeasures produced a deceptive outcome. That subject was in the STD group and used relaxation as a countermeasure.

Objective Quantitative Analyses

Skin Conductance Response (SCR) Amplitude

Mean SCR amplitudes of guilty and innocent subjects to control and relevant questions are presented in Table 4. The Guilt X Question Type interaction was significant, $F(1/66) = 40.76$, $MSe = 2227.57$. Guilty subjects responded with relatively greater amplitude to relevant questions, and innocent subjects responded with relatively greater amplitude to control questions. The Guilt X Question Type X Treatment interaction was not significant, $F(2/66) = 1.78$, indicating no difference among the three treatments in terms of the SCR amplitude to control and relevant questions.

TABLE 4
Mean Skin Conductance Response Amplitude (mm)
for Guilty and Innocent Subjects

	Control	Relevant
Guilty	5.9	8.9
Innocent	9.6	5.8

Heart Rate (HR) Response

Mean HR deviations from prestimulus HR are presented in Figure 2. Although this measure did not significantly differentiate guilty and innocent subjects, (The Guilt X Question Type X Seconds interaction was not significant, $F(18/864) = 1.49$, $p < .10$), the results were very much like those obtained in two previous experiments (Podlesny & Raskin, 1978; Raskin & Hare, 1978). Inspection of Figure 2 reveals that subjects responded to control and relevant questions with an increase in HR for the first four poststimulus seconds and then HR began to decrease toward baseline levels. However, the magnitude of HR decrease was greatest for guilty subjects in response to relevant questions and was the only instance in which HR decreased below prestimulus baseline. The HR response did not sigificantly discriminate among the three treatment groups.

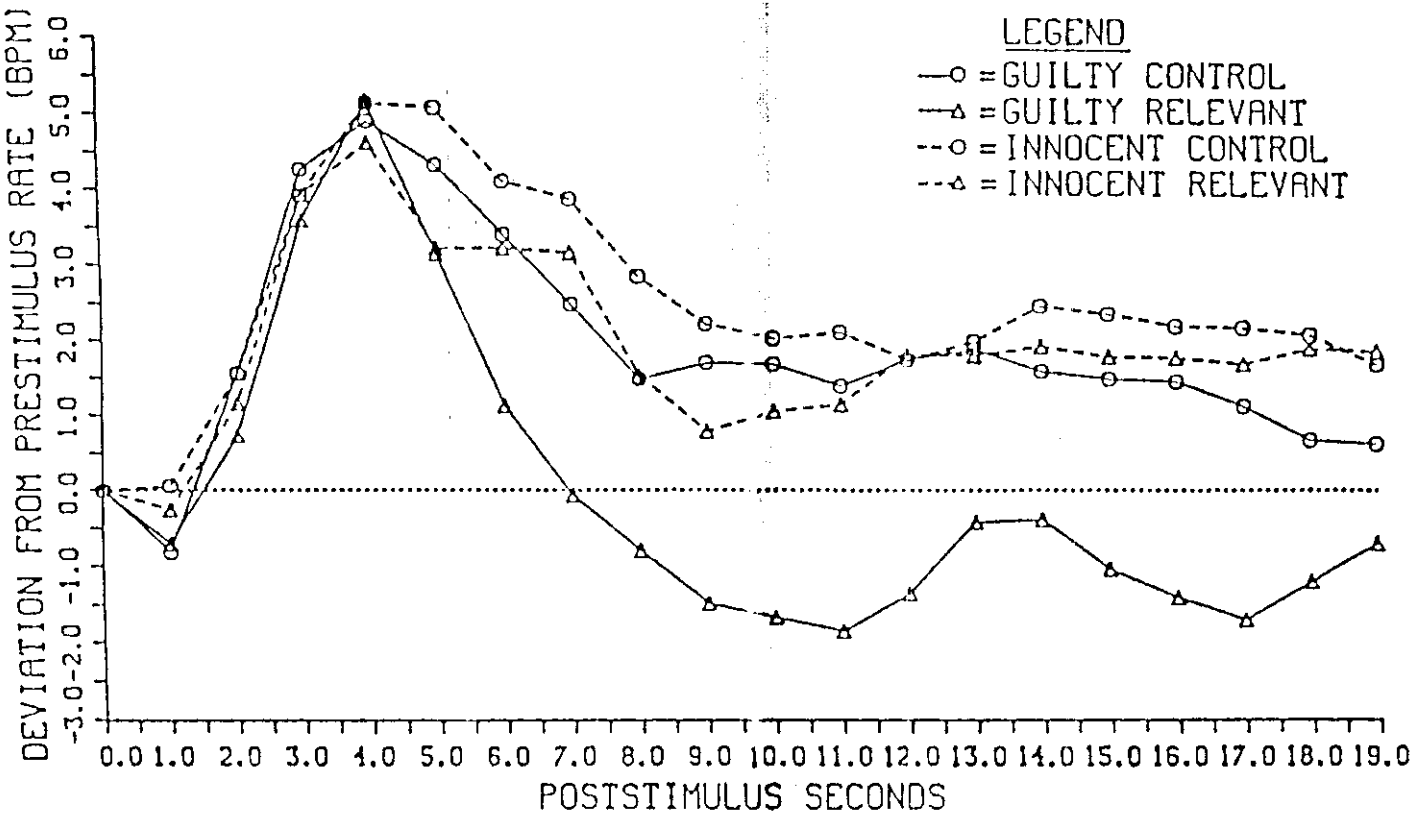

Figure 2. Mean Heart Rate Responses of Guilty and Innocent Subjects to Control and Relevant Questions.

Since the pattern of the subjects' HR responses was very similar to previous findings, further analyses were performed individually on guilty and innocent subjects in order to determine whether subjects had produced differential responses to control and relevant questions. The difference in HR between Seconds 4 and 11 was compared for control and relevant questions for guilty and innocent subjects. The HR of guilty subjects decreased significantly more in response to relevant questions than to control questions between seconds 4 and 11, $t(26) = 2.65$, SE = 34.85, but there was no significant difference in the degree of HR decrease of innocence subjects to control and relevant questions, $t(26) = 0.55$, SE = 21.82. Thus, guilty subjects responded to relevant questions with a late decrease in HR, but innocent subjects did not respond differentially to the two types of questions.

Cardio Systolic (CS) and Diastolic (CD) Responses

Since the results of the CS and CD analyses were essentially the same, past cardio results have been reported in terms of CD (Podlesny & Raskin, 1978), only the CD responses are reported here. The Guilt X Question Type interaction was significant, $F(1/48) = 13.17$, MSe = 29829.58, and the Guilt X Question Type X Seconds interaction was also significant, $F(17/816) = 3.24$, MSe = 1134.69. Innocent subjects showed greater CD increases to control questions and guilty subjects showed larger increases to relevant questions. Since the Guilt X Question Type X Seconds X Treatment interaction was significant, $F(34/816) = 1.56$, MSe = 1134.69, further analyses were performed on each of the three treatment groups. The mean CD responses of the STD, INFO, and INFO+PRAC groups are presented in Figures 3, 4, and 5, respectively. In the STD group the Guilt X Question Type interaction was significant, $F(1/16) = 11.65$, MSe = 33741.97, and the Guilt X Question Type X Seconds interaction was also significant, $F(17/272) = 3.86$, MSe = 1116.14. In the INFO group the Guilt X Question Type interaction was significant, $F(1/16) = 5.49$, MSe = 32996.36, but the Guilt X Question X Seconds inteaction was not significant, $F(17/272) = 1.61$, $p < .10$. In both the STD and INFO groups innocent subjects produced larger responses to control questions and guilty subjects responded more strongly to relevant questions. Although Figure 5 indicates that in the INFO+PRAC group the responses of innocent subjects to control questions were somewhat stronger than their responses to relevant questions, the CD response did not significantly discriminate between guilty and innocent subjects $F(1/16) = 0.03$.

Cardio Pulse Amplitude (CPA) Response

Mean CPA responses of guilty and innocent subjects to control and relevant questions are presented in Figure 6. The Guilt X Question Type X Seconds interaction was significant, $F(17/816) = 5.35$, MSe = 0.007. For innocent subjects the mean decrease in CPA was greater in response to control questions than it was to relevant questions. The mean decrease in CPA for guilty subjects was about the same to control and relevant questions, but their subsequent increase in CPA was greater in response to relevant questions. The CPA response did not significantly differentiate the three treatment groups.

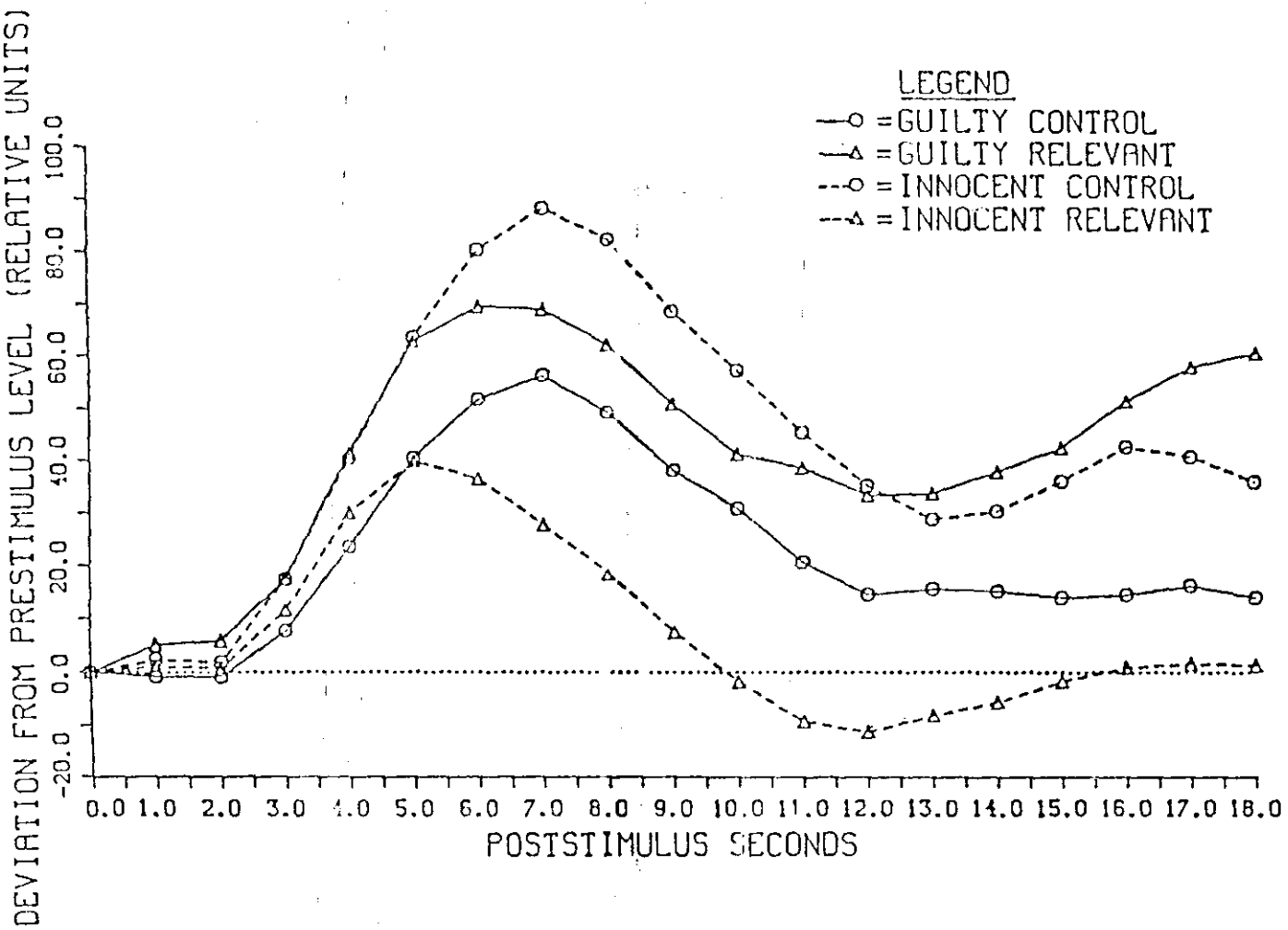

Figure 3. Mean Cardio Diastolic Responses of Guilty and Innocent Subjects to Control and Relevant Questions - STD Group.

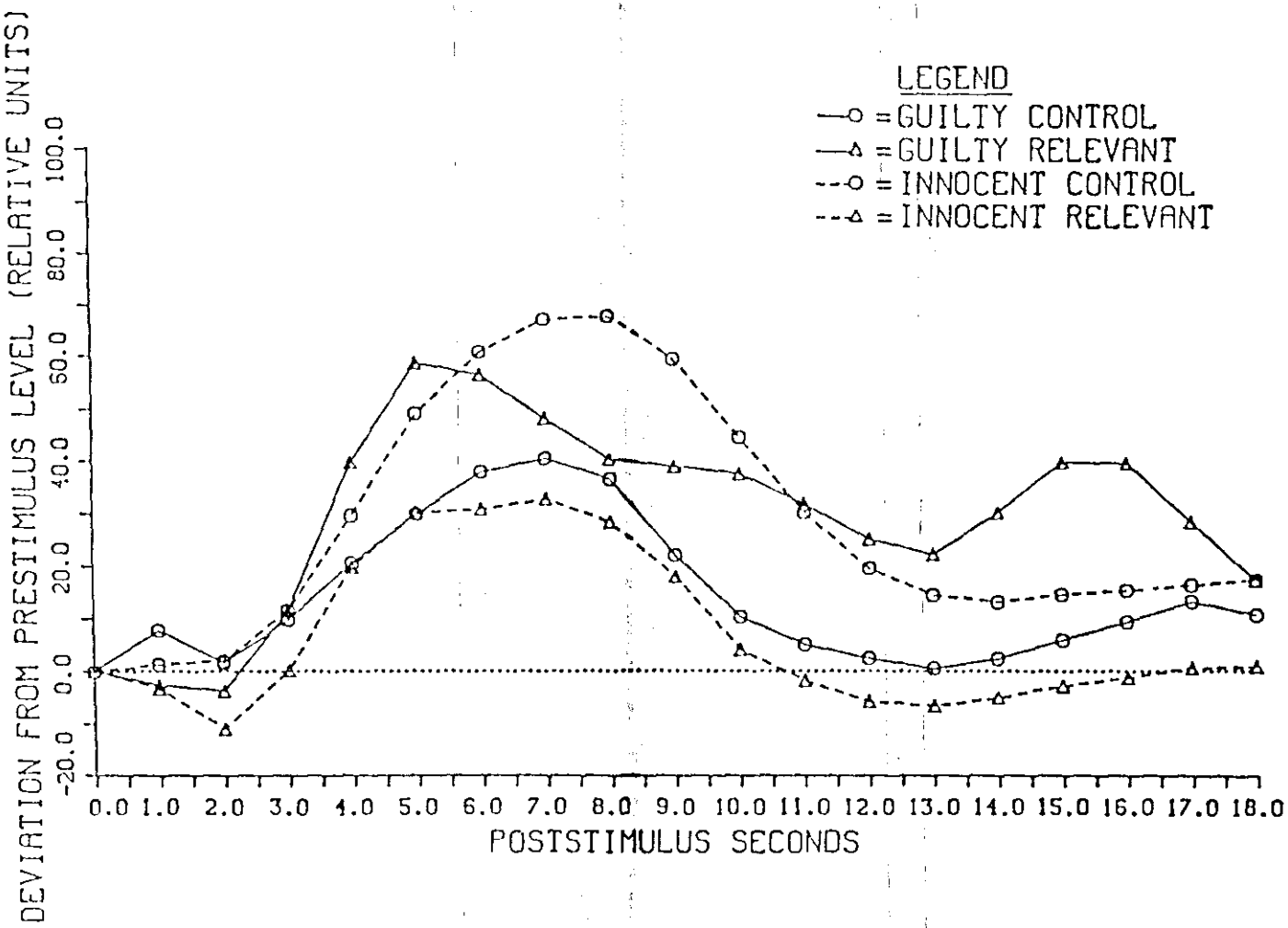

Figure 4. Mean Cardio Diastolic Responses of Guilty and Innocent Subjects to Control and Relevant Questions - INFO Group.

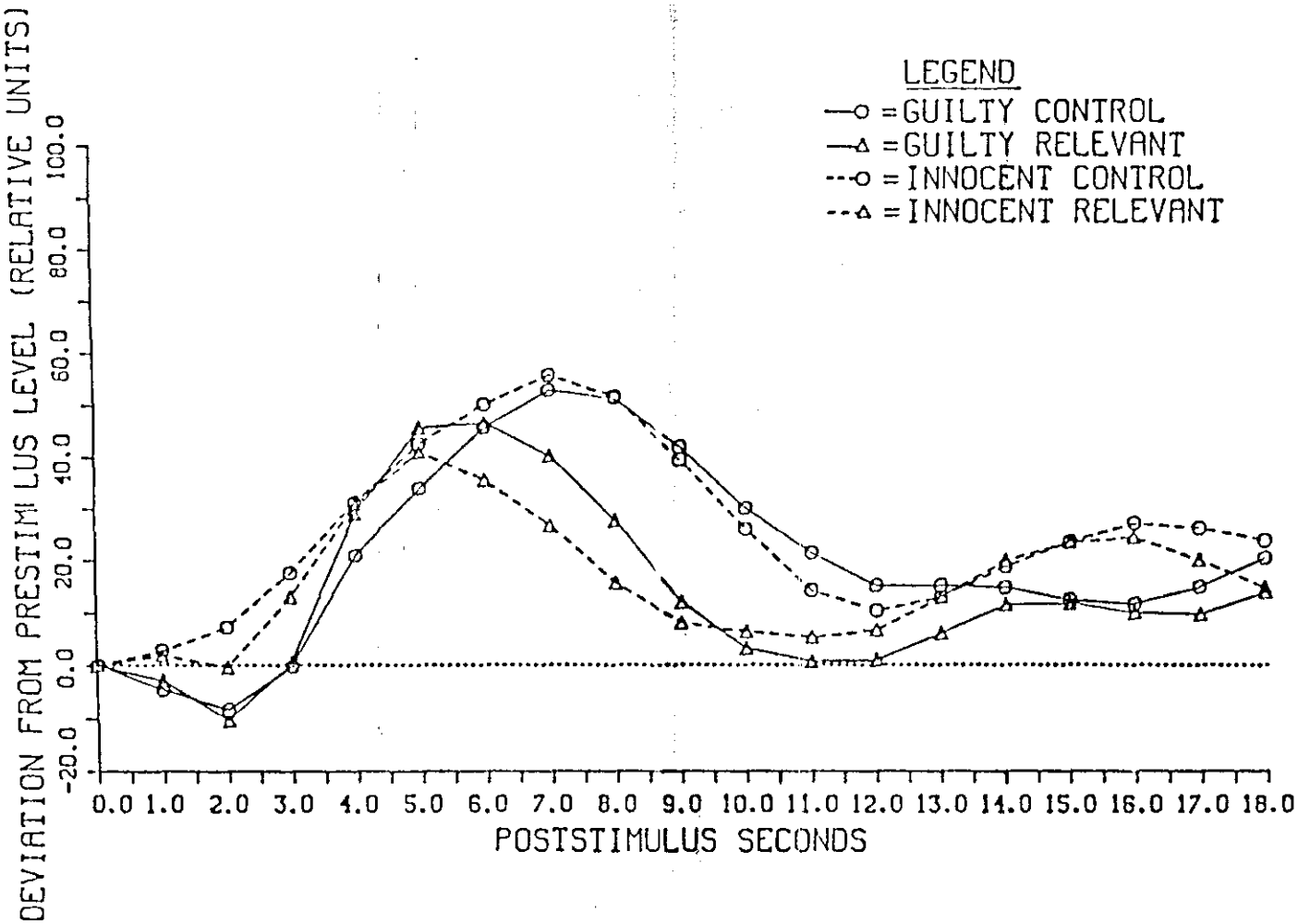

Figure 5. Mean Cardio Diastolic Responses of Guilty and Innocent Subjects to Control and Relevant Questions - INFO + PRAC Group.

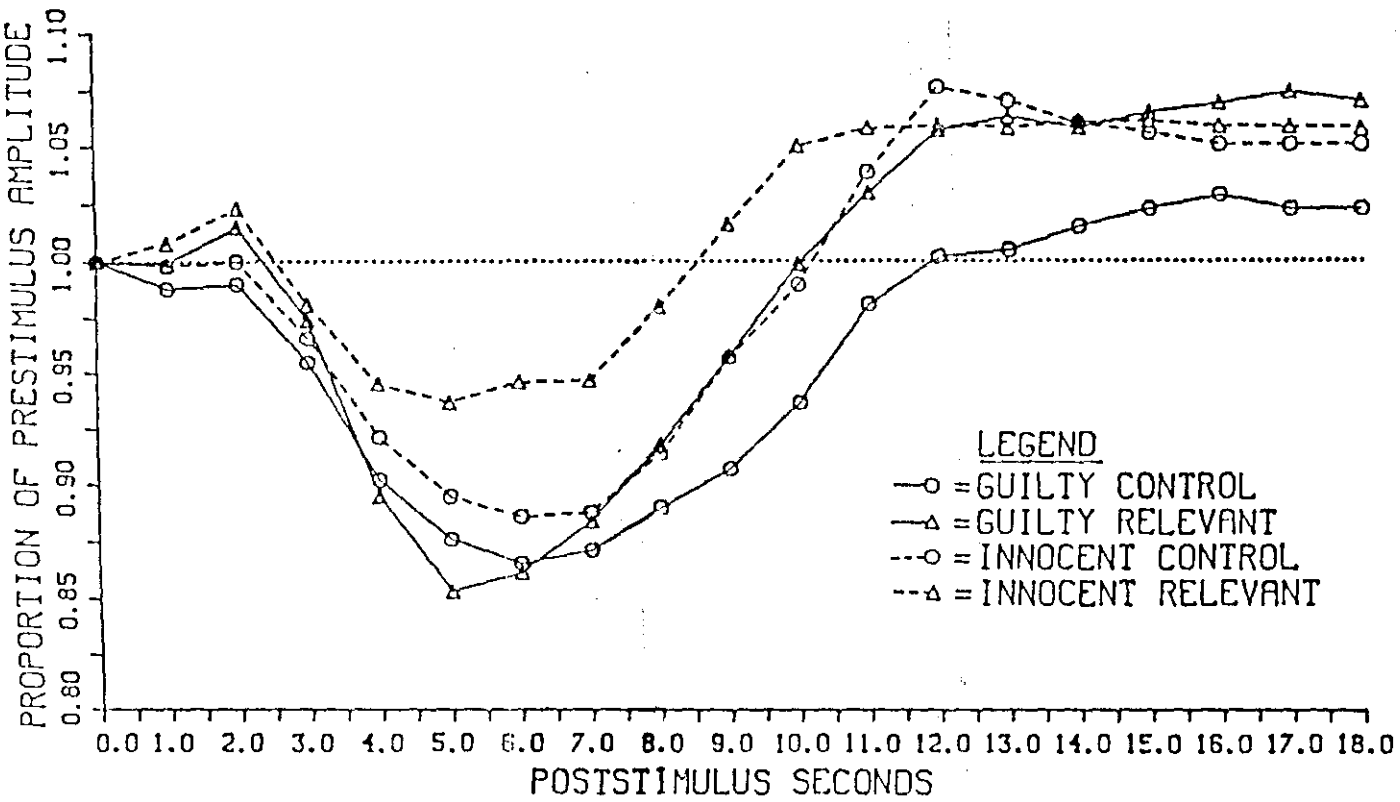

Figure 6. Mean Cardio Pulse Amplitude Responses of Guilty and Innocent Subjects to Control and Relevant Questions.

Finger Pulse Amplitude (FPA) Response

Mean FPA responses of guilty and innocent subjects to control and relevant questions are presented in Figure 7. The Guilt X Question Type X Seconds interaction was significant, $F(17/816) = 2.30$, $MSe = 0.006$. Inspection of Figure 7 reveals that innocent subjects had more prolonged decreases in FPA in response to control questions than to relevant questions. Although the FPA measure did not significantly discriminate the three treatment groups, additional analyses were performed on each of the three treatments to determine whether any of these groups replicated the results of previous studies (Podlesny & Raskin, 1978; Raskin & Hare, 1978), which found that the FPA measure was more effective in identifying guilty subjects than innocent subjects. For the STD group the Guilt X Question Type X Seconds interaction was significant, $F(17/272) = 2.17$, $MSe = 0.006$. Guilty subjects produced greater decreases in FPA in response to relevant questions and innocent subjects produced decreases of longer duration to control questions. For the INFO group the Guilt X Question Type X Seconds interaction was significant, $F(17/272) = 1.82$, $MSe = 0.006$, indicating that innocent subjects produced decreases in FPA of longer duration to control than to relevant questions. The FPA measure did not significantly differentiate guilty and innocent subjects in the INFO+PRAC group.

Finger Blood Volume (FBV) Diastolic Response

The mean FBV responses of guilty and innocent subjects to control and relevant questions are presented in Figure 8. The Guilt X Question Type X Seconds interaction was significant, $F(17/816) = 4.45$, $MSe = 247.55$. This interaction was due to differential responses of innocent subjects to control and relevant questions. Innocent subjects responded to control questions with a greater decrease in FBV than they did to relevant questions. The FBV response did not significantly discriminate among the three treatment groups.

Thoracic Respiration Amplitude (TRA) and Abdominal Respiration Amplitude (ARA) Responses

Mean difference and mean proportional TRA and ARA responses did not significant differentiate between guilty and innocent subjects. This was true for the analyses which considered the first five poststimulus cycles and for the analyses which considered the first poststimulus cycle following the subjects' answers. There were no significant differences between the three treatment groups for either the TRA or ARA measures.

Thoracic Respiration Cycle Time (TRCT) and Abdominal Respiration Cycle Time (ARCT) Responses

Mean difference and mean proportional TRCT and ARCT responses did not significantly differentiate between guilty and innocent subjects for either method of analysis. There were no significant differences between the three treatment groups for either of these measures.

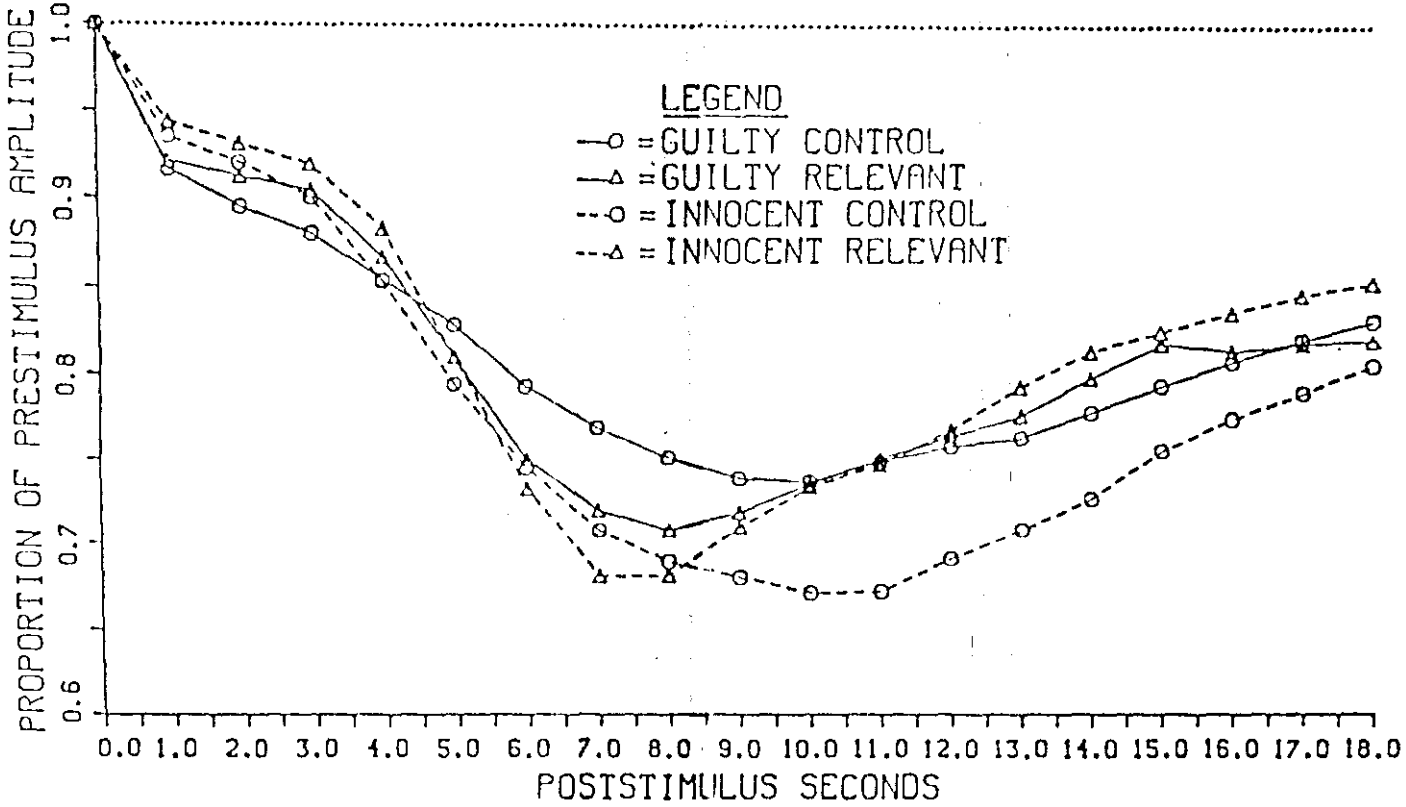

Figure 7. Mean Finger Pulse Amplitude Responses of Guilty and Innocent Subjects to Control and Relevant Questions.

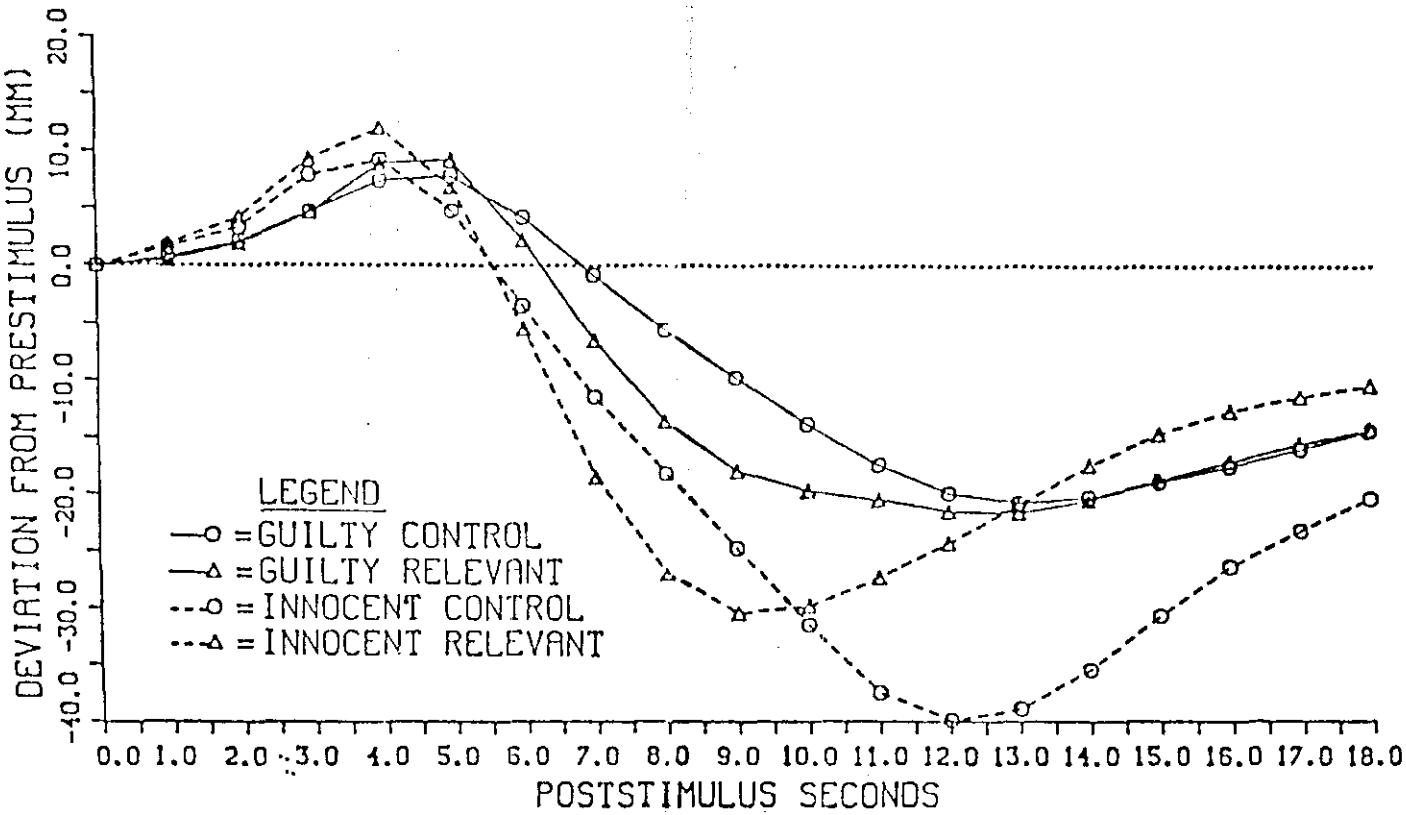

Figure 8. Mean Finger Blood Volume Responses of Guilty and Innocent Subjects to Control and Relevant Questions.

Thoracic Respiration (TRB) and Abdominal Respiration Baseline (ARB) Responses

Mean TRB responses of guilty and innocent subjects to control and relevant questions are presented in Figure 9. For the analysis which was performed on the first five poststimulus respiration cycles, the Guilt X Question Type interaction was significant, $F(1/66) = 4.75$, $MSe = 856.23$. When the prestimulus TRB level was compared to the level of the first complete expiration following the subjects' answer (Barland & Raskin, 1975; Raskin & Hare, 1978) there was also a significant Guilt X Question Type interaction, $F(1/66) = 5.54$, $MSe = 257.94$. In both analyses the TRB increased when innocent subjects responded to control questions and decreased when they responded to relevant questions. The TRBs of guilty subjects increased to both relevant and control questions; the mean increase was greater in response to relevant than to control questions.

Mean ARB responses of guilty and innocent subjects to control and relevant questions are presented in Table 5. The analysis involving the first five poststimulus respiration cycles failed to significantly discriminate between guilty and innocent subjects. However, when the mean baseline levels of the prestimulus cycle and the first poststimulus expiration following the subjects' answers were compared (Barland & Raskin, 1975; Raskin & Hare, 1978) the Guilt X Question Type interaction was significant, $F(1/66) = 4.83$, $MSe = 345.89$. Innocent subjects produced an increase in ARB in response to control questions, and a decrease in response to relevant questions. The ARB of guilty subjects decreased below the prestimulus level in response to both relevant and control questions. There were no significant differences among the three treatment groups for either the TRB or ARB measures.

TABLE 5

Mean Abdominal Respiration Baseline Response (mm)
for Guilty and Innocent Subjects

	5 Poststimulus Cycles		Cycle Following Answer	
	Control	Relevant	Control	Relevant
Guilty	-0.7	-2.0	-2.6	-1.9
Innocent	3.8	-1.2	4.3	-2.8

CAM Systolic (CMS) and Diastolic (CMD) Responses

Mean CMS responses of guilty and innocent subjects to control and relevant questions are shown in Figure 10. The Guilty X Question Type X Seconds interaction was significant, $F(17/816) = 3.83$, $MSe = 1184.61$. Inspection of Figure 10 reveals that this interaction was due to the differential responses of innocent subjects. Those subjects produced a greater decrease in CMS levels to control questions than they did to relevant questions. The CMS measure did not significantly discriminate between the three treatment groups.

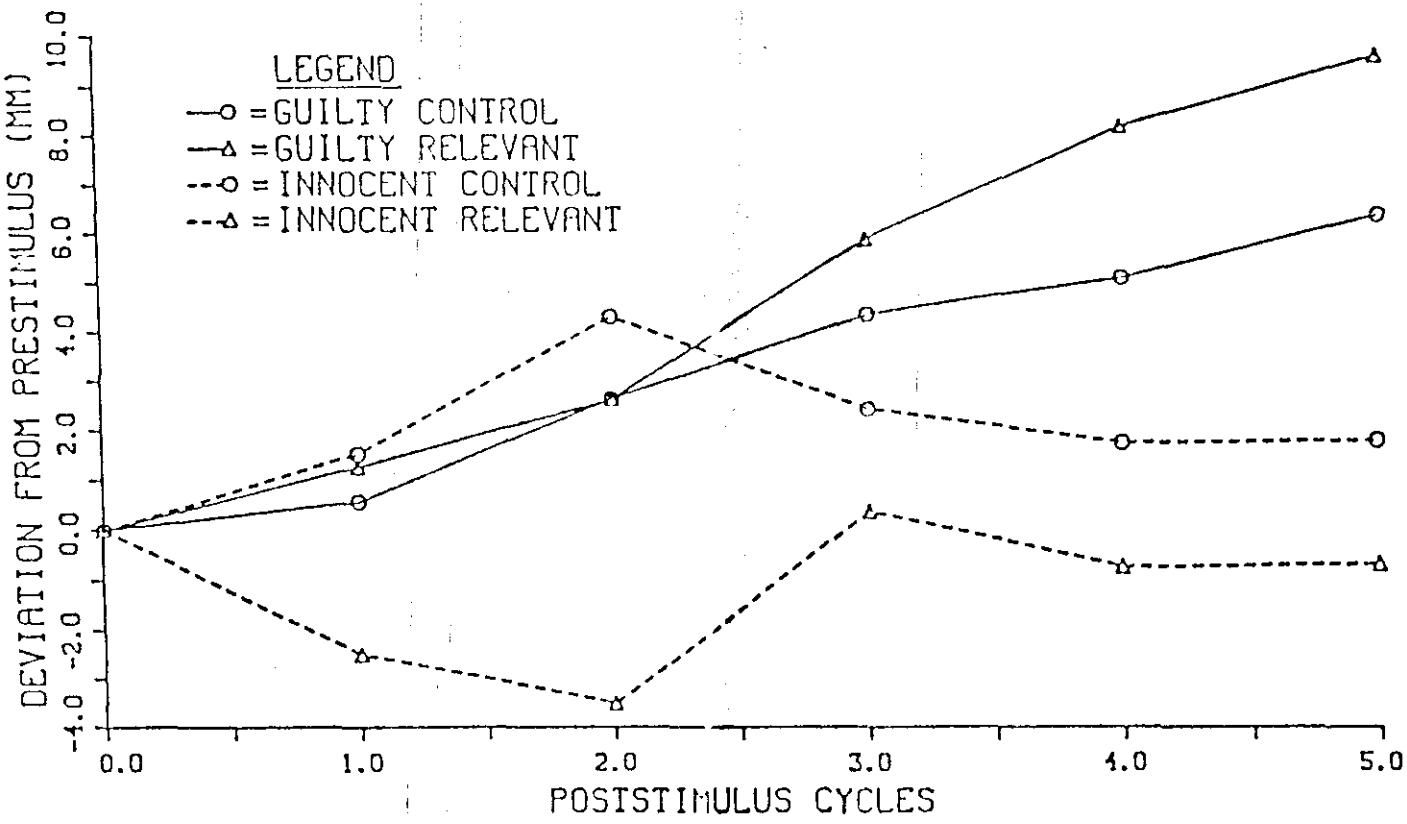

Figure 9. Mean Thoracic Respiration Baseline Responses of Guilty and Innocent Subjects to Control and Relevant Questions.

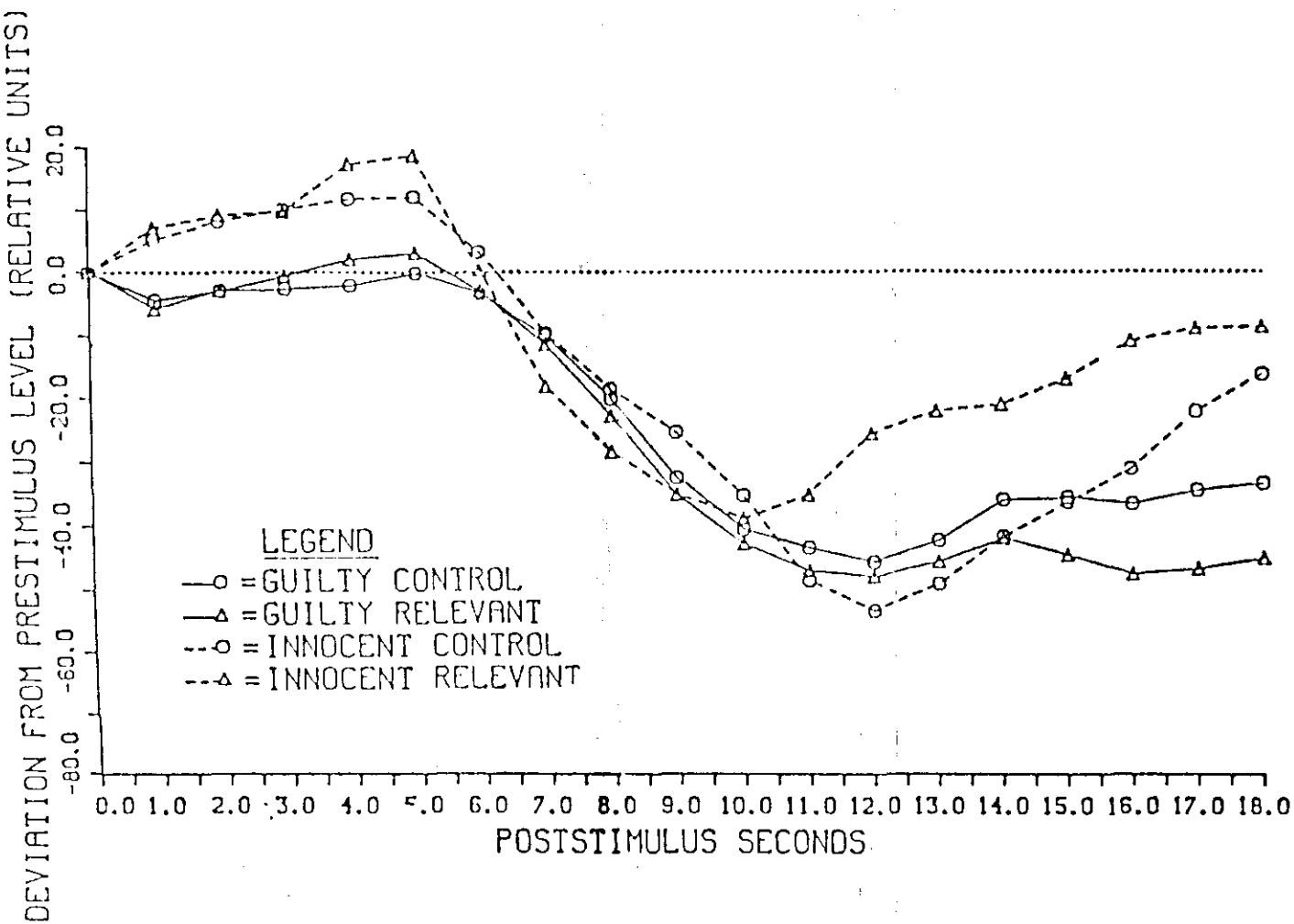

Figure 10. Mean CAM Systolic Responses of Guilty and Innocent Subjects to Control and Relevant Questions.

Mean CMD responses of guilty and innocent subjects to control and relevant questions are shown in Figure 11. The Guilt X Question Type Seconds interaction was significant, $F(17/816) = 3.98$, $MSe = 917.51$. This was due to the differential responses of innocent subjects to control and relevant questions. The decrease in CMD levels for innocent subjects was more rapid in response to relevant than control questions, and the return toward baseline levels began earlier for relevant questions. The Guilt X Question Type X Seconds X Treatment interaction was significant, $F(34/816) = 1.60$, $MSe = 917.51$. Further analyses revealed that the Guilt X Question Type X Seconds interaction was significant for the STD group, $F(17/272) = 2.33$, $MSe = 971.53$, and the INFO group, $F(17/272) = 4.12$, $MSe = 881.25$. The CMD pattern of response for innocent subjects in both the STD and INFO groups was similar to the mean response for all innocent subjects, i.e., a more rapid decrease in the STD and INFO groups produced a more rapid decrease and recovery of CMD levels to control questions than they did to relevant questions. The CMD measure did not significantly discriminate guilty and innocent subjects in the INFO+PRAC group.

It should be noted that the CMD and CMS responses consisted of decreases relative to the prestimulus levels. It would seem that the CAM did not measure relative blood pressure, since increases in relative blood pressure generally occur when innocent subjects answer control questions and when guilty subjects respond to relevant questions.

CAM Pulse Amplitude (CMPA) Response

Mean CMPA responses of guilty and innocent subjects to control and relevant questions are shown in Figure 12. Although this measure did not sigificantly differentiate guilty and innocent subjects for the entire sample, the Guilt X Question Type X Seconds X Treatment interaction was significant, $F(34/816) = 2.75$, $MSe = 0.013$. Further analyses revealed significant discrimination between innocent and guilty subjects in the STD and INFO+PRAC groups. For the STD group the Guilt X Question Type X Seconds interaction was significant, $F(17/272) = 3.17$, $MSe = 0.01$. For guilty subjects increases in CMPA were greater in response to control questions, and for innocent subjects increases in CMPA were greater in response to relevant questions. The Guilt X Question Type X Seconds interaction was significant for the INFO+PRAC group, $F(17/272) = 1.90$, $MSe = 0.02$. Innocent subjects responded to relevant questions with a greater increase in CMPA, but there was no discrimination between guilty subjects.

DISCUSSION

The results of this study indicate a high degree of effectiveness of the CQ technique for the detection of deception in a mock crime situation. Blind numerical field scoring with an inconclusive zone resulted in significant identification of guilty and innocent subjects. When the subjects were naive with regard to specific knowledge about the test (STD group), 95.5% were correctly identified as being truthful or deceptive. Even when subjects received detailed information about the CQ test and possible countermeasures (INFO group), the accuracy of decisions was 95.5%. However, when subjects were given two practice polygraph tests with feedback from the experimenter after having received information about the test

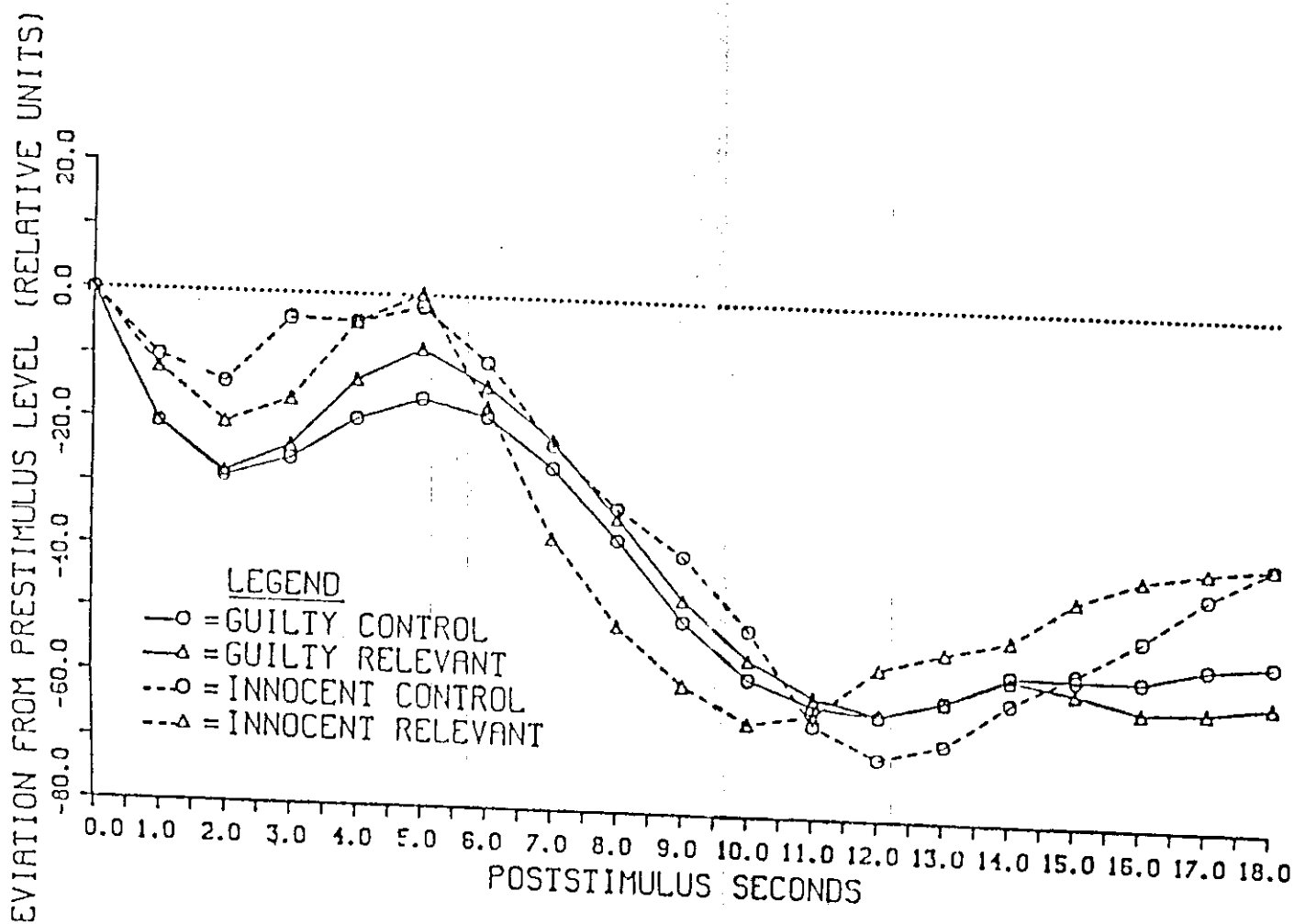

Figure 11. Mean CAM Diastolic Responses of Guilty and Innocent Subjects to Control and Relevant Questions.

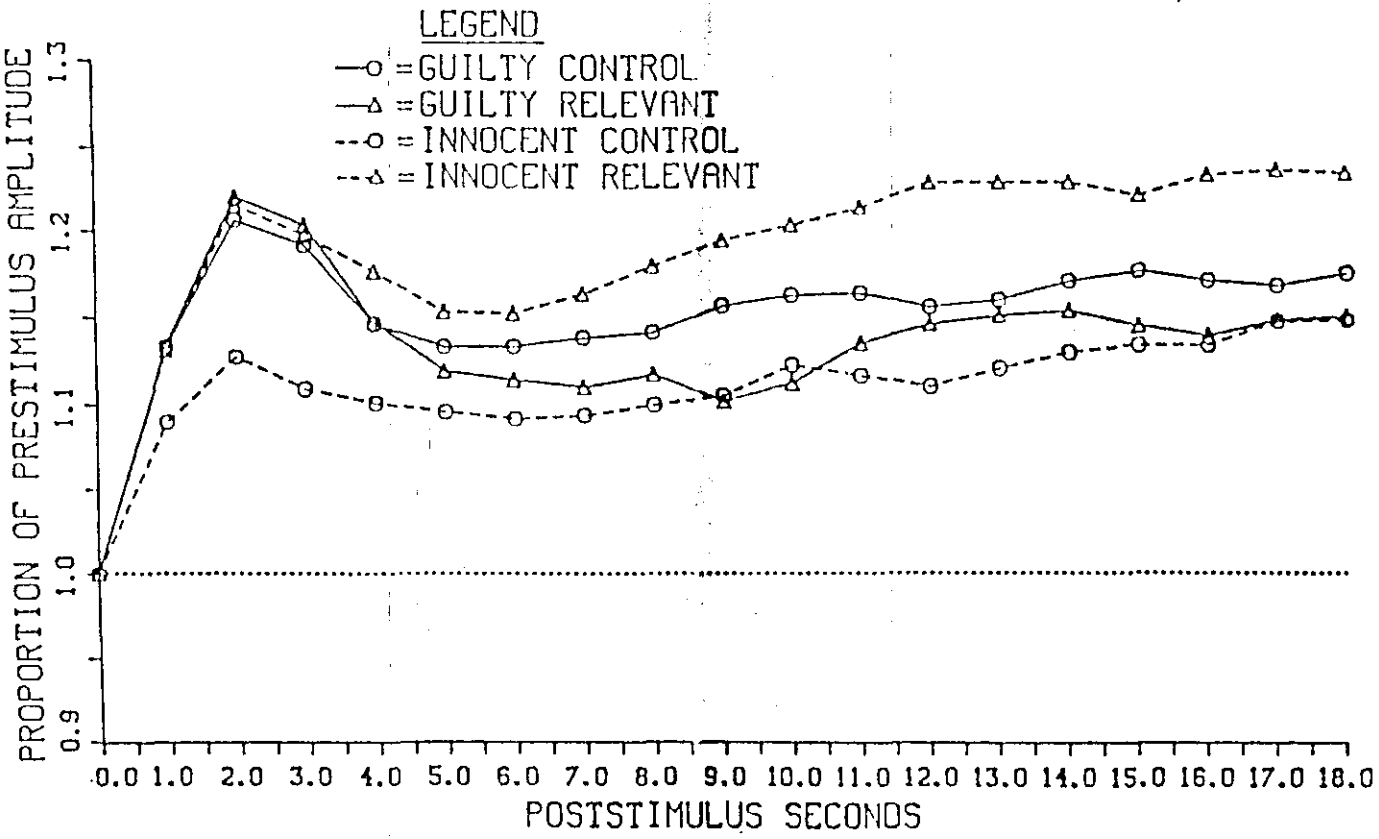

Figure 12. Mean CAM Pulse Amplitude Responses of Guilty and Innocent Subjects to Control and Relevant Questions.

(INFO+PRAC group), the accuracy of decisions fell to 71%. That manipulation diminished the effectiveness of the CQ technique, although the differentiation of guilt and innocent subjects was still better than chance.

The results of the STD group confirm previous findings that naive subjects in a mock crime situation are highly detectable using the CQ technique (Podlesny & Raskin, 1978; Raskin & Hare, 1978). The present study extends those findings to subjects who are somewhat sophisticated in the CQ technique. Subjects in the INFO group who were given detailed information about the technique and suggestions for countermeasures were detected with the same degree of accuracy as naive subjects. Although the mean numerical scores of subjects in the INFO group were slightly lower than those of the naive subjects, the difference was not significant.

The 71% accuracy of decisions for the INFO+PRAC treatment gorup was the most striking effect of the study. Although accuracy of decisions was lower than for the other two groups and the mean numerical scores were the lowest of all three groups, it should be noted that the INFO+PRAC treatment was designed to maximize the effects of information and practice. That is, subjects were tested immediately after receiving their training and practice, and the practice test was almost identical to the subsequent test. It would be expected that a longer time lapse between the treatment and testing would reduce the effect of the treatment, especially in light of the relationship between time lapse and memory decay (Lipton, 1977). Also, any reduction in similarity between the practice and subsequent tests would be expected to reduce the effects. Certainly in a field situation there would be such a period of time between training and testing and such close similarity between the two tests would be very unlikely. However, the existence of such a time function and similarity difference are questions for further research.

In order to generalize the results of a PDD study using a mock crime paradigm, several conditions must be met which approximate factors which are present in the field situation (Podlesny & Raskin, 1977). It is of upmost important that the mock crime be as realistic as possible so as to involve the subject in the task. The fact that eight potential subjects refused to participate in the study for moral or ethical reasons may be attributed in part to the religious and social climate in the Salt Lake City community. However, it is also plausible that the paradigm was so realistic that participating in the theft might have conflicted with the moral codes of many individuals.

Threat of punishment and motivation to produce a truthful outcome on the polygraph test are additional features which must be present in a laboratory study in order to enhance its generalizability (Podlesny & Raskin, 1977). The present study used a cash bonus of $10.00 to meet this requirement; the bonus was awarded to subjects who produced a truthful outcome and withheld from those who appeared deceptive. Although motivation to produce a truthful outcome is undoubtedly higher for a subject being tested in an actual criminal investigation, this method of motivating subjects has been used in previous laboratory studies (Davidson, 1968; Podlesny & Raskin, 1978; Raskin & Hare, 1978) and it seems to provide a sufficient impetus for guilty subjects to attempt to alter their physiological reactions in order to "beat the test." Since all subjects in the

three treatment groups were offered the bonus it is not likely that the diminished rate of accurate decisions for the INFO+PRAC group was due to a differential level of motivation of the subjects in that group. However, the exceedingly more serious nature of the consequences of being detected in deception concerning a real crime committed by a criminal suspect might be expected to mitigate any benefits of the treatment administered to the INFO+PRAC subjects in this experiment. The results of this experiment probably represent an upper limit of the effectiveness of such procedures, and effects of such procedures in the real-life criminal situation would be expected to be lower.

A further factor involved in the decrease in accuracy regarding the INFO+PRAC group was feedback during the training session. After each of the two practice polygraph exams subjects were given the opportunity to examine their charts and to ask questions of the examiner. It was this feedback which allowed them to gauge the effects of countermeasures that they were using. Since it has been shown that merely having undergone previous polygraph tests does not significantly affect an examiner's accuracy (Barland, 1975), it is not likely that simply having experienced the practice tests led to decreased accuracy in this study. Since detailed information about PDD techniques and countermeasures was ineffective in decreasing the accuracy of decisions in the INFO group, it seems likely that the combination of detailed information and feedback in a structured practice situation was responsible for the performance of subjects in the INFO+PRAC group.

Although all three of the guilty subjects who produced truthful outcomes reported using countermeasures, it is unlikely that these techniques alone were responsible for the false negatives, or that any single countermeasure or particular combination of countermeasures increased these subjects' probabilities of producing a truthful outcome. Two of those subjects employed two countermeasures and one used three techniques, but there was no common countermeasure employed by all of them. Furthermore, the countermeasures used by these subjects were among the most c mmon techniques reported by other subjects in the study, and the other 22 guilty subjects who used countermeasures were unable to produce truthful outcomes.

In a field situation it is conceivable that false positives or false negatives may be more likely to occur in subjects who have undergone training and practice procedures similar to those in the present study. However, there are practical considerations which might preclude a subject from receiving that training. First, the innocent subject is not likely to seek information on how to beat the test. Furthermore, innocent subjects are more likely to experience false positive outcomes as the result of training and thus it would be counter to their best interests to engage in that training. Second, although the guilty subject's probability of producing a false negative outcome may be increased by structured training and practice, that training would require the participation of a competent polygrpah examiner and perhaps the subject's attorney. Since such activities would clearly violate the codes of ethics of both the American Polygraph Association and the American Bar Association (Pirsig & Kirwin, 1976, p. 640) and might lead to criminal prosecution of those parties, it is unlikely that the participation of examiners and attorneys would be readily

available. Nevertheless, it may be advisable for field examiners to include questions in pretest interviews and the polygraph examination to attempt to determine whether a subject has had special training and practice in PDD techniques and countermeasures.

The finding that an inconclusive zone of zero led to the correct identification of more subjects than an inconclusive zone of +/- 5 should not necessarily indicate that inclusive zones are not useful in the field. Many factors which influence subjects in a PDD situation differ between the laboratory and the field (Barland & Raskin, 1973). Among those factors is the degree of severity of the consequences of producing a deceptive outcome. Although the withholding of a monetary bonus may be important to laboratory subjects, a deceptive outcome during a criminal investigation could lead to prosecution of that subject. For an innocent subject, the threat of the potential consequences (among various other factors) might sometimes lead to a negative score on his polygraph test. Elimination of the inconclusive zone in a field situation could increase the risk of producing a greater number of false positive outcomes. Thus, it would be prudent to continue using an inconclusive zone and to adopt stringent criteria when making decisions based on polygraph examinations.

Continued theoretical attacks on the efficacy of the CQ technique (Lykken, 1974, 1978) were not substantiated. The present results confirm previous findings that innocent subjects respond more strongly to control questions and that guilty subjects respond more strongly to relevant questions (Podlesny & Raskin, 1977, 1978; Raskin, 1978b; Raskin & Hare, 1978). In fact, blind scoring procedures in this study resulted in numerical scores for innocent subjects which were approximately 50% greater in magnitude than the scores of guilty subjects. Objective measurement and analysis of the individual physiological measures generally confirmed these numerical scores. Thus, it would appear that in this experiment control questions were more effective in identifying innocent subjects than relevant questions were in identifying guilty subjects. Guilty and innocent subjects have also been significantly differentiated in field studies (Bersh, 1969; Raskin et al., 1978) but the scores of innocent subjects in criminal investigations are usually less extreme than those in the present study (Raskin, 1978a).

The extremely high rate of agreement between the decisions and numerical scores of the polygraph examiner and the blind scorer is similar to those found in previous studies (Podlesny & Raskin, 1978; Raskin et al., 1978).

The results with specific physiological measures generally confirmed previous findings. The STD group in the present study provided the best basis for comparison with the results of previous studies. The positive findings with SCR amplitude confirmed previous findings (Podlesny & Raskin, 1978; Raskin & Hare, 1978). Insofar as SCR significantly discriminated between guilty and innocent subjects in all three treatment groups, it was the most valid measure of those employed. However, SCR was not particularly effective in identifying innocent subjects in the INFO+PRAC group.

The HR results, although not statistically significant overall,

tended to confirm previous findings (Podlesny & Raskin, 1978; Raskin & Hare, 1978). It appears that the HR measure is useful only in identifying guilty subjects using the CQ technique. As such, it has limited utility.

The results of the cardio measures generally confirmed the only previous study employing a sec-by-sec analysis (Podlesny & Raskin, 1978). Although the cardio measures significantly discriminated between guilty and innocent subjects, they were particularly useful in identifying innocent subjects.

The positive results with FPA confirmed previous findings that naive, guilty subjects can be identified using this measure (Podlesny & Raskin, 1978; Raskin & Hare, 1978). The present study extended those findings by demonstrating that naive innocent subjects may also be identified with the FPA measure. However, when subjects were knowledgeable about the CQ technique (INFO group), the FPA measure was useful in identifying innocent subjects. However, other investigators have found FPV to be useful in identifying guilty subjects as well (Kubis, 1973; Podlesny & Raskin, 1978; Raskin & Hare, 1978).

The results of the respiration measures are particularly interesting. The field evaluations of respiration yielded a significant differentiation between guilty and innocent subjects and were especially useful in identifying innocent subjects. However, the objective quantification of these measures resulted in significant discrimination of innocent and guilty subjects only with measures of baseline changes. The analyses of respiration amplitudes and cycle times did not yield significant discrimination. These findings are generally consistent with those of Podlesny and Raskin (1978), although they did not employ a respiration baseline measure. Podlesny and Raskin felt that their lack of positive results with those measures may have been due to the generally poor signal quality of their transducer, and that its size and construction made it relatively obtrusive to subjects, thus raising the possibility that those subjects attended more to their breathing than they might have under different circumstances. In the present study the signal quality of the respiration measures was excellent, and the mercury strain gauge transducers were less obtrusive than the pneumatic bellows used in other studies and those which are typically used in the field. It should be noted that previous studies which employed pneumatic tubes as respiration transducers yielded positive results for respiration amplitude and cycle time (Barland & Raskin, 1975; Raskin & Hare, 1978). It may be that that type of respiration transducer is superior to those used in the present study. Using the mercury strain gauge transducer, it may be that the methods of objective quantification employed in this study are not as sensitive to changes in those tracings as field evaluation procedures. Another possible explanation of the various findings is the position of the subject in the chair. The two studies which yielded positive results with respiration amplitude and cycle time (Barland & Raskin, 1975; Raskin & Hare, 1978) employed chairs in which the subjects sat upright without slouching. However, the present study employed a comfortable, upholstered armchair in which many subjects slouched down and leaned their heads back. That body position may have interfered with the respiration responses observed in the earlier studies.

The positive results of the CAM measures in this study may be somewhat misleading. The wet CAM transducer presented many problems to the examiner. Proper placement of the transducer is extremely important, and the examiner often had to reposition the CAM several times in order to obtain acceptable recording. The water in the transducer often leaked, sometimes in the middle of an examination. These difficulties made it impossible to use several records in the analyses. In addition to these physical problems, the CAM recordings resemble those of a vasomotor response rather than a change in blood pressure. Since the CAM was designed as an alternative to the cardio cuff for measuring changes in blood pressure, it would seem not to be a proper substitute. Because of these shortcomings, the wet CAM has limited usefulness in the PDD.

In summary, the CQ technique was again shown to discriminate reliably between innocent and guilty naive subjects with a variety of measures. The same level of accuracy was obtained when subjects were sophisticated with regard to the CQ technique and countermeasures. Similar results have been obtained using the guilty knowledge technique (Lykken, 1960). However, accuracy of decisions decreased somewhat when sophisticated subjects had the opportunity to engage in practice on a polygraph and obtain feedback from an examiner prior to their examinations. The finding that the use of countermeasures was relatively ineffective in decreasing the rate of accurate decisions contradicts some previous findings (Kubis, 1962). However, those studies were either not replicable (More, 1966) or had serious problems of design and analysis (Corcoran et al., 1978). Although problems of generalizing these results to field situations remain, the results from this laboratory study would seem to justify some cautious generalization to the field situation. It is important that field examiners realize that sophisticated, trained subjects may be more likely than others to produce erroneous outcomes on their tests. Examiners might wish to attempt to determine whether their subjects have received training in PDD techniques.

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THE USE OF BEHAVIORAL SYMPTOMS IN THE SEARCH FOR THE TRUTH: A TOOL FOR THE PROSECUTOR*

By

Joseph P. Buckley III and Philip A. Mullenix

The fate of any defendant in a criminal case is determined by the judge or jury's perception as to whether or not the defendant, the victim, or other witnesses are telling the truth. This decision is reached by an evaluation of the evidence, as well as by the impressions created by the respective parties and their witnesses when they testify during trial. Underlying the judicial process is the question "Who is telling the truth --whom do I believe?" Every lawyer, judge, and juror evaluates the behavior displayed by the person on the witness stand, and draws from it a conclusion as to that person's truthfulness or deception. These conclusions are usually reached by a subconscious assessment of the behavior displayed by the testifying witness as compared with the evaluator's individual internal model developed from that person's life experiences in perceiving what he determined to be "truthful" and "deceptive" behavior. The purpose of this article is to specifically identify those behavioral characteristics that can be consciously observed and evaluated for possible indications of truth or deception, and thereby increase the accuracy of behavior assessments.

The original research on verbal and nonverbal behavior symptoms indicative of truth and deception was conducted by John E. Reid in 1942 at the Chicago Police Scientific Crime Laboratory.[1] Reid systematically recorded the behaviour symptoms of all suspects who were given polygraph examinations at the laboratory. By subsequently confirming the suspect's guilt status (e.g., a confession or the finding of substantiating facts) or innocence (through the establishment of another person's guilt) Reid was able to compare and tabulate the recorded behavior symptoms displayed by the suspect with established truth (the proven status of the suspect). Subsequently, Reid developed a behavioral profile of the typical truthful and deceptive subject.[2] Since that early research, and particularly in recent years, many others have investigated the meaning of various verbal and nonverbal behaviors in terms of truth and deception.[3]

The result of Reid's research is not only of great value to the police and private security investigators, but also can be of considerable assistance to prosecuting attorneys in their pretrial interviews with witnesses, as well as during direct and cross-examination at trial.

Before describing the typical behaviors exhibited by truthful and deceptive subjects, some cautions must be emphasized:

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1. There is no single verbal or nonverbal behavior that automatically, in all cases, means that a person is telling the truth or lying. Each behavior displayed must be considered in the context of the environment, intensity of the setting, and in comparison to the subject's normal behavioral patterns.

2. The assessment of a subject's truthfulness should be based on the overall behavioral pattern displayed and not upon any single observation.

3. Behavioral indications should be evaluated on the basis of when they occur (timing) and how often they occur (consistency). To be reliable indicators of truth or deception, behavioral changes should occur immediately in response to a question or simultaneously with the suspect's answer.

4. The evaluation of behavior symptoms should take into consideration the subject's intelligence, sense of social responsibility and degree of maturity. As a general rule, the more reliable behavior symptoms will be displayed by persons who are socially responsible--the ones who have more at stake in the outcome of a case--family, job, reputation, etc. Also, the person who is more developed as to maturity level will display more reliable behavior symptoms. On the other hand, as to persons who are emotionally or psychologically unstable, extreme caution must be used in the evaluation of their behavior symptoms.

5. It is important to be mindful of the fact that some behavioral characteristics which will be subsequently described as indicative of deception, may be displayed by a subject who is actually telling the truth, but who is experiencing fear, anxiety, anger, mistrust, or some other negative emotion which is causing the misleading behavioral display.

Nevertheless, with these cautions in mind, the verbal and nonverbal behavior displayed by a person during questioning may provide very valuable and accurate indications of possible truthfulness or deception. In the following discussion we will describe some of the behavioral characteristics of each group.

Verbal responses include both spoken words and gestures that serve as word substitutes, such as a nodding of the head indicative of "yes" or a side to side head motion as "no". Also within the category of verbal responses are such vocal characteristics as tone, speed, pitch and clarity.

The careful listener is aware not only of the significance of a verbal response, but also of the timing, words, and emphasis associated with the response. Fundamental to the psychology of verbal behavior is that the normally socialized individual does not enjoy lying; deception leads to a conflict that results in anxiety and stress. When a suspect offers an evasive answer or an objection in response to a direct question, he does so because of an attempt to avoid the internal anxiety associated with an outright denial.

Nonverbal responses include body movements and position changes, gestures, facial expressions, and eye contact. Nonverbal behavior is

internally motivated to reduce anxiety. Whether through distraction (like shifts in body posture, bringing a hand to the face, or crossing the arms) or through displacement behavior (such as picking the lint off the clothing, pacing, or repetitious fast movements), all nonverbal behavior which accompanies a deceptive response emanates from a guilty suspect's efforts to relieve anxiety.

VERBAL RESPONSES

Generally speaking, a truthful person answers questions in a direct, straightforward, spontaneous and sincere manner, particularly if the question is simple and unambiguous. On the other hand, a deceptive person may delay his response, or repeat the question before giving his answer. Oftentimes the delay or the repeating of the question is a stalling tactic used by the deceptive person to contrive a false answer. Some deceptive subjects may answer questions too quickly, even before the question is completed. Subjects who hesitate in answering a question by saying "Let me see now," prior to saying "no", may be trying to borrow time to deliberate on how to lie effectively or to remember previous statements, and to camouflage true guilty reactions with the expression of a pretended serious thought. The truthful person does not have to ponder over an answer. Truthful subjects have only one answer, and it will be substantially the same regardless of any repetition of the inquiry. Contrary to the directness of the truthful person's verbal response, the deceptive person may give an evasive answer such as "I was home all day" or "I don't even own a gun" when asked if he shot the victim.

A lying subject will sometimes speak in an irrational manner or use fragmented or incomplete sentences, such as "It's important that ..."; "If you think ..."; or "I ... I hope that you ...". He also may feign a memory failure when confronted with a probing question. The deceptive person may respond with a half-lie, such as "I don't remember," "As far as I know," or "I don't recall," or he may try to bolster his answer with such phrases as "To be perfectly honest with you" or "To be quite frank." The more sophisticated liars may use the same type of evasions, but they usually plan before hand so that their answers include a protective verbal coating, such as: "At this point in time," "If I recall correctly," "It is my understanding," "If my memory serves me right," or "I may be mistaken, but ..." By these tactics lying subjects seek to establish an "escape hatch" rather than risk an outright lie. On the other hand, some lying subjects may exhibit an unreasonably good or selective memory, even as to irrelelvant details. The end result, however, will be so patently implausible as to reveal the attempted deception.

Truthful subejcts tend to use harsh, realistic words such as "steal," "rape," "kill," "rob," "stab," while deceptive subjects usually avoid such language in order to assuage their guilty feeling. A person who uses an insincere facade of religion or oaths to support his answer is, in many instances, not telling the truth. Typical examples of expressions used by lying subjects who try to make their statements believable are: "I swear to God, sir," "I'll swear on a stack of Bibles," "With God as my witness." Some may even go so far as to state "On my poor mother's grave, sir." When a subject uses his religion as a defense, "I couldn't do something like that sir, I am a (naming his religious affiliation)," he is usually not telling the truth.

Truthful persons will not only respond directly; they also will speak with relative clarity. Some liars, however, tend to mumble or to talk so softly that they cannot be clearly heard while others may speak at a rapid pace or may display erratic changes in the tone or pitch of their voices. Similarly, a verbal response coupled with nervous laughter or levity is a common attempt to camouflage deception.

Deceptive subjects are more likely to challenge minute details of the factual information on a case: "She said the guy who did this is 6'2" and I'm only 6'!" They tend to offer excuses or justifications to support their claims of innocence, and may give very special denials: "I did not take that $12,437.18". The truthful subject will generally offer much more general denials: "I did not steal that $12,000 or whatever it is--I didn't steal a penny of it!"

In summary, truthful persons make general, sweeping denials. They offer unqualified, direct and spontaneous answers; exhibit a reasonable memory; respond to questions in a rational manner with a distinct and clear tone of voice. Deceptive persons may offer very specific denials; avoid realistic words; give delayed, evasive or vague answers; exhibit an unusually poor, selective or remarkable memory; qualify their answers or use religion or oaths to support their statements; speak in an irrational manner, fragmented sentences, and in a mumbled or subdued manner.

NONVERBAL RESPONSES

Nonverbal behavior is generally recognized as responsible for providing more than half of the information and meaning of a message communicated in a conversation. While the verbal statements a person makes are usually carefully thought out and certainly under the person's conscious control, most people do not pay the same careful attention to their physical movements and gestures while speaking. As a result, the true meaning of a person's statement in many cases may only be discerned by considering the verbal content in conjunction with the nonverbal behavior which accompanies it. For example, if you ask A if he committed a particular criminal act (such as a robbery), and he responds in a firm tone of voice by saying "Absolutely not! I had nothing to do with that," while leaning forward in the chair in an open posture and maintaining steady eye contact, the entire message conveyed is one of sincerity and directness. On the other hand, if B is asked the same question, and he verbally responded in a weak tone of voice but with the same words, and while doing so shifts positions in the chair, drops his eye contact to the floor, crosses his arms and legs into a crossed posture and leans back in the chair as he completes his answer, an entirely different message is conveyed--one of insincerity and lack of candor. Most people would recognize this difference but would be unable to verbalize the basis for distinguishing the "good" answer from the "bad" one. However, there are very specific and observable nonverbal behaviors that can be consciously evaluated for possible indications of deception.

A person's posture can be very revealing. A truthful person will generally sit upright, but not rigid, directly positioned in front of the questioner. He may lean forward toward the questioner when making a point, but generally will appear relaxed and casual, and any posture

changes will seem smooth and natural. On the other hand, the deceptive individual often will slouch or lean back in the chair, or may be unnaturally rigid and stiff, perhaps with legs and feet pulled back under the chair. Usually the deceptive person will not sit in a direct frontal alignment with the questioner, but rather at an angle in the chair or off to its side, as though unwilling to face the questioner. He may sit in a posture with elbows close to his side, or the arms may be folded and locked in front, accompanied perhaps by the crossing of legs at the knees or ankles. The deceptive person may also exhibit rapid, erratic, and otherwise unnatural poisture changes.

In an effort to relieve the internal anxiety and tension associated with lying, the deceptive person oftentimes engages in a variety of physical movements.

In summary, physical activities of the deceptive person may be categorized into the following general types:

1. Gross body movement; posture changes such as a movement of the chair back from the questioner; an indication of being about to stand up, or perhaps to even leave the room where they are being questioned.

2. Grooming gestures and cosmetic adjustments; rubbing and wringing of the hands; stroking the back of the head; touching the nose, earlobes or lips; picking or chewing of fingernails; shuffling, tapping, swinging, or arching of the feet; rearrangement of clothing or of jewelry; dusting; picking lint or pulling threads on the clothing; adjusting or cleaning glasses; and straightening or stroking of the hair.

3. Supportive gestures; placing a hand over the mouth or eyes when speaking, crossing arms or legs, hiding the hands (by sitting on them) or hiding the feet (by pulling them under the chair), holding the forehead with a hand, or placing the hands under or between the legs.

When a suspect repeatedly engages in any of the foregoing nonverbal reactions in conjunction with verbal responses, that fact is a strong indication that the verbal responses may not be truthful ones.

One of the most important transmitters of nonverbal behavior symptoms is the degree of eye contact maintained by the suspect with the questioner. Deceptive persons generally do not look directly at the questioner, they look down at the floor, over to the side, or up at the ceiling as if to beseech some divine guidance. They feel less anxiety if their eyes are focused somewhere else than on the questioner during deception; it is easier to lie while looking at the ceiling or floor. Consequently, they either try to avoid eye contact by making compensatory moves or else they overact by staring in a challenging manner.

The truthful persons, on the other hand, are not defensive in their looks or actions and can easily maintain eye contact with the questioner. Even though they may be apprehensive, they show no concern about the credibility of their answers. Although attentive, their casual manner is unrestrained.

It is exceedingly important--indeed very critical--that a suspect's behavior symptoms should be assessed in accordance with the cautions set out earlier in this article. Nevertheless, by assessing a person's behavior as to truth or deception, some practical benefits can be realized.

PRACTICAL APPLICATIONS FOR THE PROSECUTOR

For the prosecuting attorney the assimilation of these principles of behavior symptom analysis into daily professional activities can pay high dividends toward successful case resolution. The more confident a prosecutor can be of the legitimacy of the charge against a defendant, the more effective his ultimate presentation will be to the judge or jury.

Naturally, evidence is the cornerstone of any decision to either charge, indict, and finally, convict. The point of origin, however, for all evidence is other people. Therefore, a prosecutor's ability to elicit full and complete information from others as well as the ability to shrewdly assess the veracity of that information will impact upon the degree of confidence in the charges filed and the strength of the presentation made to the court.

Unfortunately, crystal balls are at a premium, so the prosecutor sometimes has to reach conclusions about another's truthfulness by relying upon intangibles, intuition, or even gut feelings born of prior experiences. Systematic analysis of behavior symptoms, however, does provide definition to that formidable task of eliciting the truth. For example, within the context of an interview of an occurrence witness to a criminal act, seeds of doubt oftentimes linger in the prosecutor's mind about whether that witness really knows what he said he knows. Is the witness giving a full story or an exaggerated version? If the nonverbal behavior symptoms belie the verbal content in a manner outlined earlier in this article, then legitimate doubt can be cast upon a person's truthfulness.

When confronting a possible suspect or an important witness prior to seeking an indictment, information, or complaint, a prosecutor's line of questioning can take many directions, from the non-accusatory cursory interview to the most poignant interrogation. In either instance, the person being interviewed or interrogated is going to tell something somewhere along a continuum from defiant silence to ebullient conversation. Now a decision will have to be made as to reliability. Is all of it true or only part of it? Is any of it true? In the absence of corroborating or contradictory evidence, how is the decision to be made?

Regardless of what a suspect says, consideration will have to be given as to the way in which it was said. Mannerisms, body movements, speech patterns, and visual contacts will either substantiate or contradict the credibility of the verbal content. Furthermore, the same behavioral responses will serve as a guide that will permit a focus upon a set of questions which evoke the greatest clues of internal anxiety. Once an identification is made of the areas of inquiry to which the suspect is most vulnerable, persistence, either through continued interrogation or independent investigation, in pursuing those vulnerabilities can help lead to the material evidence which will make or break the case. For example, envision a case, an actual one in our experience, in which a felony

conviction was obtained of a man suspected of having stolen, from his employer, industrial precious metals valued at over $100,000.00. During the course of his interview, his relaxed demeanor matched the content of his convincing denials of involvement. As the interview progressed, a hypothetical motive was presented to the suspect which could conceivably have prompted someone to steal the missing property. The motive suggested was that the bullion was stolen in order to pay off dangerous loan sharks whose account was long overdue. This caused an uncharacteristic shift in body posture by the suspect, coupled with a diversion of eye contact to the floor. The interviewer perceived this behavioral response and read into it a possible vulnerability on the part of the suspect. The topic was pursued, and as the conversation developed, the "hypothetical" appeared more and more to be a reality as the demeanor of the suspect became progressively marked by grooming gestures, posture changes, and supportive gestures of placing his hand on his forehead or over his mouth. The suspect's denials shortly became a full confession which lead to an indictment and eventual conviction.

From the foregoing example and others like it, the conclusion can be reached that there are valid methods of identifying and assessing verbal and nonverbal behavioral cues which speak louder than words.[4] A prosecutor with knowledge of these behavior symptoms and the ability to analyze them can be far more effective in discerning the facts from fiction. In the realm of criminal law, this skill can be a valuable weapon for the prosecutor to employ, either at a crime scene, in the office, or in the courtroom.

Footnotes

[1] Reid and Inbau, Truth and Deception: The Polygraph ("Lie Detector") Technique, second edition (1977) pages 292-296.

[2] Reid and Arther, "Behavior Symptoms of Lie-Detector Subjects," 44 J. Crim. L., C. & P.S. 104-108 (1953).

[3] Ekman and Friesen, Unmasking the Face: A Guide to Recognizing Emotions From Facial Clues (1975); Ekman and Friesen, "Detecting Deception From the Body or Face, 29 J. Personality & Soc. Psy. 288-298 (1974); Zuckerman, Defrank, Hall, Larrance, and Rosenthal, "Facial and Vocal Cues of Deception and Honesty," 15 J. Exp. Soc. Psy. 378-396 (1979); Zuckerman, Koestner, and Alton, "Learning to Detect Deception," 46 J. Personality & Soc. Psy. 519-528 (1984); De Paulo, Rosenthal, Eisenstat, Rogers & Finkelstein, "Decoding Discrepant Nonverbal Cues," 36 J. Personality & Soc. Psy. 313-323 (1978); and De Paulo, Zuckerman, and Rosenthal, "Humans as Lie-Detectors," J. Communication 129-189 (1980). Horvath, "Verbal and Nonverbal Clues to Truth and Deception During Polygraph Examinations," 1 J. Police Science & Adm. 138-152 (1973).

[4] For a more thorough discussion of behavior symptoms, as well as various interviewing tactics and techniques, see Inbau and Reid, Criminal Interrogation and Confessions, 2nd edition, 1966. A new third edition will be published by Williams & Wilkins in early 1986.

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STRESS MONITORING BY POLYGRAPHY FOR RESEARCH PURPOSES

By

Walter Atwood and Harry Hollien

Research designed to assess the human condition of psychological stress is becoming increasingly important. Thus, it is timely to study the existence of stress states and the various behaviors that indicate its presence. Many questions can be asked in this regard; for example: 1) What is the general nature of stress? 2) What are its subcomponents? and 3) What are its long-term effects (emotional, physiological)--including how can they be induced and how can they be monitored? Further, no matter what the motivation for studying stress may be--or how this concept is conceptualized--the initial problem to be faced results from the need for operational definitions. Is stress fear, or anxiety, or (even) anger? The concept appears to relate to some sort of negative psychological state. But what state? How intense is it? Do stress states of similar types vary from individual to individual? In short, it appears necessary to resolve how stress is defined, determined and measured.

Definitions of Stress:

In laboratory experiments, stress is often demarcated in terms of the applied stressor. However, this type of definition is not very useful because, even though the stressor itself can be defined--and often quite precisely--the emotion(s) being experienced (by the subjects) remain essentially unknown. Worse yet, when emotions (including stressful ones) are identified for research purposes, the process in doing so often involves simulations by actors. The reason for this approach is due to the fact that it is only rarely possible to study a person experiencing stress during the event--i.e., at the instant it occurs--and also study that same person during unstressed but otherwise parallel conditions. In short, the concept of stress is difficult to define in terms of either the event or the way the person is stressed.

It can be said, however, that no matter how stress becomes operative, its presence in a person results from some sort of threat (Appley and Trumbull, 1967)--or, as Lazarus (1952) points out, to be stressed, an individual must anticipate confrontation with a harmful condition of some type. He further points out that the strength of the stress response pretty much results from the magnitude of the threat and that this condition must be predicated on menace to a person's ego, integrity, values, goals or well being. Moreover, Scherer (1981) suggests that stress can be either internal or external with adapting and coping behavior required--whereas Baswitz, et al.(1955) contend that this condition is not "imposed"

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at all but rather that it constitutes an individual's "response" to stressful conditions. In any case, a threat* ordinarily will create some degree of anxiety, fear or anger in a given individual, we opt for the definition provided by Hicks and Hollien (1981), i.e.: that stress is a psychological state which occurs in response to a perceived threat; it will be accompanied by the specific emotions of anxiety, fear and/or anger.

Level of Stress:

Even when the definition problems surrounding stress are mitigated the trade-off between controlled stress and stress that occurs "naturally" remains. Instances of the second case are where some sort of terrifying, tragic or life threatening situation occurs and the individual responds. To illustrate, stress obviously was present when an announcer was reporting arrival of the Hindenberg and observed its crash; so too were pilots (experiencing stress) when they were fearful of crashing (Kuroda, et al., 1976; Simonov and Frolov, 1973; Williams and Stevens, 1972). Unfortunately, these events were uncontrolled, population size was quite small, behavior samples during comparable non-stress conditions were not available --and, most limiting of all, the level of stress was unknown. Thus, the cited events have not proved very useful for research purposes.

The problem of population size can be mitigated by investigations where sample size is controlled by the experimenter; so too, can the nature of the stressor and the inclusion of unstressed states. Moreover, there are a number of induced and "natural" conditions that can be used to insure that stress is present in the individual subject--but yet nothing dangerous is involved and no harm will result. Public speeches, the speaking of taboo words (to an audience of the opposite sex), electric shock, observation of film/video clips of highly charged content are among the many stressors available. The problem remains, however, that the intensity (or level) of the stress state occurring in the individual is of critical importance--and that it usually is unknown. That is, in nearly all cases, the experimenter can only presume the level of stress and this problem renders trivial--or even useless--the results obtained from that particular project. In certain instances, checks of some type are attempted and such effort somewhat enhances the significance of the study. However, approaches of this type usually involve 1) experimenter observations, 2) subject reports, and 3) anxiety checklists, and as can be seen, such techniques are limited. For example, the first two are quite subjective and, while the third provides better information, it suffers from the problem that it cannot be applied during the study and, thus, can be misleading (i.e., it may define stress levels during states of apprehension before the task or relief after its completion). Thus, approaches of the cited type are crude at best (see, for example, Derogatis, 1982; Wherry, 1966); they certainly do not provide a stable and reliable index of the presence and level of stress.

*These psychological states often are referred to as emotions but, as Arnold (1967) points out, there are many emotions (for example, joy, love) that have little or nothing to do with stress.

A single example should suffice to illustate this point. The reflection of stress in the human voice has been studied. It has been found that listeners can determine when stress is present by responding to various changes heard in the voice (Fairbanks and Pronovost, 1939; Kuroda, et al., 1976; Scherer, 1977, 1979; Williams and Stevens, 1969). Basically, it has been reported that increases in fundamental frequency (fØ) correlates with the presence of stress (Fairbanks and Pronovost, 1939; Kuroda, et al., 1976; Scherer, 1977, 1979; Williams and Stevens, 1969). On the other hand, Almeida, et al., (1975), Hecker, et al., (1968), Hicks (1979), Hicks and Hollien (1981) and Markel, et al., (1973) either did not find that this relationship existed for all of their subjects--or reported decreases in fØ for at least a few of them. Secondly, some investigators (Costanzo, et al., 1969; Friedhoff, et al., 1964; Hicks, 1979; Williams and Stevens, 1972) report varying degrees of increased vocal intensity to accompany stress states; yet Hecker, et al., (1968), report a trend in the opposite direction. The same type of trend differentials also are reported for speech timing and rate (Bachrach, 1979; Fairbanks and Hoaglin, 1941; Hicks, 1979; Scherer, 1974, 1977, 1979; Silverman and Silverman, 1975, and Williams and Stevens, 1972). While attempts have been made to order these data (Hollien, 1981, in press; Scherer, 1981), they only have been partially successful. Thus, while it must be conceded that difficulties/differences in definition, experimental design, signal measurement/analysis or interpretation may account for the confusions noted, it is the inability or unwillingness of the cited investigators to correlate their subjects' stress presence/level with the obtained data that probably constitutes the fundamental problem--that is, if systematic differences exist in the first place.

Stress Monitoring By Polygraph:

It is now rather obvious that if the effects of stress upon human behavior are to be reasonably well understood, the research that is conducted must be better controlled than it has been in the past. What better way to introduce appropriate controls than to monitor those psychophysiological events within the body that reflect the presence--and especially the level--of stress. Such features are thought to include: heart rate, brain waves, pupil diameter, blood pressure, respiration and electrodermal response. All have been suggested as being good candidates for stress monitoring. However, pupilametrics and EEG are rather awkward to instrument whereas information about the other four is much easier to obtain--and they are amenable to standard polygraphy (heart rate, and perhaps blood pressure appear especially viable; Deane, 1961; Evans, 1974; Frankenhauser and Johannson, 1976; Hayre and Holland, 1980; Marston, 1917).

The basics about polygraph and its uses are well known (see for example, Abrams, 1977; Reid and Inbau, 1977; Matte, 1980; Nagle, 1985; Weir and Atwood, 1981); hence, only a brief review of this technique and its accompanying procedures will be included. In any case, the standard polygraph is an instrument which captures certain physiological data under relatively controlled conditions (see Nagel, 1985 for an excellent history). That is, it incorporates receptors (placed on the body) that measure respiration, galvanic skin response, blood volume and pulse rate/amplitude (Reid and Inbau, 1977). The activities monitored by these

receptors are transduced and amplified by the polygraph circuits in such a way as to allow the signal to be recorded by moving pens; in turn, these pens permit a trace of the signal to be placed onto paper moved by a kymograph, or hard copy recording unit. Specifically, the standard field polygraph contains paper, which is propelled at the constant speed of six inches per minute, and four pens to trace the signals on it. Two of the pens record breathing patterns while the other two record electrodermal response and cardio output.

The polygraph's pneumographic subsystem measures respiration rate--i.e., breathing patterns. They are recorded as responses to pressure changes in two pneumatic tubes positioned around the subject's torso (at the thoracic level and abdominal level). Expansion in the area of the subject's chest and stomach during breathing causes stretching of the tubes, the movement of which are transmitted through bellows to the chart pens. Second, the galvanic or electrodermal skin response (EDR) subsystem provides information on skin resistance as a function of the neural activity associated with stress and emotions. It is obtained by attaching electrodes to two of the subject's fingers and passing a small amount of electrical current through this completed circuit. Any variation in perspiration (a routine sympathetic response to stress) is thereby detected and permanently recorded on the appropriate polygraph channel. Finally, the cardiosphygmograph subsystem is used to measure changes in the subject's blood pressure and pulse; this measure is accompanied by placing an inflated rubber cuff around the upper arm over the bracial artery; the forearm or wrist also can be used. As the heart contracts it creates a blood volume increase that expands the arm whereas, when the heart is at rest, blood volume (and arm size) decreases; such changes result in parallel variation in the pressure in the cuff. An increase in pressure causes the appropriate polygraph pen to move upward while a blood volume reduction results in a downward swing of the pen. Moreover, since the peaks represent individual heartbeats, and paper speed is both constant and known, heart rate (in beats per minute) can be calculated. In any case, those physiological changes which may occur are revealed as variations in the frequency and amplitude of the heartbeats as a function of cardiovascular trends.

The theory upon which polygraph measurements are based also should be reviewed. Specifically, changes in the cited parameters are presumed to reflect arousal or stress as a function of changes in the sympathetic division (SNS) of the autonomic nervous system (ANS). That is, the human body will respond to a stressful situation and these responses are induced by the ANS which coordinates the activities of the endocrine system and smooth muscle tissue such as those associated with the intestines, blood vessels and heart. More importantly, this system operates involuntarily and ordinarily cannot be brought under conscious control (Abrams, 1977). Of the two branches comprising the ANS--the Sympathetic Nervous System (SNS) and the Parasympathetic Nervous System (PNS)--it is the SNS that is of interest here. That is, while the PNS is dominant when an individual is at rest, the SNS takes over when energy mobilization is required (Andreassi, 1980). As stated, the SNS is activated by a perceived threat or "aroused emotional state" (Abrams, 1977) and, during this period, it prepares the body to cope with the emergency--such as by fleeing or fighting. In turn, these states result in emotions such as fear, anger and anxiety

(i.e., stress)--conditions which stimulate the body to produce a physiologic effect. Among these responses are the cited increases in blood volume and pulse rate, decreases in skin resistance and changes in respiratory rates. Finally, it should be noted that emotional states also can be reflected by combinations of these physiologic responses--and that all of them can be monitored by a polygraph.

It is unfortunate but these cited responses can co-vary with the stress-induced neural activity while their strength may differ in an unknown or unmeasurable manner as a function of environment, basic physiology, subject, stressor and so on. Thus, metrics for each of these elements or parameters are needed and, excepting for heart rate, they are a little difficult to establish. Once done, however, verification of the presence of stress, indication of stress level and even identification of potential stress adaptation effects (over time) are possible. However (and as will be seen below), quantitative monitoring of heart rate and the systematic (if not quantitative) observation of the other parameters may prove useful anyway--that is for the cited purpose for monitoring stress during research.

Examples of Stress Monitoring by Polygraph:

The first of two examples to be reviewed involved a study of speaker identification as a function of arousal and/or stress. That is, the basic purpose of the project that constitutes the first exmaple was to discover if stress (or arousal) enhanced or degraded aural/perceptual speaker identification. In order to do so, a group of young females was screened for potential sensitivity to stressors. The 15 most susceptible to stress, and the 15 least likely to be affected by stress (controls) were selected as subjects. The "stress" group was presented 10 minutes of violent video stimuli (attacks on women, rape scenes, death of children) while a male voice read a threatening commentary; the controls saw a pastoral video sequence (primarily of a horse being exercised in a corral) while hearing a male voice read neutral material. A procedure involving speaker recognition (of the male voice) over time was carried out.

The presence and level of stress experienced by subjects during the experiment was monitored by interpretation of the output of a standard polygraph. In this case, only changes in heart rate and EDR were calculated and used as indices of stress levels. Specifically, the existance of stress states was established operationally with moderate/severe stress being defined as increases of 4/5 or more heart beats per vertical column on the chart paper and a GSR increase of 5/10 or greater increments above baseline. On the other hand, no or mild stress was judged to exist if change in HR was no greater than (increases in) two beats per unit and/or the shift in GSR was observed to be less than three increments. These states had to be maintained during 10 minutes of stimulus presentation. The results suggest that stress/arousal enhances the accurate identification of a speaker somewhat. Of primary interest, however, is that two experimental subjects did not experience stress as expected while two of the controls did so (and at a very high level). This finding is quite startling. It alone demonstrates how very necessary it is to directly monitor the presence and level of stress states, as they occur, if research results in this area are to be considered valid. Moreover, the project

demonstrates how polygraphy can be used effectively as an aid to stress research.

The second project focused on the development of a vocal metric method for the assessment of depression and the early detection of depressive states (Talevera, Hollien and Tingle, in ms form). The overall procedure was as follows: Two different (but generally similar) prose passages were read/recorded by two different speakers of the same sex. One was fed (binaurally) to the subject's dominant ear; the other to the contralateral ear. These passages are 10 minutes in total length but are divided into ten equal one-minute segments. Subjects repeat messages heard in the ipselateral ear and this recorded material is scored for number of errors. First, three pilot studies were carried out in order to develop technique, assess problems and obtain preliminary data. Initial error rate for normals was found to be between 5-10% and that, after a slight rise (around segment-3), it decreased to about 5% (i.e., the subjects developed strategies for coping with the task); this level was maintained at least until after the tenth segment. Depressives, on the other hand, appeared to initiate the process at relatively high error rates (40-60%) and after a rise (again around segment-3), exhibited a decay only to about 30-50%.

Data now are being processed for 11 severe depressives (drawn from a pool of 16) who met all selection criteria (diagnosis, adequate hearing as tested, ability to do task, etc.). Further, all psychotropic drug therapy had been discontinued and for at least five days. Stress levels again were monitored by polygraph recordings--but in this case heart rate and respiration were the parameters--before, during and after the experiment; the Zung Self Rating Depression Scale and the Spielberger State-Trait Anxiety Inventory also were administered (and correlated with the polygraph readings). Experimental variables included error rate as a function of the task (10 serial scores), tests of relative ear advantage (REA) and the differential effect of the dominant ear on the process. Acoustic/temporal analyses of the speech produced during the test also are being carried out. Preliminary results are generally consistent with the pilot data. Further, they support our stress model; i.e., one which suggests that depressives generally withdraw from social contact and the dichotic listening task employed forces them to interact with others (i.e., they are stressed). It should be noted that this research could not have been completed successfully without the use of the polygraph. If the high stress levels observed in the subjects actually used could not have been determined, all 16 (or nearly 20) of the initial subject pool would have been included in the study--thus creating a situation where a significant number of the population studied essentially would not have represented to required experimental group.

A Critique:

It should be clear from the above discussion that the use of one or more of the psychophysiological parameters assessed by the polygraph will enhance the rigor and sophistication of research on stress. Indeed, the need to clearly demonstrate both the presence and level of stress states now can be seen as mandatory if the results of experiments of this type are to be considered valid. That the standard polygraph provides a

compact, reliable and accurate way of making such determinations seems apparent; further, it is both efficient and reasonably cost effective.

Unfortunately, however, there also are some negatives associated with the cited procedure. First, the polygraph equipment must be in close proximity to the subject, thereby making it difficult if not impossible to track the stress levels of individuals who are to be studied in remote locations. Such close placement of the equipment also limits gross movement or locomotion on the part of a subject--and such activity might be a condition of relevance to the research. However, the coupling of a telemetric link to the system might permit effective remote sensing even though applications of this type would require modification of commercial models and the unitary aspect of these units is otherwise a positive factor. Second, subjects must remain relatively motionless during polygraph use in order to permit a baseline to be established and the shifts in psychophysiological function observed. Even small movements--such as those in response to startle, for example--could prove detrimental to stress level assessment. While this limitation is serious, it also is one that may be amenable to improvements in the sensors. That is, there is a possibility that receptors can be designed that are relatively impervious to general body movement yet are still sensitive to the parameter of interest. Finally, it is possible that the greatest problem with this technique is that observations of polygraph traces are in-and-of themselves subjective. If a monitoring approach of this type is to be utilized, viable and quantitative metrics must b established. This problem certainly is a serious one; however, there is little question but that it can be solved by experiments focused directly upon development of specific metrics for each of the psychophysiological parameters recorded by the polygraph.

In summary, it can be said that the use of standard polygraph techniques permits an upgrading of the quality of research in the area of stress. Further, even though there currently are some limitations to the approach, it appears possible that system modification will further enhance its robustness for these purposes.

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LIE DETECTORS AND THE PRESS

By

Catherine E. Long

Content analysis indicates that the Washington Post does not give lie detectors unbiased coverage. In fact, polygraphs are receiving quite negative publicity from the Post. The number of positive articles about polygraph featured in the newspaper over a two year period is one sixth that of the negative articles. None of the positive articles are news stories or editorials. They are all letters to the editor written by people not on the newspaper's staff. A detailed content analysis is set forth in this article based on analysis of the material in the Washington Post from January 1983 to December 1984. [Ed.]

Lie detectors, or polygraphs, have long been a subject of controversy in the United States. Proponents of the devices say that when administered carefully and correctly and analyzed properly, lie detectors can be 80-90 percent accurate in their findings and can prove remarkably effective. They also argue that lie detector tests can only be conducted on a voluntary basis, and that their findings are always used in conjunction with other evidence. Opposers of the polygraph charge that it is not accurate, that is misclassifies truthful persons as liars, and therefore, that is is not useful. They say that the use of lie detectors is a violation of privacy and other fundamental rights.

The use of lie detectors falls into three main categories. They are used as preliminary screening devices to test the fitness of applicants for jobs or other positions. Law enforcement agencies use polygraphs to help identify the guilty and the innocent in criminal cases by verifying statements and confessions. Polygraphs are also employed widely as security devices. In this context, they are used to explore for leaks, spies and other on-the-job problems in many companies, firms and governmental agencies.

News media and news organizations acquire a large part of their information from unauthorized sources. They depend heavily on leakers and informers and do not like to see them exposed. It follows, then, that news agencies are not likely to favor any system of searching for leaks and disloyalities in an organization, including the use of lie detectors. But, can they still treat them fairly?

Universe of Content

This study is a look at how the press treats lie detectors. It seeks to discover if the news media are capable of giving unbiased coverage in

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an area that so obviously affects them. The analysis looks at the content of articles in order to determine what kind of publicity lie detectors are receiving. It analyzes the claims made about polygraphs, who is making them, and what evidence is given.

The content analysis looks at the treatment of lie detectors, or polygraphs, in The Washington Post from January 1983 to December 1984. It is a deductive descriptive study which describes the relevant content without judgement by using a predesigned category system and draws conclusions from the findings. The Washington Post was chosen for its availability and its large following, but also for its known heavy reliance on governmental leaks and informers for a substantial portion of its information. The years 1983 and 1984 were selected arbitrarily.

The sample used in the analysis consists of every story, editorial, or letter to the editor featured in The Washington Post during the specified time period which mentions lie detectors or lie detection. Story, editorial, and letter to the editor are considered three genres in the larger class of newspaper article. An article is defined as a one or more paragraph item under one headline and broken into columns, and is the sampling unit. The recording unit is first the article as defined above, and second the paragraph, which is defined as a set of one or more related sentences which is introduced by an indention.

Recording Instructions

First the articles that mention lie detectors or lie detection are analyzed using the pre-designed category system and coding sheets. Each article is given a different number which is followed by a letter, an "S" indicating story, an "E" for editorial, or an "L" for letter to the editor. After being numbered and identified, the article is classified as being positive, negative, mixed, or neutral towards lie detectors and as being implicitly or explicitly so. Then it is determined whether the article mentions, has as a theme, or focuses upon lie detectors or lie detection.

Next the individual paragraphs which mention lie detectors or lie detection are studied. Each relevant paragraph of an article is assigned a letter and the number of the article is noted. A paragraph is first classified according to its context: preliminary screening, secondary screening, criminality, or general. Then the paragraph is examined to determine whether it involves a discussion of the accuracy of lie detectors. If it does, the supporting evidence given is classified according to type and categorized as positive, negative, mixed, or neutral towards lie detectors. The source of the evidence is classified and the name and position are noted if possible. Next, the paragraph is searched for a discussion of the legitimacy of lie detectors. If one is found, the supporting evidence is classified and recorded as positive, negative, mixed, or neutral, its source is categorized, and the name and position of the source are given if possible. Last, the paragraph is explored for a discussion of the utility of lie detectors. If the paragraph contains one, the evidence is classified and recorded as before, and the source is noted with its name and position given if available.

Category System

The categories defined below are used in conjunction with the recording instructions just described and the coding sheets to carry out the content analysis.

For articles:

Genre

Story - written composition in prose on a specific topic.

Editorial - article presenting the opinion of the publisher or editor(s) of the paper; an article found on the editorial page of the newspaper.

Letter to the editor - communication in writing by someone not on the newspaper's staff usually addressed to the editor(s) and remarking on a previous article.

Attitude

Positive - in favor of lie detectors and lie detection or presenting them in a favorable manner.

Negative - in opposition to lie detectors and detection or presenting them in an unfavorable light.

Mixed - combination of positive and negative or presenting lie detectors and lie detection as favorable on some counts and unfavorable on others.

Neutral - neither positive nor negative with regard to lie detectors and detection.

Implicit/Explicit

Implicit - implied rather than expressly stated.

Explicit - fully and clearly expressed, leaving nothing implied; definite.

Quantity

Mention - less than 10% of article is about lie detectors.

Theme - between 10 and 50% of article is about lie detectors.

Focus - over 50% of article is about lie detectors.

For paragraphs:

Context

Preliminary screening - use of lie detectors to sift or sort out

good from bad (as in job applicants), to test the fitness of persons for a job or position.

Secondary screening - use of lie detectors to explore for leaks, disloyalty, or other security or on-the-job problems.

Criminality - use of lie detectors to identify guilty and innocent in criminal cases.

General - mention of lie detectors or detection in any other context.

Discussion

Of accuracy - whether or not the use of lie detectors is exact, precise, free from errors or mistakes.

Of legitimacy - whether or not the use of lie detectors is rightful, lawful, proper, or allowed.

Of utility - whether or not the use of lie detectors is in fact useful or helpful.

Evidence

Assertion - opinion, belief, view or judgement not supported by proof.

Reason - assertion plus justification or explanation.

Example - assertion plus illustration, anecdote, or specific case used to show nature of use.

Research - assertion plus research findings, or statement of research findings alone.

Fact - statement of something known to be true with no assertion.

Evaluation

Positive - same as above

Negative - same as above

Mixed - same as above

Neutral - same as above

Source

Journalist - writer for a news medium, author of the story or editorial.

Other - anyone not classified as journalist, includes author of letter to the editor.

Source (cont.)

Journalist paraphrasing other.

Results

Forty-seven articles are found in The Washington Post from January 1983 to December 1984 that mention lie detectors. There are also many cartoons concerning lie detectors and their use, but since those call for another type of analysis they are not looked at in this study. Twenty-five of the articles about polygraphs fall into the story category, 16 are editorials, and six are letters to the editor.

Of the 47 articles, three are positive toward lie detectors or detection, 19 are negative, 22 are neutral, and three are mixed. All three of the positive articles are letters to the editor. The negative articles can be broken down into eight stories, eight editorials and three letters to the editor. The three mixed articles are all news stories about lie detectors or detection. Fourteen of the neutral articles are stories, eight are editorials, and none are letters to the editor.

TABLE 1
Articles

	Articles	Stories	Editorials	Letters
Positive	3	0	0	3
Negative	19	8	8	3
Mixed	3	3	0	0
Neutral	22	14	8	0
Total	47	25	16	6

Counting the 22 neutral articles all as implicit, only five other articles are implicitly opinionated. Of those five, one is positive and four are negative. There are 20 explicitly slanted articles about lie detectors and detection. Two articles are explicitly positive, 15 are explicitly negative, and three are explicitly mixed. It is interesting to note that out of the 19 negative articles about lie detectors, only four are implicitly so, the rest are explicitly negative.

TABLE 2
Articles

	Articles	Implicit	Explicit
Positive	3	1	2
Negative	19	4	15
Mixed	3	0	3
Neutral	22	22	0
Total	47	27	20

Fifteen of the 47 articles only mentioned lie detectors or detection, while 13 had it as a theme, and 19 had it as the focus of the article. Of those articles that focused upon lie detectors, three were positive towards them, ten were negative, three were mixed, and three were neutral.

TABLE 3
Articles

	Articles	Mention	Theme	Focus
Positive	3	0	0	3
Negative	19	2	7	10
Mixed	3	0	0	3
Neutral	22	13	6	3
Total	47	15	13	19

Out of the 47 articles, 200 paragraphs are found to have at least a mention of lie detectors or lie detection. Of these 200 paragraphs, only one refers to lie detectors in the context of preliminary screening, while 123 mention it in connection with secondary screening, four discuss its criminal uses, and 62 mention lie detectors in a general context. Nine paragraphs have a double context of secondary screening and general use, and one paragraph refers to polygraphs with regard to both their criminal and general uses.

TABLE 4
Paragraphs (Context)

Context	# of paragraphs
Preliminary screening	1
Secondary screening	123
Criminality	4
General	62
S. screening/General	9
Criminality/General	1
Total	200

Not all of the 200 paragraphs contain a discussion of the accuracy, the legitimacy, or the utility of lie detectors, and some mention more than one. Fifty-one paragraphs have some discussion of the accuracy of lie detectors, while 18 discuss their legitimacy, and 29 discuss their utility.

TABLE 5
Paragraphs (Discussion)

Discussion	# of paragraphs
Accuracy	51
Legitimacy	18
Utility	29
None	102
Total	200

Most of the supporting evidence is presented in the form of an assertion. There are 63 assertions, 17 reasons, six examples, nine research findings, and eleven facts cited as evidence. Most of the evidence is also negative. Seventy-eight pieces of negative evidence are found, but only 21 positive pieces, three mixed ones, and four netural ones.

TABLE 6
Paragraphs (Evidence)

	Total	Positive	Negative	Mixed	Neutral
Assertions	63	15	42	3	3
Reasons	17	4	13	0	0
Examples	6	0	6	0	0
Research	9	1	8	0	0
Facts	11	1	9	0	1
Total	106	21	78	3	4

Of the 78 negative pieces of evidence, 42 are negative assertions, 13 are negative reasons, six are negative examples, eight are negative research findings, and nine are negative facts. The 21 positive pieces of evidence can similarly be broken down into 15 positive assertions, four positive reasons, no positive examples, one positive research finding, and one positive fact. The three mixed evidences are all assertions, while the four pieces of evidence neutral toward lie detectors consist also of three assertions and one fact.

The sources of the supporting evidence are broken down into three broad categories. The source of 23 pieces of evidence is the journalist. Non-journalist others are the direct sources of 69 pieces of the evidence given. And a journalist is paraphrasing another in 14 cases.

Of those "others" cited directly and paraphrased, government officials are attributed with 47 pieces of evidence and union officials with six. College professors are cited 15 times and polygraphists eight. Credited with six pieces of evidence are government reports, while "experts" are responsible for two, "lawyers" for two, "skeptics" for one, and citizens for six.

TABLE 7
Paragraphs (Sources)

	Total	Journalist	Other	J. Paraphrasing O.
Positive	21	1	19	1
Negative	78	20	47	11
Mixed	3	0	2	1
Neutral	4	2	1	1
Total	106	23	69	14

The person referred to most often for evidence in the paragraphs is John F. Beary, labelled, "Pentagon Health Director". He is credited with 22 pieces of evidence. Also quoted and paraphrased often is David Lykken, a professor of psychiatry and psychology at The University of Minnesota Medical School. Eleven pieces of supporting evidence are attributed to him. Raymond J. Weir, a polygraphist, is responsible for six pieces of evidence, and Richard K. Willard, Deputy Assistant Attorney General, for five. Other government officials quoted or paraphrased are James A. Baker, George P. Shultz, Edwin Meese, William H. Taft, Henry E. Catto and the directors of the F.B.I. and the C.I.A., William Webster and William J. Casey. The union officials cited are Michael L. Tiner, Judy Goldberg, and John Shattuck. Three professors beside Lykken are used as sources, and another polygraphist.

Conclusions

The findings of this content analysis seem to indicate that the press, or at least The Washington Post, does not give lie detectors unbiased coverage. In fact, lie detectors are receiving quite negative publicity from The Washington Post. The number of positive articles about polygraphs featured in the newspaper over a two-year period is one sixth that of the negative articles. It is important to note also, that none of the positive articles are news stories or editorials. They are all letters to the editor written by people not on the newspaper's staff.

Obviously, journalists are most concerned with the use of lie detectors as security devices and thus pay little attention to their other uses. Well over half of the paragraphs mentioning lie detectors or lie detection discuss them in the context of secondary screening.

Although 1983 was the year of the John DeLorean lie detector controversy, only five articles mention the use of polygraphs in criminal cases and only three mention it in the DeLorean case.

Within the articles concerning lie detectors, many questions are raised about their accuracy, their legitimacy, and their utility. The claims made in these discussions are negative seven times out of ten, with negative evidence given in support. Most often, the articles try to raise doubts about the accuracy and utility of polygraphs as security devices, most likely with the intent of discouraging this use.

The evidence given to support the many negative claims about the accuracy, legitimacy, and utility of lie detectors is rather weak. In over half of the cases, there is no real evidence, only a negative assertion. Most of the positive, mixed, and neutral pieces of evidence are assertions also.

It is surprising to note that the sources of this negative evidence are most often "others" rather than the journalists themselves. Journalists were lucky to find others with views similar to theirs on lie detectors that could be quoted. They were extremely fortunate in finding John F. Beary, whom they cited for one fourth of their negative evidence, and David Lykken, who was responsible for about one seventh of it.

In light of these findings, it seems that the press are not the champions of objectivity that they claim themselves to be. In fact, they seem quite incapable of providing unbiased coverage in an area which affects them. In this case The Washington Post presented obviously negative coverage of lie detectors, devices which journalists undoubtedly feel very negative toward.

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TESTIMONY BEFORE THE EMPLOYMENT OPPORTUNITIES SUBCOMMITTEE*

By

Lawrence W. Talley

My name is Lawrence W. Talley, and I am Vice President of Risk Management for Days Inns of America, which operates 425 hotels and motels nationwide. I also serve as Vice President-Private of the American Polygraph Association. In addition, I am chairman of the Georgia State Board of Polygraph Examiners which is appointed by the governor. This board regulates polygraph examinations and licenses polygraph examiners in the state. In 1984, I worked closely with members of the Georgia General Assembly in drafting a law which is considered to be a model for the nation.

I have seen countless instances in which the polygraph has been invaluable to both employees and employers. Therefore, I oppose outlawing the use of the polygraph in the private sector, as H.R. 1524 and H.R. 1924 would do, but I do support legislation which would provide strict guidelines for examiners and strong protections for the rights of the examinees.

I believe that guidelines for examiners and protections for examinees are essential to protect both employees and employers. I also believe that it is the responsibility of the states to enact and enforce such legislation. States have the Constitutional right and duty to regulate the businesses and industries that provide goods and services to their citizens. They license doctors and dentists, insurance and real estate brokers, utility companies, and numerous other trade and professional groups. The states are accepting this responsibility and, to date, at least 30 of them have passed legislation regulating the use of polygraph examinations and licensing of polygraph examiners.

The right of the states to govern themselves should be respected. Legislators throughout the country are working to develop legislation which:

- protects the rights of those taking the examinations

- establishes training and educational guidelines for examiners

- sets guidelines for the type and quality of equipment used during the examination

- restricts the types of questions asked during the examination. Questions would be prohibited involving political or religious beliefs or

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*Testimony of Lawrence W. Talley, Chairman, Georgia State Board of Polygraph Examiners, Vice President of Risk Management, Days Inns of America, Inc., Vice President-Private, American Polygraph Association, before the Employment Opportunities Subcommittee, Committee on Education and Labor, U.S. House of Representatives, September 18, 1985.

affiliations, opinions involving racial matters or sexual preferences, and beliefs, affiliations, or lawful activities regarding unions or labor organizations.

In my professional career, I have had an opportunity to gain extensive experience with the use of the polygraph. I believe it is an important investigative tool. In my opinion, Congress acted correctly when it voted 333-71 to support expanded use of the polygraph in protecting national security. The directors of our government's intelligence agencies, such as the Naval Intelligence Agency and the National Security Agency, have said that the polygraph is a legitimate investigative tool that is valuable in helping them to carry out their mission. American business also needs this tool to carry out its responsibilities to protect the health and welfare of millions of American consumers as well as to protect billions of dollars in company and stockholder assets.

In 1975 in my own company, we were experiencing internal losses which amounted to over $1 million annually. By instituting a loss prevention program which uses the polygraph technique, we have been able to reduce those losses to an average of $115,000 a year. While losses have been reduced to about one-eighth of the 1975 figure, company revenues have tripled. We also have experienced more than $1 million in restitutions made by employees.

At Days Inns, the polygraph has shown such positive results over the last ten years, employees readily volunteer to take polygraph examinations when a question of honesty occurs. The polygraph identifies more honesty than dishonesty, and exonerates honest employees who are wrongly accused of misconduct on the job.

Besides the polygraph's value in protecting employees, customers, and company assets, many American businesses use the polygraph to pre-screen persons they are considering hiring. This helps them to select employees who will have a special responsibility to the public, such as:

- day care centers, who must be especially careful in screening child care personnel

- banks, where 84% of losses are attributed to internal theft

- nuclear facilities, whose employees have access to lethal and valuable substances.

In my own industry, the lodging industry, courts across the nation are awarding huge punitive damages against hotels for improperly screening employees who commit crimes against guests.

In addition, the nation's pharmaceutical manufacturers, distributors, and retailers have an important responsibility to protect their products. The Drug Enforcement Administration, which endorses the use of polygraphs, says that half a million to a million doses of legal drugs vanish from inventories each year. These legal drugs can be twice as lethal as illegal drugs. The DEA says that 350,000 Americans are killed or injured each year by legal drugs which are improperly or illegally consumed. This

compares with 150,000 who die or are injured each year from using illegal drugs.

From the standpoint of the consumer, the polygraph is an important tool in controlling prices. The National Association of Chain Drug Stores estimates that consumers pay 10-15% more for goods because of internal theft. The polygraph helps in isolating those few employees who violate their employers' trust, enabling businesses to control losses and therefore costs.

The polygraph also protects the many honest employees who may be accused or implicated in a crime, but who have no other way to prove their innocence than by taking a polygraph examination. I have seen many instances where employees were wrongly accused, often by fellow employees, of crimes that they did not commit. The willingness of these accused employees to take a polygraph to prove their innocence has shown that they, too, respect its value.

Even though the polygraph is considered to have an 85-85% accuracy rate, the polygraph profession strongly discourages employers from using the test results as the sole basis for employment or continued employment. The polygraph is a valuable investigative tool that should be used in conjunction with other methods to gauge an employee's honesty.

The polygraph's value has been demonstrated to me repeatedly, and I hope that I have been able to convey to the committee some of my respect for its usefulness.

Over the past 15 years, at least 100 studies have been conducted by scholars, scientists, and polygraph practitioners concerning the accuracy of the polygraph technique. Based upon a responsible reading of these results, the polygraph has been shown to have an accuracy rate of 85-95%.

I believe that the Office of Technology Assessment, in its 1983 report, distorted its results by using inaccurate statistical methods. We encourage a repeat of that study to present a more realistic picture of the polygraph's accuracy. In 1984, the Department of Defense released a report entitled "The Accuracy and Utility of Polygraph Testing." We believe this report is more thorough than the OTA study.

Last year, there were widely publicized hearings in the State of Georgia concerning polygraph legislation. At that time, fewer than ten individuals came forward with complaints alleging polygraph abuse in spite of the thousands of polygraph tests that are given each year. At the time of those hearings, I challenged the American Civil Liberties Union to document its claim that the ACLU is inundated with complaints about polygraph abuse. I am still waiting for that documentation.

I appreciate the opportunity to testify today and would be happy to provide the Committee with data supporting any of the points that I have made.

Whether protecting customer trust, company assets, or employee integrity, many American businesses have found the polygraph to be a valuable

tool. I believe in the accuracy of the polygraph, and I support the right of American business to have the same access to this investigative tool that the Federal government has. Further, I believe that the authority to regulate polygraph examinations and the licensing of examiners should be with the states.

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STATEMENT OF THE AMERICAN SOCIETY FOR INDUSTRIAL SECURITY

CONCERNING THE POLYGRAPH PROTECTION ACT OF 1985
(SENATE BILL S. 1815)

PRESENTED TO THE COMMITTEE ON LABOR AND HUMAN RESOURCES
OF THE UNITED STAES SENATE

By

E.J. Criscuoli, Jr.

Mister Chairman and Members of the Committee:

I am E.J. Criscuoli, Jr., executive vice president of the American Society for Industrial Security. My written statement at this time is on behalf of the officers, directors, and members of the American Society for Industrial Security (ASIS). Prior to becoming the Society's executive vice president, I was employed for more than twenty-five years at various management levels in the field of security in both the private and public sectors. Eighteen of those years were with one of the nation's largest corporations with plants located throughout the world. I was also the Society's 20th President in 1974.

The Society would like, at this time, to thank the chairman of this committee for the opportunity to present our written concern in an area that affects not only the private security sector--dedicated to protecting the personnel, property, and information of business and industry--but also the interests of the public at large.

Putting S.1815 in its Proper Perspective

Crime against business is an insidious and growing problem in the United States, one with which we at ASIS are very familiar. We have witnessed firsthand the problems and losses it inflicts on both business and the public at large. Crimes against business are said to cost the American economy more than $40 billion in annual losses; some experts estimate as high as $200 billion (U.S. Chamber of Commerce). This number does not include the cost of investigating and prosecuting the offenses.

Let me assure you these losses are ultimately passed on to the consumer in the form of higher prices. An interesting point to consider is that many of these offenses are committed by insiders--men and women in positions of trust who abuse their positions largely for personal gain.

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Business has an obligation to both its stockholders and the public to insure its assets and institutions will not be used to the detriment of our society.

To prevent members of this Committee from downplaying the scope and seriousness of this problem, I would like to cite the following illustrations:

According to the American Bar Association (ABA), business computers are now being used to embezzle money, alter data, and defraud corporate stockholders for up to $730 million annually. These losses reflect only the tip of the iceberg, since many business crimes often go unreported. Seventy-eight percent of those who responded to an ABA survey noted "the perpetrators were individuals within their organization." (ABA)

A survey of 5,127 banks and 854 insurance companies by the EDP Fraud Review Task Force of the American Institute of Certified Public Accountants (AICPA) found many of the thefts and other losses the private sector suffers can be atributed to dishonest employees. Insiders were found to steal assets, data, and other valuables; losses per incident ranged up to several million dollars (American Institute of Certified Public Accountants).

A national survey by the accounting firm of Arthur Young found employees, not shoppers, are the leading cause for mounting losses in the retail industry: the numbers were placed at more than $2 billion a year. To carry their losses, retailers simply raise their prices. As a result, each consumer in the United States pays an extra $300 annually in higher retail prices (Stamos).

A Babaco Alarm Systems, Inc. survey of sixty randomly chosen cargo thefts discovered losses averaged $50,000 per incident during the first four months of 1985. Textiles, clothing, food, business equipment, and jewelry were the leading targets. The survey also stated cargo theft from motor vehicles costs American businesses more than $500 million annually in losses ("Executive Briefing").

A survey by Opinion Research Corporation found one in four employees in leading United States companies was hired on the basis of a doctored resume ("Executive Briefing").

The diversion of drugs to black market sources is said to cost the pharmaceutical industry $1 billion annually in losses. One such scam bilked a large New Jersey-based pharmaceutical firm out of more than $1 million ("Tracing...").

According to the U.S. Chamber of Commerce, the annual losses from embezzlement and pilferage are said to exceed those sustained throughout the nation from burglary and robbery by several million dollars. Embezzlement and pilferage are insider crimes (U.S. Chamber of Commerce).

A survey of 172 known cases of fraud and abuse involving insiders by the Office of Inspector General for the U.S. Department of Health and Human Services found losses per incident ran as high as $177,383 (U.S.HHS).

Crimes against business translate into higher prices and taxes, bankruptcies, and loss of confidence in our free enterprise system. The polygraph and other investigative screening instruments must be viewed in the above contexts. Unfortunately, the private sector has no other recourse but to turn to existing technologies to safeguard the public and the nation. To remain competitive, America's businesses must by necessity provide reasonably priced goods and services. Dishonest insiders make this difficult.

In 1985, more than 2,000 men, women, and children lost their lives to aviation accidents, but no reasonable person would call for an end to air travel. Except for scant reference to several abuses, no one has yet demonstrated any lie detectors cause irreparable harm. Yet we are now confronted with legislation that would curtail the private sector's option to use existing technologies to safeguard the public's interest. We oppose such efforts.

Arguments in Support of S.1815 are Flawed

On March 7, 1985, Representative Pat Williams (D-MT) introduced the Polygraph Protection Act (H.R. 1524) on the House side. He was joined by 165 cosponsors, including twenty Republicans. On October 28, 1985, Senator Orrin G. Hatch (R-UT) introduced a Senate version of the bill (S. 1815). If enacted, the Polygraph Protection Act of 1985 would outlaw the use of lie detectors in the private sector. This legislation would include not only polygraphs, but also deceptographs, voice stress analyzers, psychological stress evaluators, and other devices. It would also provide for fines of up to $10,000 for any person found to be violating its provisions. Enforcement power would rest with the U.S. Department of Labor and the Secretary could seek a court order to restrain any employer from violating the act. In addition, an individual could bring an action against an employer who violated the act.

A review of the testimony presented to the Congress by supporters of the Polygraph Protection Act of 1985 can best be summarized as follows:

- More than 50,000 men and women (out of one million) are administered the test annually, fail it, and thus jeopardize their careers.

- Polygraphs are inaccurate; their correct guilty detections range from about 35 to 100 percent.

- Polygraphs are used to harass and intimidate union employees and organizers.

- State courts and legislatures cannot adequately regulate the industry, thus making it necessary for federal intervention.

We at ASIS find no substance for these arguments. To be candid, they are flawed. We say this not because our members have a vested or financial interest in lie detectors, the overwhelming majority of our members do not, but rather because our review of the existing literature and our own experts tell us otherwise.

We will address the above arguments and then proceed to our own position. First, it can be stated categorically no one in the United States really knows how many lie detector tests are administered annually in the private sector, nor does anyone really know how many persons fail these tests each year. At best, the figures presented are an educated guess. They are not based on any hard data.

Secondly, their experts are no better than ours on the issue of the accuracy of polygraphs. The record is replete with judicial decisions allowing for the admission of polygraph evidence at both the federal and state levels. Further, if some Congressional members are really concerned about the scientific reliability of lie detectors, why exempt the Federal government from the provisions of the Act? Why adapt (H.R. 1529) an amendment by Representative Dennis E. Eckort (D-OH) to allow companies that manufacture drugs to use lie detectors in cases involving missing or stolen narcotics? It would appear polygraphs are only scientifically reliable when used by those companies or industries Congress chooses to exempt. We disagree, and take the position that like any technology, lie detectors are only as reliable as the persons that administer the examinations.

We also disagree with the contention local government cannot regulate the licensing and use of lie detectors. More than thirty states now have laws requiring the licensing or certification of polygraph examiners. Another twenty states and the District of Columbia have enacted laws that regulate an employer's use of the polygraph (Paterson).

The courts have demonstrated a willingness to enforce these laws. For example, in the Case of Cook v. Rite Aid Corporation, the Maryland Court of Special Appeals ruled in favor of an employee who had argued she had been administered a test in violation of state law. The court upheld an award of $1.3 million in damages (Tucker). This decision was hardly an indication local government is neither willing nor able to regulate the use of lie detectors.

I should also add none of the states or their representatives have asked for any federal assistance or intervention in this arena. No local government unit has asked Congress to intervene and establish an added layer of bureaucracy in a sphere the states have demonstrated both the ability and willingness to regulate. The present legislation constitutes an infringement on state rights in a field the states have historically regulated with success.

We at ASIS firmly believe the existing state machinery is more than adequate to regulate the licensing and administration of lie detector tests. Creating an additional bureaucratic layer at the federal level is unnecessary and constitutes an added expenditure of taxpayer dollars. These funds could be better used elsewhere.

The act also makes criminals out of millions of business people, especially individuals owning smaller businesses that often rely on polygraph testing to safeguard their assets as well as the health and welfare of the general public. For example, think of the havoc maladjusted employees in key positions could cause the hotel/motel, hospital, and

restaurant industries if not properly screening. The existing state machinery is both adequate and in place to do the job. We ask why you would want to dismantle a regulatory edifice that apparently works well?

The Question is One of State Rights

If S.1815 is eventually enacted into law, under the doctrine of preemption, it will overrule more than forty years of state regulation and judicial decisions. Specifically, S.1815 and its companion bill H.R. 1524 pose a direct challenge to both state rights and the federal system. For if we agree lie detectors need federal regulation, then why not apply the same argument to the state licensing and regulation of other professions, the registration of automobiles, or other health and safety-related fields. Carried to its logical conclusion, the argument would signal the demise of meaningful state governance. It could threaten the political power base of states that has served the nation so well.

More than twenty states now regulate the manner in which private employers employ polygraphs; more than twenty-five states now regulate and license examiners. The following examples indicate states have long recognized the value of the judicious and ethical use of polygraphs:

- An examiner is required to inform an examinee in advance as to the nature of the examination.

- Limitations are placed on the subjects about which an examiner may ask. For example, questions regarding an examinee's political, religious beliefs or sexual behavior are prohibited.

- Examiners found to violate state laws can have their licenses suspended or revoked. They may also become the target of a lawsuit (Food Fair, Inc. v. Anderson).

- Examiners are also prohibited from interfering with the lawful activities of union organizers.

Employers historically have had the right to expect their employees to act in a lawful manner. Is it reasonable for an employer to weed out thieves, drug dealers, and other malcontents from sensitive positions in the workplace? What reasonable person would oppose private efforts to bar a child molester from a day-care center or drug addict from a hospital pharmacy? Would anyone want an embezzler to handle multimillion dollar EFT transactions? To screen these individuals requires the use of technology; lie detectors have proven themselves to be an economical and reliable vehicle.

The courts seem to agree with our position that lie detector tests, when properly employed, can prove both valuable and reliable. The following decisions give some examples:

- The Alabama Supreme Court ruled an employer can rightly dismiss an employee who refuses to take a polygraph test during an in-house criminal investigation (Smith ...).

- Arizona courts have upheld the use of polygraphs;("Larson ...") as have those courts of Missouri ("NLRB...").

- Federal courts in North Carolina have allowed the results of polygraph tests in evidence ("Jackson ...").

- The U.S. Seventh Circuit Court of Appeals also allows such evidence at the discretion of the trial court (U.S. v. Penick).

- The U.S. Sixth and Eighth Cirucits have taken the same stance ("Poole ...").

State Regulation Works

Many states have taken steps to ensure lie detectors are used judiciously. State laws now provide civil remedies for any person wronged by the misuse of lie detectors. Lawsuits for libel, negligence, and malpractice against examiners and employers are now common. The following examples show the courts are willing to uphold cases that have merit:

- An Indiana court allowed an employee who was fired after failing a polygraph test to sue for negligence ("Lawson ...").

- A Michigan court awarded the plaintiff a $150,000 libel judgment, and a Minnesota court upheld a jury verdict for $60,00 in damages ("Kamrath ...").

- Both New York and Pennsyvlania allow actions against employers who fail to administer a polygraph examination within the confines of their statutes ("Zampatori ...").

- Courts have also recognized Title VII claims against employers in this arena ("Smith ...").

Given the above, one cannot really say employees are deprived of their civil rights by employers armed with polygraphs. It may make for good cinema, but it bears little resemblance to reality. Employees have adequate remedies under state laws. They also have the option to move to amend these laws. The following evidence demonstrates that statement:

- An examinee must be informed the test is voluntary.

- An examinee may refuse to answer any questions posed during the course of an examination.

- An examinee must be provided with the results of the test upon request.

- An examinee must be given an opportunity to explain his or her reaction or behavior.

The states have also imposed tight controls for licensing examiners. For example, an applicant for a license must demonstrate both educational and professional achievements, as well as be morally fit. Further, an

examiner who is convicted of a misdemeanor, demonstrates unethical conduct, or fails to post a surety bond can have his or her license suspended or revoked. The state regulators can also initiate an investigation if an examinee files a formal complaint.

States have demonstrated both an ability and willingness to safeguard employees from polygraph-related abuses. The courts have also recognized the value of this technology when properly employed. Why change things?

Conclusion

We at ASIS have never taken the position polygraphs are foolproof. On the contrary, the polygraph, like any other technology, suffers from occasional mishaps. However, our position is efforts should be directed at improving them, rather than preventing their use.

Employers are only human. Their primary concern is how best to serve the public and, at the same time, stave off foreign competitors. Unfortunately, the legislation not only serves to undermine these efforts, it also denigrates the valuable role of business in our society. In addition, the bill undermines the traditional role of the states in our political edifice.

In closing, we at ASIS are most grateful to you, Mr. Chairman, and other members of the Committee for the opportunity to make this statement. We also reserve the right to submit additional statements. Further, we request we have the opportunity to offer verbal testimony when the Committee holds hearings on S.1815. Thank you.

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PUBLICATIONS AVAILABLE

Truth and Science, A Bibliography, 2d edition by Norman Ansley, Frank Horvath and Gordon Barland. This volume is an essential reference tool in researching Detection of Deception. Listing over 3,000 entries, the volume is indexed by subject, journal and co-author. ($8.00 postpaid.)

Justice and the Polygraph, 1985, by Norman Ansley and Janet Pumphrey. This book was originally prepared for the House Hearings of the Subcommittee on Employment Opportunities. This second edition, with thorough indexing, features seven chapters on Innocent Persons; Guilty Persons and Polygraph Examinations; Employers Use of the Polygraph; Probation and Parole; Specific Investigations of Espionage; Suitability Statistics from the U.S. Department of Defense; and Surveys in Law Enforcement and Commerce. (Members $6.95; Non-Members $9.95).

Quick Reference Guide to Polygraph Admissibility, 1985, 10th edition by Norman Ansley. A handy reference guide to the 50 States, U.S. Circuits, District of Columbia, U.S. Territories, and Military Cases. (Members $3.95; Non-Members $4.95).

Reprint: The Accuracy and Utility of Polygraph Testing by the Department of Defense, Washington, D.C., 1984. This is an analysis of the scientific literature on the accuracy of the polygraph with supporting information on use and utility. ($8.00).

Send check payable to "American Polygraph Association" to APA Publications, P.O. Box 1061, Severna Park, Maryland 21146. Please print or type your mailing address. Orders will be shipped within 48 hours.

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INSIDE THE CRIMINAL MIND

Times Books, 3 Park Avenue, New York, N.Y. 10016
285 pages, $15.50
By
Stanton E. Samenow

A BOOK REVIEW

By

Anita M. Collector*

Three cheers for Dr. Stanton E. Samenow, Clinical Psychologist and author of Inside the Criminal Mind. He has made a pioneering contribution to society through a form of correctional therapy that is proving to be successful, where others have failed. He presents a solid insight into the causality of criminal behavior--that criminals are basically getting away with murder (so to speak).

In each chapter, Dr. Samenow progresses through the life of the criminal beginning with his family, manipulation of others to his own advantage, and finally either to rehabilitation or further regression. Dr. Samenow has introduced a form of therapy based on the premise that the criminal thinks differently from law abiding citizens and will continue to be maladjusted unless his thinking patterns are altered. This form of therapy is one in which the criminal patient takes an active role in effecting positive growth, and accepts sole responsibility for his actions. Dr. Samenow strongly asserts that all former beliefs, assumptions and therapies dealing with the criminal mind are erroneous. He believes that there are certain basic myths associated with criminals. For example, 1) Criminals are victims of an oppressive society, 2) Television violence begets real life violence and 3) Criminals are strangely different from others because they are ignorant of what is right and wrong. The final chapter contains recommendations for new ways of dealing with the criminal; for example, training counselors in this form of therapy and providing more adequate probationary measures.

Although this book is written by a psychologist, it is unpretentious and devoid of technical terminology and creates worthwhile reading for a wide range of audiences. Polygraph is not mentioned, but a polygraph examiner's knowledge of Samenow's findings and his insight into criminality would certainly be beneficial in understanding criminal examinees.

For anyone who must encounter deviant behavior, this book is likened to an elementary primer--a novel and ingenious outlook on rehabilitating society's misfits. It is about time someone has recognized the active role of the criminal mind, the ensuring destruction, and offered new hope with an effective method of rehabilitation.

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*The Reviewer has an M.A. in Clinical Psychology.

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ABSTRACTS

Validity of the Guilty Knowledge Test

M.T. Bradley and J.F. Warfield. "Innocence, Information, and the Guilty Knowledge Test in the Detection of Deception." Psychophysiology 21 (6)(1984): 683-689.

The purpose of this detection of deception experiment was to study the assumption of the Guilty Knowledge Test that subjects with guilty knowledge will be classed as guilty by the test regardless of their actual guilt or innocence. Prior to a polygraph examination, three groups of innocent subjects were given the same crime-relevant information as members of a group guilty of a mock crime. These innocent subjects either witnessed the crime, were told the crime details, or carried out innocent activities involving crime-relevant information. An additional group of innocent subjects had no crime-relevant information.

Analysis of the Guilty Knowledge Test results showed that the detection scores of guilty subjects were higher than those in any of the innocent groups. In fact, with the exception of the innocent activities group, the innocent informed subjects did not differ from those in the uninformed group. The major conclusion is that subjects may have crime-relevant information and not be classed, based on the detection scores, as guilty. The only physiological measure was skin resistance response.

Address requests for reprints to M.T. Bradley, Division of Social Science, P.O. Box 5050, University of New Brunswick, Saint John, New Brunswick, E2L 4L5, Canada.

The Importance of Answering "No."

Christopher J. Horneman and J.G. O'Gorman. "Detectability in the Card Test as a Function of the Subject's Verbal Response." Psychophysiology 22(3)(1985): 330-333.

The study compared, in a within-subjects design, the effect on electrodermal responsiveness of the subject affirming, denying, or making no response to questions about the card selection in a laboratory test of deception. Contrary to previous findings, denying that a card had been selected led to greater responsiveness and an increased likelihood of correct detection.

Address requests for reprints to J.G. O'Groman, Department of Psychology, University of New England, Armidale, Australia 2351.

Nonverbal Detection of Deception

Miron Zuckerman, Richard Koestner and Michele J. Colella. "Learning to Detect Deception From Three Communication Channels." Journal of Nonverbal Behavior 9(3)(Fall 1985): 188-194.

A videotape of senders delivering truthful and deceptive messages was administered to subjects via one of three channels: Face only, speech only, or face plus speech. Feedback information, identifying the messages as truthful or deceptive, was given to some subjects (learning condition) but not to others (control condition). It was found that subjects in the learning condition performed better overall relative to control condition subjects, regardless of the channel presented to them. However, accuracy of subjects, in the learning condition improved progressively over the course of the test, relative to control condition, for the speech only and face plus speech channels but not for the face only channel. This effect was interpreted in terms of the limited number of deception cues offered by the face. [author abstract]

Requests for reprints should be sent to Miron Zuckerman, Department of Psychology, University of Rochester, Rochester, New York 14627.

Pulse Transmit Time

Yukihiro Sawada and Ken-ichi Yamakoshi. "A Correlation Analysis Between Pulse Transit Time and Instantaneous Blood Pressure Measured Indirectly by the Vascular Unloading Method." Biological Psychology 21(1) (August 1985): 1-9.

Linear correlation coefficients (r) between pulse transit time (PTT) and blood pressure (BP) were evaluated on within-subject by within-condition level. Beat-to-beat systolic and diastolic BP was measured noninvasively using the vascular unloading technique (Yamakoshi, Shimazu and Togawa, 1980). PTT was determined from the time interval between the R-wave of ECG and the peak of the finger pulse wave. Five male subjects underwent a 2 minute resting (RE), a 1 minute cold pressor test (CP), eight 15 second anagram tests (AN), and another 1 minute CP. Significant r values were most frequently obtained for systolic BP and PTT in the RE condition. Under the CP or AN conditions, no consistent tendencies were observed. It was suggested that none of the r values are sufficiently high to warrant the use of PTT as an alternative index of BP. Some factors lowering the r values were discussed. [author abstract]

Caffeine and Heartrate/Rhythm

David J. Sutherland, M.D.; David D. McPherson, MD.D.; Kenneth W. Renton, Ph.D.; C. Anne Spencer, B.Sc.; and Terrence J. Montague, MD.D. "The Effect of Caffeine on Cardiac Rate, Rhythm, and Ventricular Repolarization." Chest 87(3)(March 1985): 319-324.

To determine clinical electrophysiologic effects of a moderate dose of caffeine, we compared prevailing cardiac rhythm and rate, the prevalence and frequency of ventricular dysrhythmia, and Q-T intervals in two populations over an initial 24-hour caffeine-free period and a subsequent 24-hour period in which caffeine was ingested in a dosage of 1 mg/kg of body weight at intervals of one half-life during waking hours. Group I was composed of 18 clinically normal subjects; group 2 was 18 subjects with frequent ventricular ectopic beats (VEBs) and no (n=16) or minor

(n=2) cardiac disease. Sinus rhythm was the prevailing rhythm in all subjects at all times. For group I, the mean sinus rate during the caffeine-free period was 77 +/- 10 beats per minutes, compared to 73 +/- 9 beats per minute during the period of caffeine ingestion (not significant). Similarly, for group 2, the average sinus rate during the caffeine-free period was 76 +/- 11 beats per minute, not significantly different from the average sinus rate during the test period, 76 +/- 11 beats per minute, not significantly different from the average sinus rate during the test period, 76 +/- 10 beats per minute. During abstention from caffeine, four of 18 subjects in group I had infrequent (<1/hr) VEBs, compared to nine of 18 during caffeine ingestion (not significant). In group 2, some 16 of the 18 subjects had VEBs during the caffeine-free period, with the frequencies varying from less than one VEB per hour to 1,449 VEBs per hour. During the test period, 14 of the 18 subjects in group 2 increased their VEB frequency, and the group's mean frequency rose from 207 +/- 350 VEBs per hour (control period) to 307 +/- 414 VEBs per hour (test period) ($p < 0.01$). The Q-T interval in group 1, measured as the corrected Q-T interval (Q-T), averaged 0.430 +/- 0.027 during the caffeine-free period, not significantly different from the test period (0.425 +/- 0.019). The comparable Q-T values for group 2 were 0.424 +/- 0.018 during the caffeine-free period and 0.433 +/- 0.025 for the period of caffeine ingestion (not significant). Thus, these data suggest that in moderate doses and in the absence of major underlying cardiac disease, caffeine does not significantly affect prevailing cardiac rhythm or rate, nor the mean rate of ventricular repolarization; however, the data also suggest, that caffeine can have a ventricular dysrhythmogenic effect, and although the clinical significance is still not completely certain, it seems reasonable to use it with caution in patients who may be at increased risk from ventricular dysrhythmia.

For reprints write to Dr. Terrence J. Montague, Victoria General, Halifax, N.S., Canada B3H 2Y9.

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American Polygraph Association pamphlets:

APA Pamphlet - a handout explaining the American Polygraph Association and the polygraph profession. (Single copy is free upon request with a self-addressed stamped envelope, letter size. Bulk rates: 10¢ each.)

Polygraph: Issues and Answers by Joseph P. Buckley is an eight-page pamphlet aimed at essential facts about the polygraph. ($2.00 each, mailed first class).

Request copies from APA Publications, P.O. Box 1061, Severna Park, Maryland 21146.

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