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# CONTROL QUESTION TESTS BY POLICE AND LABORATORY

# POLYGRAPH OPERATORS ON A MOCK CRIME AND REAL EVENTS

Bу

## M.T. Bradley, M.E. Cullen, and S.B. Carle

#### Abstract

Male and females, truthful or deceptive, were examined about a real life embarrassing story or a laboratory mock crime with control question detection of deception tests. Examinations were conducted either by a police or a laboratory trained polygraph operator. Deceptive subjects were relatively more reactive to event relevant questions than control questions whereas innocent subjects were more reactive to control questions. With skin resistance response and cardiovascular measures, subjects examined by the police scored more towards innocence whereas those tested by laboratory investigators scored more towards guilty. Such a result could mean that laboratory investigators when mistaken would have a tendency to classify innocent people as guilty, whereas, the police when wrong would tend to classify the guilty as innocent.

There are many difficulties in assessing the validity of polygraph tests (Ben-Shakhar & Furedy, 1990). From the perspective of some researchers (Ben-Shakhar & Furedy, 1990), tests, such as the commonly used Control Question Test (CQT), are inherently flawed and are not amenable to scientific evaluation. The view of the present authors is that adequate experimental evaluation is possible but difficult. One problem involves the establishment of settings appropriate for measuring polygraph outcomes in a meaningful way. Choices for this are between the field or laboratory.

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#### Police and Laboratory Polygraphers Compared

The CQT has been the subject of both field and laboratory studies but problems particular to both settings prevent resolution of validity issues. A problem for any field study is that it is difficult to verify the "ground truth" of who is actually guilty or innocent by satisfactory criteria outside of the polygraph test (Forman & McCauley, 1986). "Ground truth" can be known in laboratory studies because subjects are assigned to their conditions but, of course, the situations are not real. The assigned conditions involve being "guilty" or "innocent" of enacted "mock crimes." Usually students are the subjects and there are no important consequences contingent on the outcome. The lack of realism may not allow for results to be generalized to the field.

Reviews (Ben-Shakhar & Furedy, 1990; Iacono & Patrick, 1988; and Saxe, Dougherty & Cross, 1985) of selected studies point out in detail the problems that limit comparability and generalizability of laboratory studies to field situations. The laboratory crime is a simulation. Simulations often involve relatively small incentives and no punishment. The population examined are usually students who have volunteered to participate. Any lies are contrived through following a mock crime scenario. Laboratory examiners, although highly trained in psychology, psychophysiological measurement and general testing, may have little experience with criminal polygraph work or criminal interrogation. By contrast, in the field, the crimes are real. The incentives and threats can be of the most important nature, the population varies from the hardened criminal to the first time offender, and the examiners typically have much criminal investigation experience.

Various researchers have attempted to avoid generalization problems by studying field situations directly. In some field studies, attempts have been made to establish "ground truth" by verifying polygraph outcomes by criteria outside of the test. Barland and Raskin (1976) and Bersh (1969) used legal experts who did not have knowledge of polygraph outcomes but instead judged the guilt of criminal cases on the basis of all other investigative knowledge. The rate of agreement between expert judgments and polygraph test outcomes was high. The polygraph examiner had the same information prior to the original polygraph exam and may have used this information to come to the same conclusion as the other experts. Their preconceived notions could have influenced polygraph test procedures and scoring. Under such circumstances, a high level of agreement between the experts and the examiner would not be surprising.

The confession has been used to verify field outcomes (Horvath, 1977; Hunter & Ash, 1973; Kleinmuntz & Szucko, 1984; Slowik & Buckley, 1975). This is problematic because confessions are not usually independent of polygraph outcomes. Suspects likely to confess are those found guilty by the test. Guilty suspects found innocent are not likely to reverse that favorable but incorrect outcome by confessing.

Ginton, Daie, Elaad and Ben-Shakhar (1982) used a quasi-experimental approach to test policemen in a real situation with potentially important consequences. Twenty-one policemen participating in a course were given an opportunity to cheat and improve their scores in an important test. Cheating could be discovered through the use of a chemically sensitive page on the test sheet. Seven cheated and all were to be interrogated on the polygraph under the contingency outcome. By the time of the test, because of refusal to take the test or confession, only two guilty and thirteen innocent subjects were available for examination. Considering cases where a judgment was made, original examiners achieved a 92 to 93% accuracy level, depending on the evaluation technique used. This high level of accuracy was not obtained, however, when blind chart evaluations were made. The results at 60%, were lower.

The study by Ginton, Daie, Elaad and Ben-Shakhar (1982) presents an example of problems of the type inherent in quasi-experimental designs. Guilty and innocent subjects freely selected their conditions and then elected to take or not take a polygraph test. Thus, the test conditions, especially the guilty condition, with only two subjects contained small numbers of self selected subjects. The small numbers problem in this particular study was then compounded by the inconsistency of results over scoring occasions.

Given difficulties in every approach, it is perhaps not surprising that an adequate resolution of validity issues has remained elusive up to this date. This type of problem, however, is not new to psychology. For many years, issues related to finding adequate field and laboratory testing conditions have been of central concern to social psychologists (Bickman & Henchy, 1972; Campbell & Stanley, 1967). In practice, although no satisfactory resolution has been obtained, all approaches have value depending on how well an area is understood (Greenberg & Folger, 1988). The pessimism expressed by Ben-Shakhar & Furedy (1990) that mock crime experiments fail completely to satisfy external validity concerns is in our view unwarranted. McCauley & Forman (1988) have shown there is little difference between results of field and laboratory studies except in the number of inconclusive judgments reported. In their view, mock crime studies provide information to solve some issues.

Although realism differences between the field and laboratory are multifaceted, it seems that some aspects of realism can be operationalized in the laboratory to correspond directly to real situations. Bradley and Cullen (1993) looked at one type of real event that was suitable for laboratory study. They examined subjects on embarrassing events that had occurred in their life and that had a strong emotional impact on them. Each story, which for ethical reasons, had to be non-criminal, involved events that subjects preferred no one knew of and they would rather deny. Each subject was examined with CQTs on two stories, one of which was from their life and the other was from another subject's life. They denied involvement in both stories. Subjects were accurately classified as deceptive in denying their own story and truthful in denying the other story. The results demonstrated that real life stories could be used in the laboratory. The overall classification accuracy rate was 78%.

In the present study, the testing of real events was compared to the testing of mock crimes. Another purpose was to compare test results done by real police examiners with those done by laboratory examiners in both types of situations with both types of examiners performing under the same laboratory conditions.

Two police officers trained by the Polygraph School of the Canadian Police College in the early 1980's conducted examinations in this study. Their work since their police school training has been in the use of the CQT for criminal investigation. In a way comparable to the laboratory examiners, the police officers agreed to operate in our laboratory with our equipment and blindly examine subjects solely on the basis of knowing only the details of the mock crime or the particular embarrassing story to classify whether subjects were deceptive or truthful about their role in these events.

Because field workers typically report higher levels of accuracy than those reported by laboratory investigators and because Horvath and Reid (1972) showed that examiners with extensive practical experience were more accurate than less experienced examiners, it was expected that subjects examined by police officers would be more accurately classified than subjects examined by laboratory workers. Predictions of difference are less certain with the different scenarios. Embarrassing stories, although not crimes, because they are at least real, emotionally evocative, and memorable for the person involved, may provide conditions closer to those of the field than provided by the enactment of an artificial mock crime. A potential interaction effect could emerge since the police were more experienced with real events and the laboratory workers with mock crimes. Each type of examiner could be at optimal accuracy when testing subjects in scenarios with which they are experienced.

### Method

### Subjects

Sixty male and sixty female introductory psychology student volunteers participated for a bonus course credit. Prior to volunteering, they, through a consent sheet, were informed of most of the experimental requirements. A sensitive issue highlighted in the form involved the fact that an experimental assistant would know the names of subjects and their embarrassing incidents.

#### Apparatus

A Lafayette model 760-566 polygraph was used to record skin resistance responses (SRR) and respiration. Skin resistance was measured by standard Lafayette zinc chloride electrodes. After the skin had been cleaned with a cotton swab dipped in alcohol, the electrodes were attached to the medial phalanges of the first and second fingers. Respiration, both thoracic and abdominal, was measured by a standard Lafayette pneumatic chest assembly. Cardiovascular responses were recorded through the use of a lafayette blood pressure cuff set at 40 to 70 mm of pressure. Baseline and sensitivity levels were adjusted individually.

# Procedure

Twenty-one male and twenty-three female volunteer subjects were asked to write out in some detail a true, very embarrassing incident about which they would really rather not tell anyone. The stories were read for clarity and understanding. Eleven stories were discarded because they were either unclear or dealt with very trivial incidents. Two well-written stories, one dealing with a violent rape and the other with a suicide were also not used. The events in these two stories were excellent in regard to the purpose of the study but the senior experimenter,

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in consultation with the university ethics committee, was concerned that the content as too upsetting. The 15 male and 15 female authors of the selected stories were contacted and polygraph examination sessions were arranged. An equal number of subjects were contacted who had not written a story. They were examined on one of the stories generated by the first group of subjects. Subjects who appeared truthful on the subsequent polygraph test received \$20.00.

A second set of subjects followed instructions leading them to be guilty or innocent of a mock crime murder. Guilty subjects were asked to go into a room labelled hotel, pick up a gun from the window ledge, and shoot a mannequin wearing a red shirt three times in the chest. The mannequin was wearing a name tag with "Bob" written on it and had \$15 in his shirt pocket. Guilty subjects stole the \$15, put the money in their footwear, hid the gun in a wastebasket and left the room. They had about 10 minutes to complete their task and once done they went to a room to await the return of an experimenter who arranged for a polygraph test. Subjects were told that if they appeared innocent of the crime they would receive \$20.00.

The instructions for the innocent subjects informed them that they were murder suspects and, although they had no alibi to account for their activities, they were given a chance to prove their innocent on the polygraph. These subjects were informed that they would receive \$20.00 for a judgment of innocent on the polygraph test.

All subjects were reminded that during the polygraph examination they were to deny their involvement in the mock crime or the embarrassing incident. In that way, half of the subjects were deceptive and half were truthful about the events. Subjects were reminded at this point that they could receive \$20.00 for a judgment of innocent whereas they would not receive money if they were judged guilty.

The polygraph examinations, either done by the police or by a laboratory examiner blind to whether the subjects were attempting deception or not, were all carried out in the same university laboratory room. Both the police examiners and the laboratory examiners used the same polygraph as described in the apparatus section. The CQT was in a standard format for the Canadian Zone CQT taught by the Polygraph School of the Canadian Police College. There were 10 questions for all exams. The first 3 three questions and question number 8 could be considered general orientation questions and required a yes answer to appear truthful. Scored questions were arranged in control and crime relevant pairs with the control question always given before the crime relevant question. The control and crime relevant pairs were numbered 4 and 5, 6 and 7, and 9 and 10 respectively. These questions required the subjects to answer no to appear truthful. The mock crime Control Question Test was as follows:

- 1. Is your last name \_\_\_\_\_?
- 2. Regarding the crime, do you intend to answer all questions about it truthfully?
- 3. Are you convinced that I will only ask questions on this test that we have already okayed?
- 4. Before the age of 18, did you ever steal any money?

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- 5. Did you take the money from the body of the man?
- 6. While you were in school, did you ever steal anything of value?
- 7. While you were in the hotel, did you shoot the man?
- 8. Is your first name \_\_\_\_\_?
- 9. Before the age of 18, did you ever physically harm anyone in any way?
- 10. Did you use the gun to kill the man?

Examiners reviewed the questions prior to the actual examination. If they answered yes to any of the control questions the examiner asked for a brief description of the event and added a phrase such as "Except for the incident(s) you described ....?" such that each control question would be answered with a "no."

In the embarrassing event groups, the CQT followed the same standard format but the event relevant questions had to be appropriate for each specific story. For example, a subject who was responsible for the injury of a little girl in her care was questioned (slightly altered to ensure anonymity) as follows:

- (1) Your first name is \_\_\_\_\_?
- (2) Are you going to tell me the entire truth in this examination?
- (3) Do you believe I will only ask the questions that we have reviewed in this test?
- (4) Have you ever cheated a friend?
- (5) Did you volunteer to take care of the two little girls?
- (6) Have you ever stolen anything of value?
- (7) Did you take the girls on a dangerous ride?
- (8) Is your last name \_\_\_\_\_?
- (9) Did you ever intentionally physically harm a friend?
- (10) Was it your fault that one of the little girls was quite seriously hurt?

The question set during the actual examination was repeated three times. After each question, approximately 20 seconds was allowed for physiological responses.

# Data Analysis

The major analyses involved  $2 \ge 2 \ge 2 \ge 2$  MANOVA and univariate analyses on detection scores derived from the polygraph recordings of cardiovascular, respiration and skin resistance measures. Gender, situations (mock crime, embarrassing events), and condition (innocent or guilty) were the independent variables. Significance for all analyses was accepted at the .05 level.

Skin resistance responses were measured at the maximum decrease in resistance in millimeters occurring within 10 seconds of the beginning of each question. To derive a numerical score, responses for control and event/mock crime relevant questions were considered in pairs; the pairs being questions 4 and 5, 6 and 7, and 9 and 10. Depending on whether the size of a response to a control question was two, three, or up to four times larger than the response to the paired event/mock crime related question, a positive one, two or three was assigned to the pair. If the response to the event/mock crime related question was larger, then, depending, on the relative difference a negative one, two, or three was assigned to the pair.

Respiration scores were derived through the use of a contour map wheel. The wheel was used to follow the curvilinear tracings that represented inhalation and exhalation and gave distance readings in millimeters. Measures were taken for 10s of chart time following question onset. Timm (1982) found respiratory suppression associated with deception. If the response to a control question was shorter than to its paired event/mock crime relevant question a  $\pm/-1$  was assigned, if longer then a -1 assigned, and if there was no difference the score was 0. The separate scores from abdominal and thoracic records were added to conform to the single respiration score format favored by the police.

Cardiovascular responses were recorded in a 20 second window. A line was established from the beginning point to the end point and absolute value deviations from that line were summed. If the deviation sum was larger, less or the same to the control question than to its paired event/mock crime relevant question a  $\pm/-1$ ,  $\pm1$  or 0, respectively, was assigned.

With three sets of questions repeated three times, for three measures a total of 27 judgments were made. Chart scores, following the scoring protocol outlined above for the measures, had the possibility of ranging from +45 (the maximum innocent score) to -45 (the maximum guilt score). If subjects scored +6 or higher they were classed as innocent; less than or equal to -6 resulted in a guilty classification. Scores between these numbers were judged as inconclusives.

### Results

A four factor multivariate analyses of variance (MANOVA) was used to examine the three dependent measures. The factors were examiners (police or lab), gender, situation (mock crime or embarrassing story) and condition (guilt or innocence). The dependent measures were SRR scores, respiration scores, and cardiovascular scores.

The multivariate test revealed a guilt innocent main effect, F(3,102) = 30.36. Univariate tests on all three measures showed that guilty subjects had scores more in the guilty direction than innocent subjects: SRR (F(1,104) = 39.76; Mg = -2.33, S.D. = 4.6, Mi = 3.12, S.D. = 4.9), respiration (F(1,104) = 13.37; Mg = -1.90, S.D. = 4.0, Mi = 1.27, S.D. = 4.5), cardiovascular (F(1,104) = 47.33; Mg = -1.20, S.D. = 2.4, Mi = 1.33, S.D. = 1.3). A multivariate examiners effect (F(1,103) = 5.31 was due to the police, more than the laboratory examiners, scoring subjects in the innocent direction on the SSR measure (Mpol = 1.98, S.D. = 4.5, Mlab = -.40, S.D. = 5.8, F(3,102) = 7.21, and the cardio measure (Mpol = 1.00, S.D. = 3.8, Mlab = -.40, S.D. = 3.2, F(3,102) = 9.20). A multivariate condition by examiner interaction F(3,102) = 5.77 was supported solely by cardiovascular scores F(1,104) = 17.40 (see Figure 1).



Figure 1 Interaction Between Conditions and Examiners With Cardiovascular Scores

Probing the interaction on cardiovascular scores in Figure 1 with Newman-Keul's procedures revealed that innocent subjects examined by the police had scores more indicative of innocence than innocent subjects tested by laboratory examiners (diff between means = 3.32, qcrit = 1.20). As would be expected from the main effects all other differences were significant except for that between guilty subjects tested by the police or laboratory examiners.

In reference to classifications, the police made more decisions by judging 75% of their 40 subjects. Laboratory examiners judged 55% of their 80 subjects,  $x_1^2 = 3.7$ . The groups did not differ in overall detection rates. The police were correct with 79% of their guilty judgments and 100% of innocent judgments. Laboratory examiners were correct with 95% and 79% of their respective guilt and innocent judgments. Classification numbers in Table 1 show more correct than incorrect classifications by both types of examiners and in both situations with significance measured by chi square tests set at p < .05 (see Table 1).

#### Table I

# Classification of Subjects as Guilty or Innocent Based on Composite Scores

Measure, examiner actual condition		and		Classi	fication		
		Correct		Incorrect		Inconclusive	
		Story	Crime	Story	Crime	Story	Crime
Composi	te Score						
Police	Guilty (40s)	5	6	2	1	3	3
	Innocent	7	$9 \\ \chi^{2}_{1}$	0 = 17.6	0	3	1
Lab	Guilty (80s)	10	9	0	1	10	10
	Innocent	6	$13 \\ x_{1}^{2}$	3 = 21.8	2	11	5

Table 2 shows what classification rates would be for the individual measures used by the police and laboratory investigators. For single measures subjects with scores between +/- 2 were considered to have inconclusive results whereas subjects with scores above or below those levels were classified as innocent or guilty respectively (See Table 2).

For all measures when a judgment was made, more subjects were classified correctly than incorrectly. For laboratory examiners with the SSR and respiration measures more subjects were judged correctly than with the cardiovascular measure,  $x_{\perp}^2 = 6.0$ ,  $x_{\perp}^2 = 4.1$  respectively. No

measure differences were found for the police. No differences were found between the police and laboratory examiners with guilty subjects but with SRR  $x_1^2 = 6.9$  and cardiovascular measures  $x_1^2 = 8.1$  the police judged greater proportions of innocent subjects correctly.

# Table 2

# Classification of Subjects on Individual Physiological Measures

Measure, examiner		and	<u></u> -	Classi	ficatior	<u> </u>		
actual condition		<u>Correct</u>		Inco	<u>Incorrect</u>		Inconclusive	
		Story	Crime	Story	Crime	Story	Crime	
Lab	Guilty	15	10	0	4	5	6	
	Innocent	7	12	8	2	5	6	
SRR scores			$\chi^2$	= 14.5				
Police	Guilty	3	5	2	2	5	3	
FOLICE	Innocent	9	10	0	0	1	0	
$\chi^2_1 = 15.6$								
T.ah	Guilty	8	11	5	3	7	6	
	Innocent	10	11	8	5	2	4	
Respiration			X1	= 5.3				
Police	Guilty (40s)	3	6	1	0	6	4	
	Innocent	4	6 2	3	0	3	4	
			$\chi^{2}$	= 8.5				
Lab	Guilty (80s)	6	7	1	2	13	11	
	Innocent	5	5,	6	3	9	12	
Heart ra	ate		χ-1	= 2.9				
Police	Guilty (40s)	5	5	2	1	3	4	
	Innocent	8	8 x <sup>2</sup> .	0 = 16.7	0	2	2	
			~ 1					

# Discussion

All three measures for both the police and laboratory examiners differentiated between guilty and innocent subjects. Subjects examined by the police differed on SSR and cardiovascular measures such that they, compared to those tested by laboratory examiners, tended to score as more innocent. On one measure, the cardiovascular measure, an interaction showed support for the hypothesis that police could be more accurate than laboratory examiners in classifying subjects since they scored innocent subjects as more innocent.

The difference found between guilty and innocent subjects in basic scores was reflected in classification results. Subjects were classified correctly at above chance levels by all three measures. In agreement with previous laboratory studies (Kircher & Raskin, 1988), SSR and respiration measures were found most effective for laboratory examiners. A lack of differential effectiveness amongst the measures for the police corresponds to field worker reports of no higher levels of accuracy for the SRR measures (Barland & Raskin, 1973).

The examiners' effect was due to the police generally scoring subjects in the innocent direction, whereas the laboratory examiners scored subjects slightly in the guilty direction. This translated into differing rates of classification of innocent subjects on specific measures. That is, more innocent subjects were correctly classified by the police with the SSR and cardio measures than were classified by laboratory workers. Classifications of guilty subjects did not differ.

The difference suggesting that laboratory examiners are more likely than field workers to make errors classifying innocent subjects is relevant to a major controversy in the area of lie detection. Reviews show that laboratory workers report false positive errors as the most probable error (Iacono & patrick, 1988, McCauley & Forman, 1988, Saxe, Dougherty & Cross, 1985). These reviews support Lykken's (1981) logical analysis suggesting that crime relevant questions are so obvious and so important to a suspect taking a CQT that they are unlikely to be relatively more responsive to control questions. The extension of the argument has been made that false positive errors could even be greater in the field where the consequences of responding to the obvious crime relevant questions are serious. If, however, the examiner difference we found is replicated then the generalization of results collected by laboratory examiners may be misleading and not applicable to police field workers.

It is difficult to know the cause of the police finding fewer false positive errors. One possibility is that they are better trained and more experienced. Their skills prevent them from making false positive errors. For example, the Toronto police in a handout on the polygraph report that they know of no case where a competent polygrapher has found someone truthful untruthful. Lykken (1991) cited the above statement to illustrate, in his belief, a dangerous level of overconfidence by police examiners. Our data supports the view put forward by the police, but our best working hypothesis is that it is somewhat of an artifact of our testing situation. Control questions become more important when asked by the police. They may deal with events that could relate to criminal acts or to actions that if not criminal are still somewhat incriminating in nature. By comparison the mock crime event is pretend and our real events were selected to

be non-criminal. Under these circumstances the focus of innocent laboratory subjects could most probably be on control questions when examined by the police. If this effect generalized, and there is the possibility that it could if innocent suspects believed they had something to lose through appearing as a criminal on the control questions, that field worker reports of few false positive errors could be more correct than is currently accepted by various laboratory workers.

The failure to find differences between the mock crime situation and real events suggests that lie detection tests are robust over situations that differ on the dimension of realism. At best, our results support the view of Forman and McCauley (1986) and suggest that results from mock crime studies can be generalized to real criminal events. At worst, our results do not exclude the possibility of comparing mock crimes to real criminal events.

Of course, there are reasons for caution in generalizing. A consideration of realism in isolation of other characteristics of mock crimes, embarrassing stories and real crimes may leave out important differences that would make the first two noncomparable to real crimes. For examples, 1) neither the mock crimes or stories were actual crimes and 2) there are no severe negative consequences associated with failing the polygraph test. 3) The emotions associated with mock crimes and embarrassing stories may be different than those associated with real crimes. 4) The writing of the embarrassing stories for the experiment is an artificial exercise just as being assigned to a mock crime condition is: a) there is the remote possibility that a student could falsify an event to participate in the study and b) the written story is potentially analogous to a criminal who confesses and then takes the polygraph test.

Even with the above difficulties, this study demonstrates how the study of lie detection in the laboratory can be broadened to real situations. It shows that mock crime scenarios can be comparable to at least one type of real situation. The study identified an examiner difference that could be dependent on differing examiner skills and training or it could be a result of the relevant of particular control questions asked by particular examiners. If the examiner difference can be replicated it may be very important in understanding lie detection. For example, the threat value of an incriminating control question asked by a laboratory worker may be relatively small compared to that value when the question is asked by a police examiner.

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### AN ANALYSIS OF VOICE RESPONSES FOR

### THE DETECTION OF DECEPTION

## By

### Victor L. Cestaro, Ph.D. and Andrew B. Dollins, Ph.D.

### Abstract

This study was designed to examine the feasibility of using audio pitch analysis and spectrum decomposition techniques to aid in the detection of deception following a numbers test. Audio recordings were made of 44 male subjects' responses during a peak-of-tension (POT) test. A Lafayette field polygraph was used to collect respiration, cardiovascular, and electrodermal responses for manual evaluation. Half of the examinees were programmed" deceptive" and half were programmed "truthful". The audio recordings of the subjects' responses were analyzed off-line using pitch and spectral analysis software to examine differences between truthful and deceptive "no" responses. Useable voice recordings were obtained from 28 of the original 44 subjects. No significant differences were found between the two groups on individual measures of pitch variation, response duration, or mean response energy. There was a significant concurrence rate (p < .01) between decisions made by pitch/energy analysis and an examiner based on analysis of the test data. Significant differences were found between the number of correct decisions made by the examiner (79%) and by pitch/energy analysis (37%). However, no significant differences were found between the number of false positive decisions made by the examiner and by pitch/energy analysis (35% versus 29%).

Requests for reprints should be sent to Dr. Victor L. Cestaro, Building 3195, Department of Defense Polygraph Institute, Fort McClellan, Alabama 36205-5114. The authors wish to express special thanks to the volunteers who participated in this study: Charlene L. Stephens, Master Sergeant Randall S. Reynolds, Dr. Donald J. Pettit, and Larry R. Broadwell for their assistance throughout data acquisition and processing. This research was supported by DODPI94-P-0024 project funds from the Department of Defense Polygraph Institute. The results of this study were previously published as a U.S. Government Technical Report (Cestaro & Dollins 1994). The views expressed in this article are those of the authors and do not reflect the official policy or position of the Department of Defense or the U.S. Government.

Standard psychophysiological detection of deception (PDD) tests and procedures have historically used measures of autonomic nervous system reactivity to differentiate between deceptive and non-deceptive subjects. Changes in skin resistance, breathing rate, and cardiovascular activity in response to questions requiring a "yes" or "no" answer have been the most common measures. In most cases, decisions are based on analysis of the physiological data recorded using four polygraph channels (cardiovascular, electrodermal, and two respiratory channels). There have been no additional channels added to the traditional polygraph since its inception as a tool designed for the PDD. However, various attempts have been made in the past to detect deception using voice stress analysis (O'Toole, 1975). Interest in this method was reported more than five decades ago in a study conducted by Fay and Middleton (1941) who relied on human judgments of voice responses to determine truth or deception. Forty-seven subjects were told to answer a series of ten questions either truthfully or untruthfully. Instructions to lie or tell the truth were presented immediately before each response, and subjects' responses were judged by a panel of 60 observers. Correct judgments were at or near chance levels, with judgments of "lie" answers slightly better than truthful answers (60.99% vs. 50.05%).

Using more sophisticated techniques, Motley (1974) examined extracted pitch information from voice responses in an attempt to detect involuntary (autonomic) manifestations of stress related to deception. Twenty female subjects were instructed to respond "no" to a series of questions related to a number picked prior to the experimental session. Analysis of recorded responses examined intensity, fundamental frequency, duration, formant structure, and harmonics. The only difference found between truthful and deceptive responses was in the response duration measure (p < .01). A second procedure in this experiment showed that acoustic cues associated with deception were not detectable by the unaided ear at better than chance levels, which lends support to the results obtained by Fay and Middleton (1941).

Other investigators have demonstrated an interest in the pitch component as an indicator of emotional content in speech (Lieberman, 1961; Lieberman & Michaels, 1962). Lieberman and Michaels (1962) stated that observers were able to correctly identify specific emotional states of subjects 85% of the time when unprocessed speech was presented to them. Using speech synthesis techniques, they found that identification accuracy dropped to 25% when pitch information within the raw speech waveform was smoothed. Their conclusion was that pitch perturbations in human speech were important to the transmission of emotional information, and that this was an "acoustic correlate of some phonetic or emotional event."

In another study focusing on pitch changes, Streeter, Krauss, Geller, Olson, and Apple (1977) found that subjects' average response fundamental frequency (FO) was higher when they were being deceptive than when telling the truth. In addition, they found that the magnitude of this difference was marginally greater when the deceptive act was stressful or arousing. Tolkmitt and Scherer (1986) reported that mean FO is less sensitive to stress than FO floor, and that FO floor may be a better indicator of stress (FO floor rises when arousal increases). FO floor was defined as the final FO value of a speaker's declarative statement.

Another method, commonly referred to as PSE (psychological stress evaluation), has met with varying degrees of success (Barland, 1978; Brenner, Branscomb, & Schwartz, 1979), but has never been widely accepted by PDD examiners as a reliable tool. This lack of acceptance may largely be due to the fact that PSE was meant to replace rather than augment the standard polygraph, and by itself may not provide sufficient information for confident judgment. A major drawback is that PSE appears to rely solely on changes in the FM (frequency modulation) component of speech, most often referred to as microtremor, for the detection of deception. The reliability of the relationship between voice microtremor and autonomic reactivity has not been well established. Evidence from controlled studies shows that voice stress analyzers fail to yield deception detection rates above chance levels (Horvath, 1982).

The present study was designed to examine the verbal responses of subjects to determine if features within the acoustic components are related to deception. Analyses were performed on the pitch contours (time domain) and spectral energy patterns (frequency domain) of subjects' voice responses during a peak-of-tension (POT) numbers test. The FM component, mean dominant (fundamental) pitch frequency, response duration, and mean response intensity of deceptive and truthful "no" responses were examined. Changes in the magnitude and rate of the FM component were also expected. In the frequency domain it was expected that deceptive responses would result in a spectral energy pattern shift when compared to non-deceptive responses.

### Method

# **Data Collection**

The data used in this study were collected during a repeated measures study (Dollins, Cestaro, & Pettit, 1994). A complete description of the procedures used throughout data collection is included for accuracy, though many of the procedures were not directly related to this voice analysis study.

# Subjects

Forty-four, native English speaking, healthy males [mean age (SD) = 29.2 (7.8) years; range = 19 to 47] participated in this study. Volunteers were civilian or military Department of the Army employees and were not paid for their participation. Thirty-nine of the volunteers had never participated in a PDD examination before. The remaining five volunteers had not participated in a PDD examination within the last two years. Thirty-five of the volunteers reported themselves to be medication free. The remainder were ingesting pain/relaxant (3), antiinflammatory (1), antibiotic (2), or antihistamine (3) medication. Females did not participate in the repeated measures study because of possible variations in skin resistance (over time) caused by hormonal secretions associated with the menstrual cycle. The data of 16 subjects were excluded because response amplitude was too low, leaving 28 subjects' data for analysis. Six of these subjects were using one of the above-mentioned medications.

# Examiner

All PDD examinations were conducted by the same examiner. The examiner had completed training at the Department of Defense (DoD) Polygraph Institute (Fort McClellan, AL) and was certified as a PDD examiner by the Department of the Army. He had administered approximately 500 field examinations during the five years prior to the study and was an instructor at the DoD Polygraph Institute.

# Apparatus

Data were collected using a Lafayette (Lafayette, IN) Factfinder (Model 76740/76741) polygraph equipment with three Cardio/Aux/Pneumo/GSR modules (Model 76477-G), one GSR module (Model 76480-G), and one electronic stimulus marker module (Model 76351-GET). A circuit was added to the electronic stimulus marker module to allow control of the marker via signals from a computer RS-232 serial port. Lafayette sensors were used to measure skin resistance (Model 7664), respiration (Model 76513-1G & 76513-2B), and cardiovascular activity (Model 76530).

A stimulus presentation micro-computer (Model 248, Zenith Data Systems, Chicago, IL), was used to replay questions throughout testing. The questions used throughout PDD testing were digitized and recorded to computer hard disk using a Sound Blaster board (Model 16ASP, Creative Labs, Inc., Milpitas, CA). A parallel port interface (Speech Thing, Covox, Inc., Eugene, OR), connected to a Radio Shack (Fort Worth, TX) integrated stereo amplifier (Model SA-155) and two speakers (Model Minimus-77) was used to present the questions. This system ensured that each question was presented with the same inflection, and at the same volume, each time it was asked.

Subjects' verbal responses were recorded on cassette tape using a Tascam Model 134 4channel recorder (TEAC, Montebello, CA) and a lavaliere microphone (Model 570S, Shure, Evanston, IL) positioned mid-chest and held in place by a cord placed over the examinee's shoulders. The recorder was located in an adjacent room. Excerpt recording was controlled via the software running on the stimulus presentation computer. The stimulus presentation computer serial port and an in-house built interface for the cassette recorder were used for this purpose.

A DT2821 data acquisition board (Data Translation, Inc., Marlboro, MA), installed in a standard IBM compatible 486 computer, in conjunction with Canadian Speech Research Environment software (CSRE 4.0, University of Western Ontario, Elborn College, London, Ontario, Canada), was used to acquire and digitize the analog voice signals from audio tape. A TTE 411AFS anti-aliasing filter (TTE, Inc., Los Angeles, CA) set to an upper frequency cutoff of 5000 Hz was installed between the tape recorder output and the DT2821 input during conversion of the audio responses from analog to digital format. The voice spectrograms and pitch tracks were printed on 8.5" x 11" paper using a Hewlett-Packard XL300 color printer. Software was written in-house for data reduction and display.

PDD testing was conducted in a carpeted,  $11'6 \times 12'$  partially sound-attenuated room. Each examination was recorded on video tape using two ceiling and one wall mounted video cameras. The examination was also monitored through a two-way mirror by a collaborator located in an adjacent room.

Subjects were seated in a lafayette adjustable-arm subject chair (Model 76871, Lafayette, IN) during testing. The chair was positioned beside and slightly in front of the examiner's desk. This position allowed the examiner to monitor the examinee's movements but not vice versa. The polygraph was mounted in a double pedestal examiner's desk (Lafayette Model 76183). The stimulus presentation computer and monitor were on a table next to the examiner's desk and out of the examinee's sight during testing. The speakers, through which the questions were played, were located six feet behind, and one foot above, the back of the examinee's chair. The examinee's field of view, throughout testing, was limited to a wall of uniform color, a stationary video camera, and, above the video camera, a piece of paper with the numbers 60 through 66 and the word "NO" written on it.

# Procedure

Participants were randomly assigned to the treatment or control groups, with the constraint that at least one volunteer from each group participate in every fourth examination. That is, no more than three control or treatment group participants were tested consecutively. Twenty-two subjects were assigned to each group. Each volunteer participated in two examination sessions. The two sessions were separated by at least five working days. Subjects completed six PDD tests during each examination session. Only the responses to the numbers 62 to 66 of the first three PDD tests of the first examination session were used for voice analysis in this study. The first two responses (to numbers 60 and 61) were excluded from all analyses to avoid inclusion of possible orienting responses in subjects' data.

Upon arrival at the DoD Polygraph Institute (Fort McClellan, AL), each participate was escorted by one of the investigators to a secluded briefing room and asked to read a brief description of the research project. Individuals indicating that they would participate were asked to read and sign an informed consent affidavit. Any questions were then answered. A brief biographical/medical questionnaire was then completed, to ensure that the participant was in good health and not currently taking medication which could interfere with the PDD examination results.

The participant was required to complete a number search task, which was referred to as an anagram task. During this task, the participant circled six sequences of a two-digit number which was repeated five consecutive times (in any direction) in a 20 x 30 matrix of two digit numbers. The matrix consisted of numbers between 60 and 69 for the programmed guilty subjects -- who circled the number 64, and 80 to 89 for the programmed innocent subjects -- who circled the number 84. When the anagram task was complete, the participant was asked to write his name and the number circled on two 3 x 5" cards. One card was retained by an investigator and the second concealed in the participant's pocket. The PDD examination procedure was briefly explained to the participant. It was emphasized that the participant should not reveal which number he had circled during the PDD examination. It was further emphasized that the participant should make every attempt to remain relaxed, even if he felt himself begin to react (increased heart rate, perspiration on hands, tightening of occlusive cuff) during the examination. The participant was then escorted to the examination room and introduced to the examiner.

The examiner greeted each participant, then reviewed the biographical/medical questionnaire with the participant to ensure its accuracy. No other pre-test questions were asked by the examiner. The examiner then briefly explained the sensors, procedures, and theory of PDD. The examiner explained that the polygraph simply measured the participant's physiological reactions -- and not deception per se. It was further explained that the participant's physiological responses were likely to change during deception. It was suggested that fear of detection during deception altered the normal physiological response pattern and that these changes may be evident in the recorded physiological data. The examiner described this response as being similar to the fight-or-flight reaction used to describe a fear response during military training.

The examiner reviewed the questions to be asked during data collection with the participant by playing the computer recorded questions. If there were no further questions, the participant was then seated in the examination chair and the sensors were attached. Respiration was monitored using convoluted (pneumo) tubes placed around the upper and lower chest. Skin resistance was measured using electrodes placed, with paste, on the most distal phalanges of right hand index and ring fingers. Cardiovascular activity was monitored using an occlusive cuff placed over the brachial artery of the left arm. The pneumo tube vents were closed and the DC offsets for the pneumo and skin resistance on the custom built amplifier were adjusted to zero. The sensitivity of these recording channels was then adjusted on the polygraph. Next, the occlusive cuff was inflated to 90 mmHg, massaged to remove wrinkles, then deflated to 48 mmHg. The pressure was then adjusted, as necessary, to achieve a 2 mmHg pen deflection, between diastole and systole, on the sphygmomanometer. The custom built amplifier DC offset was then adjusted to zero to keep the signal within the range of the analog-to-digital converter, and polygraph sensitivity adjustments were made.

The following series of statements were made and questions asked, via computer recorded voice, during a single chart:

X The test is about to begin.

- 01 Did you complete an anagram for the number 60?
- 02 Did you complete an anagram for the number 61?
- 03 Did you complete an anagram for the number 62?
- 04 Did you complete an anagram for the number 63?

05 Did you complete an anagram for the number 64?

06 Did you complete an anagram for the number 65?

07 Did you complete an anagram for the number 66?

XX The test is now complete, please continue to sit still while I turn the instrument off.

Before the examination began, the examiner reminded each subject that the correct response to each question was displayed on the wall directly in front of the subject. If the examiner judged that the physiological signals recorded on the polygraph chart contained artifacts, the previous question was repeated. The examiner played the message, "Please remain still" if he judged that the examinee was producing unnecessary and/or excessive movements. When a question series was completed, the pressure in the occlusive cuff was vented and the subject was instructed to "please relax while I prepare for the next test." If subjects appeared to be sleepy, they were also reminded of the importance of the study and encouraged to remain alert. The next PDD test was begun approximately three minutes later. The occlusive cuff was inflated prior to beginning the next test, as described above. This procedure was repeated until six tests were completed, after which the sensors were removed. The subjects were then asked to read and sign a debriefing form, reminded to return the following week, and escorted out of the building.

Participants returning for a second test were escorted to a briefing room where they were reminded of the number circled during the previous session and asked to conceal the second card, indicating the number circled, in a pocket. They were reminded not to reveal what the number was to the examiner, then escorted to the examination room. The examiner again reviewed the biographical/medical questionnaire from their previous session to ensure that no changes had occurred. Six additional PDD tests were completed, as described above. When the examination was complete, participants were thanked for their cooperation, asked to read and sign a second debriefing form, and escorted out of the building.

# **Pitch Data Reduction**

Digitized voice responses were processed with CSRE's software comb filter to extract pitch from the raw waveform data. The data acquisition sampling rate was set to 10 Khz. The low-pass filter cutoff frequency was set to 800 Hz prior to smoothing and comb filtering. Extracted pitch waveforms were saved for off-line processing.

Response duration was the unit of time used to convert the number of peaks per response to frequency. The number of peaks per response was determined using a software peak/trough detection algorithm, therefore providing a means to detect deviations from the dominant (fundamental) pitch frequency. This provided a measure of the mean frequency modulated (FM) component of the voice waveform. The peak excursions (deviation magnitudes) from the dominant baseline frequency were also measured. The mean peak deviation, in cycles, from the dominant pitch frequency was divided by the dominant pitch frequency to determine the modulation index of each sample (e.g., a deviation of 40 Hz from a 400 Hz dominant pitch frequency = 0.10, or 10% modulation index). This result was then multiplied by the FM component to provide an index of FM energy for each response, normalized over a one second period. Simply stated, the FM component provided a measure of the rate of shift in the dominant pitch component and the modulation index provided a measure of the magnitude of that shift. The index of FM energy was used to rank order the five responses within each test for comparison with an examiner's visually-based decisions.

### **Spectrum Analysis Data Reduction**

The CSRE software was designed to perform spectral analyses of speech, employing Fast Fourier Transforms (FFTs), Modified Covariance (MC), and Autocorrelation (AC) techniques. The resulting spectral pattern can be displayed on a computer screen using a magnitude (in dB) x frequency (in Hz) x time (in ms) scale. Spectrum data files were saved on computer disk for additional off-line processing.

It was determined during trial analyses that the Modified Covariance technique was the optimum method of spectrum decomposition for short duration responses. This method is also recommended by the software manufacturer. Signal pre-emphasis was set at 90% to compensate for approximately 6 dB per octave roll-off of voiced speech, largely due to radiation at the lips.

### Results

# Visual Analysis of Pitch Waveforms

Graphics software was used to examine the continuous pitch contours of the five responses within a test (Figures 1, 2, and 3).

It can be seen that the pitch waveform of a programmed "deceptive" subject's response (Figure 1) is represented by a relatively straight line during the target number question response (middle waveform), with little change in the dominant pitch frequency. However, the responses to questions before and after the target show obvious deviations (FM component) from the dominant frequency, especially during responses to the questions concerning the numbers 62, 65, and 66. This was not the case for responses from a programmed "non-deceptive" subject (Figure 2). All five waveforms recorded from the subject contained obvious deviations from the dominant pitch frequency. However, in many cases, subjects programmed "deceptive" showed the same pattern of responses as a programmed "non-deceptive" subject (Figure 3), and in others, the opposite pattern as seen (Figure 4). 1



Figure 1

Pitch contours of a deceptive subject's responses to five questions, showing an absence of pitch variations in the response to the target number question (64).



Figure 2

Pitch contours of a non-deceptive subject's responses to five questions, showing large pitch variations during all responses.



Question

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Pitch contours of a second deceptive subject's responses to five questions, showing pitch variations during all responses.



Question Relative Frequency (100 Hertz / division) Milliseconds

Pitch contours of a second non-deceptive subject's responses to five questions, showing an absence of pitch variations in the response to the target number question (64).

# **Pitch Data Analysis**

A certified forensic psychophysiologist at the DoD Polygraph Institute independently examined subjects' physiological data to determine which number was circled by each subject. His determinations were based on chart tracings of two pneumo channels, the cardio channel, and the GSR channel. Where no determination could be made by the examiner, the data were dropped from the analysis, leaving 50 tests out of a possible 84 for an analysis of agreement rates. The frequency of concurrent determinations (*i.e.*, a numbers match) made by the examiner and the FM energy index was significantly different from chance expectation ( $\underline{Z} = 4.0$ ,  $\underline{p} < .01$ , two-tailed). In other words, both the examiner and the energy index identified some response to a particular number, whether or not it was the number circled by the subject during the anagram task. No attempts were made to determine whether a subject's responses were evaluated as DI (deception indicated) or NDI (no deception indicated) during this comparison.

Examination of the above "correct number" decisions showed that, based on subject programming of DI (target number denied by subject) and NDI (subject's target number omitted from test), the examiner had 79% correct DI decisions versus 37% correct DI decisions based on pitch/energy ranking ( $\underline{Z}$  - 3.46, p < .05, two-tailed). This result indicated that there was a significant difference between the frequency of correct target number determinations made by the examiner and by the pitch/energy ranking algorithm. Further analysis indicated that the frequency of correct number determinations using the pitch/energy ranking algorithm was not significantly greater than chance. However, the examiner had a 35% false positive rate versus a 29% false positive rate using the pitch/energy ranking algorithm ( $\underline{Z} = .375$ , p > .05, two-tailed), demonstrating that there were no significant differences between the false positive rates of the two methods. There were only two cases where both the examiner and the pitch/energy ranking method concurred on a false positive decision. Three separate GROUPS (2) x TEST (3) x QUESTION (5) repeated measures analyses of variance revealed no significant differences for measures of dominant frequency, energy, or duration.

# **Visual Analysis of Spectrograms**

The spectrographs were printed and subsequently analyzed by overlaying and visually inspecting the degree of spectrograph match-mismatch. Figure 5 shows the spectrographs for a subject programmed non-deceptive, with the upper spectrograph depicting the non-target number response, and the lower showing the response to the target number question. Figure 6 shows the response patterns of a subject programmed to be deceptive.

Since visual inspection was determined to be too inaccurate for objective analyses, the data were collapsed across time to produce a standard amplitude x frequency spectrograph. Figures 7 and 8 are amplitude x frequency spectrographs of the data displayed in the complex spectrograph (Figure 6). The amplitude x frequency information was then divided into a series of partitions for statistical and pattern analyses.

Figure 5



Complex spectrograph showing a non-deceptive subject's responses to a non-target (upper panel) and target number question (lower panel).

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Figure 6

Complex spectrograph showing a deceptive subject's responses to a non-target (upper panel) and a target number question (lower panel).





Simple spectrograph showing a deceptive subject's response to a non-target number question. Note the energy peak at 1100 Hz.

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# **Spectrum Data Analysis**

Average magnitudes within 200 Hz bins (partitions) across the maximum allowable passband (5000 Hz) for the selected sampling rate (10 Khz) were calculated. A rank order assignment of bin magnitudes, with 1 representing the highest magnitude bin and 25 representing the lowest magnitude bin in serial order from 1 Hz to 5000 Hz, was made to generate a profile of responses for each question and subject, within a test. Since this was a relative measure, overall differences in response voice amplitude were not expected to be confounding factors.

Profiles for deceptive and non-deceptive responses were compared for congruence within each subject's data set. The dependent measure was the serial alignment (pattern match) of the 25 ranked bin values for each question with the mean ranking of the five question set. Serial alignment was assessed by non-parametric correlation (Spearman rho). The greatest pattern mismatch was expected to be associated with the question causing the most stress to be subject. A correlation of -1.0 indicates a severer misalignment of patterns, and a correlation of 1.0 is indicative of an exact pattern match. Although correlations in the direction of misalignment were seen in some cases, no systematic mismatch was found for deceptive responses to the target question.

# Discussion

Results indicated that no single human voice measure, as collected and evaluated in this study, reliably discriminated between truthful and deceptive responses. The measures examined include: dominant (fundamental) pitch frequency, voice response energy, response duration, and the magnitude and frequency of pitch changes. Within the groups sampled, the FM component had a range of 0.6 to 28.8 Hz. However, other investigators have reported that the FM component studied by Psychological Stress Evaluators (PSE) has a range of 8 to 14 Hz (Brenner, Branscomb, & Schwartz, 1979). It is, thus, not clear whether this FM component is equivalent to the PSE or is a measure of some other component.

Although other investigators have reported that a short duration response was a reliable indicator of deception (e.g., Motley, 1974), the results of the present study indicate that duration is an unreliable index of deception. Response duration may be susceptible to cognitive countermeasures (e.g., intentional changes in response duration). Changes in voice intensity (speech amplitude) were not indicative of deceptive responses and may also be susceptible to countermeasures. Various pitch parameters, however, are associated with parasympathetic nervous system activity (the vague nerve innervates the laryngeal muscles controlling certain aspects of speech), and are not under voluntary control. Streeter, et al. (1977) found that the FO of subject responses was higher during deceptive than non-deceptive responses. That relationship was not found in this study. However, instantaneous changes in the fundamental pitch frequency, and the magnitude of those changes may be related to emotional arousal or stress. The FM energy component, derived from the instantaneous change measure and magnitude, may serve as a more reliable indicator of truth or deception than any single voice measure.

Lieberman and Michaels (1962) reported that the ability of observers to correctly identify emotional states of subjects dropped significantly when all pitch information was removed from subjects' recorded responses. In the present study no significant relationship was found between the FM energy component, derived from pitch, and deceptive responses. However, a higher correct decision rate was found when the FM energy component was compared to any of the single measures investigated. Since the verbal responses were collected during a peak-of-tension polygraph examination, and only a single voice response was recorded immediately after each question, there may not have been sufficient time for a stress response to appear in the recorded waveform. Further investigations might employ a restructured question format with more than one response after each question, or instructions to subjects to delay their verbal responses. This may increase the likelihood that a delayed stress related response will be captured.

A weighted combination of mean response intensity, response duration, and the FM energy component may prove to be a reliable additional polygraph channel. Speech formant structures and a more stringent analysis of spectrum data should be examined in further studies, and added to the final equation. Computer programs employing neural networks, fuzzy logic, or other "smart" procedures may, in the future, identify response characteristics within a polygraph session and adjust weights accordingly to provide increased levels of confidence in that channel's decision output. However, the results of this research, and of the reviewed studies, suggest that voice stress analysis within the context of a standard PDD examination is not yet a reliable and valid discriminator of truth and deception.

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## A TAXONOMY OF POLYGRAPH COUNTERMEASURES

#### By

# Donald J. Krapohl

# Abstract

This monograph reviews the fundamentals of polygraph countermeasures and counter-countermeasures, and a proposed taxonomy is outlined. The pertinent literature is surveyed regarding the effectiveness and limitations of certain countermeasure approaches. Potential countermeasures not previously reported as such in the literature are also discussed, and a new category of countermeasures is identified.

Lying is an interesting and universal feature of human communication. Though the history of our species provides no direct evidence, our collective nature suggests that the phenomenon of mendacity may be only barely younger than the invention of speech itself. It pervades every class and culture. Lying has served to defend or expand the interests of uncounted generations of monarchs, merchants, spouses, debtors, knaves, and saints.

Despite its prevalence, prevarication entails a measure of effort for most people, not just in creating the lie, but also in protecting it against discovery. The deceiver must continually guard against emanating physiological signals that could betray his lie. The dry tongue, clammy or trembling hands, dilated pupils, sweaty brow and pale countenance could undo a carefully crafted deception. Liars are often aware of these cues and have devised methods for masking or neutralizing them. Anxious fibbers surreptitiously wipe their palms on their clothing, dab their foreheads, wear sunglasses indoors, or grip armrests to conceal shakiness associated with the stress of deception. They recognize that their own physiological responses must be kept in check, or at least hidden, lest they reveal their own duplicity.

The author is a former member of the American Polygraph Association and now a security officer for the Department of the Army. The author is grateful for the editorial and technical assistance of Shirley Sturm, past President of the American Polygraph Association.

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#### Polygraph Countermeasures

Among the best methods used to detect lies, the polygraph exploits physiological patterns to diagnose deception. Because the polygraph has proven to be a powerful tool in the search for the truth, it has enjoyed an extensive application with law enforcement and the U.S. government in security investigations. As would be expected, people have used many stratagems in an attempt to foil the polygraph. These methods, referred to here as countermeasures, range from the crude to the complex. Surprisingly, their success is not always a function of their sophistication. Nevertheless, the organization and grouping of countermeasure methods by their essential elements can be very useful in understanding and describing them, and in devising means to recognize and counter them.

Before moving on, let us examine what constitutes a polygraph countermeasure. This issue has been explored by other authors and researchers. Writers have proposed that polygraph countermeasures are methods a guilty test subject uses to manipulate the test recordings to render a truthful outcome (e.g., Elaad & Ben-Shakhar, 1991). This definition, or ones similar, prevail in the polygraph literature and encompass the actions of the vast majority of countermeasure users. Some individual test subjects, however, for motives all their own have specifically aimed for inconclusive outcomes, or even false positives (incorrect decisions of deception), possibilities not addressed in the conventional definitions. Moreover, as the reader will become aware later in this paper, there are countermeasures that ignore the polygraph recordings altogether. Therefore, for the purposes of the present discussion, polygraph countermeasures will be defined parsimoniously as: Any method used with the intent of precluding a correct polygraph outcome.

The importance of polygraph countermeasures has been recognized by many writers (Abrams, 1977; Elaad & Ben-Shakhar, 1991; Barland & Raskin, 1973; Gudjonsson, 1988; Orne & Thackray, 1972; Sack, 1993; Streepy), and several have offered their own taxonomies. There are differences between their various categorizations, though most have much in common. For example, the categories of physical, mental and pharmacological countermeasures are among the most frequently used. These natural divisions have proven very useful, and they constitute the majority of all methods reported from field cases. After these three categories, there is considerably less agreement. In some classification systems, particular methods have been given categories to themselves while in other taxonomies they are included with other countermeasures under a superordinate heading. The differences in these systems are largely attributable to the classification criteria, and authors have not always agreed on what they should be. One of the recognized challenges in developing a taxonomy of any type is finding the proper level of scale. Using too many criteria will result in a classification system that under-represents commonalities among the elements. Taken to extreme each element has its own category, which in turn, This writer sees that current state of eliminates the value of the classification system. countermeasure classification systems toward this end of the spectrum. The present effort is directed, therefore, toward creating a universal system that not only encompasses all possible countermeasures, but places them into the minimum number of functional groups. The ultimate aim is to establish a framework that is complete yet intuitively easy to understand, use, and convey.

The present taxonomy is based on two specific criteria. The first and overarching principle is simple; countermeasures that employ mechanisms in common are grouped together. For example, all countermeasures that entail movements as their principle mechanisms are categorized as physical countermeasures. Assignments to groups must be made with careful consideration of their underlying principles, however. For example, although biofeedback and imagery are very different phenomena (learning versus fantasy), they both rely on cognitive processes and in the present taxonomy they would be grouped among other mental countermeasures. In another example, the application of antiperspirants on the fingers in order to diminish electrodermal activity is listed here with the pharmacological/chemical approaches.

There is general acknowledgement that some countermeasures include elements of more than one group. For example, the effectiveness of all countermeasures may be mediated to some extent by the user's belief in them, thus introducing a psychological or mental component into the equation. However, the present classification method is based solely on the primary characteristics of the countermeasure, and this is the second and last criterion for group assignment.

To completely cover the field, it is important to introduce a class of countermeasures that has not been commonly identified by the literature. Generally not discussed as a polygraph countermeasure is the means by which subjects attempt to manipulate the polygraph decision process, by influencing the examiner or controlling some aspect of the conduct of the session. Manipulating the polygraph tracings is not a part of this particular class of countermeasure. This method, which I have labeled behavioral countermeasures, encompasses those strategies whereby subjects expend their efforts against the examiner or examination process. It is an approach long endorsed by the underground anti-polygraph literature (French & Van Houton, n.d., Kalishnikov, 1985, Lapin, 1983). The obvious example is the subject who tries to influence the examiner with feigned friendliness, cooperation, illness or other behaviors in hopes of ameliorating an adverse conclusion evidenced on the charts. In addition, it is not an uncommon strategy for a subject's attorney to demand specific wording for relevant questions that skirts or dilutes the true relevant issue. Neither of these two examples fits neatly into conventional countermeasures taxonomy, yet they both are clearly countermeasures by definition, that is, efforts to preclude a correct polygraphic outcome. A discussion of behavioral countermeasures will be taken up later in this monograph.

Based on the two criteria set forth earlier, the body of literature suggests that all polygraph countermeasures could be grouped into four categories. They are:

Class I:	Physical countermeasures
Class II:	Mental countermeasures
Class III:	Pharmacological/Chemical countermeasures
Class IV:	Behavioral countermeasures

This paper is organized into sections that correspond to these classes. Within each section, definitions are offered along with examples. The relevant research is also reviewed. Where appropriate, counter-countermeasures are proposed. The overall objective of this paper is to provide a logical, encompassing and economical framework for the discussion, instruction and research of polygraph countermeasures.

### **Class I: Physical Countermeasures**

Most test subjects are aware that the polygraph records physiological responses, and that assessments of deception are based on differential responding to the relevant questions. Subjects motivated to defeat the testing face the task of altering the physiologic tracings. Since many subjects consider direct control of the autonomic functions beyond their ability, some choose instead to use movements in hopes of masking their polygraph reactions or misdirecting the examiner. Various field and laboratory reports indicate that 25% to 60% of deceptive subjects will attempt physical countermeasures (Honts, Raskin, Kircher & Hodes, 1988; Reid, 1945; Sack, 1993).

As a rule, any method that involves muscular movement as its central feature can be considered a physical countermeasure. Some countermeasure movements could include the increasing or releasing muscle tension, actions that induce pain, muscular activities that deplete the body's energy reservoirs, and alterations of the normal respiratory cycle. Typical muscle manipulations have been the flexing of the arm muscles, pressing down against the chair with the arms, contracting the muscles of the legs and buttocks, pushing one's toes against the floor, eye crossing, and tightening the stomach muscles. Subjects have self-induced pain by biting the tongue or cheek, pressing a fingernail into the flesh, pushing a foot against a tack in the sole of the shoe, and exerting pressure against a wound on the foot or in the mouth. Respiration distortions have frequently taken the form of blocking, apnea, hyperventilation, and slowed or paced respiration, among others. A creative physical countermeasure, though infrequently reported, is a subject's use of exhaustion, whereby the subject engages in strenuous physical activity just prior to the polygraph examination in hopes of diminishing his or her ability to be aroused by relevant test questions.

It should be obvious that there are risks for the subject who practices physical countermeasures during the test. First, many motions taking place during the test can be detected simply by watching the test subject. Purposeful movements are prima facie evidence of deception, and therefore it could be the physical countermeasures itself that reveals the subject's guilt. Furthermore, random movements, even if concealed, may alert the polygraph examiner who observes atypical responses or significant shifts in baseline patterns on the strip charts. Finally, any countermeasure method that merely reduces the contrast of reaction against background would, at best, render the examination inconclusive when contemporary testing techniques are employed. Exhaustion, random movements and a malfunctioning instrument would have such an effect. Therefore, a guilty test subject takes on a formidable challenge when selecting physical countermeasures.

The Class I countermeasures are generally dismissed by practicing polygraph examiners as being crude, ineffective or easy to detect (Abrams, 1977; Sparagowski & Ritter, 1977). Partial support for this view is found in the work of Honts, Raskin, Kircher & Hodes (1988). Honts *et al.* found that spontaneous physical countermeasures did not significantly increase the likelihood of a false negative (incorrect truthful) outcome in mock crime paradigms. Even familiarity with the polygraph instrument and the Control Question Technique (CQT) did not enable them to defeat the test (Honts & Hodes, 1983; Honts, Hodes & Raskin, 1985; Rovner, Raskin & Kircher, 1979). When Honts added expert countermeasures training and practice to the mix, however, it was a devastating effect on detection accuracy. The combined factors drove detection rates to chance probabilities. These findings argue for more respect for physical countermeasures, especially in the testing of populations where sophisticated training is available.

Class I counter-countermeasures fall into two general subgroups: Those that involve testing techniques and others that rely on technology. For many years practicing examiners counted on their testing procedure to discourage or detect physical countermeasures. The Reid *Yes Test* was developed to invite easy-to-detect physical countermeasures from deceptive subjects, and if the subject took the bait, his or her ploy was easily revealed. Similarly, certain stimulation techniques have been devised that capitalize on a deceptive person's motivation to distort the test. These low-tech countermeasure detection methods are very effective against the unsophisticated user of physical countermeasures, but some subjects have used adroit physical manipulations that are more subtle and that can create reactions that approximate true physiological responses.

Technology has offered a method for the detection of concealed muscular movements. Movement detectors are available to reveal the shifting of body weight that accompanies certain types of countermeasures (Stephenson & Barry, 1988). For example, if a subject presses down with feet or arms, sensors in the test chair can detect the relative changes in the weight supported by each leg of the chair. A similar approach uses air bladders in the seat of the chair to detect movements (Reid & Inbau, 1977; Murray, 1989). Reid *et al.* also experimented with noncontact sensors that were sensitive to gross changes in body movement.

Currently, one of the more sophisticated methods, electromyography (EMG), can detect even invisible muscular contractions with sensors placed on the skin. The EMG functions by recording minute electrical changes that accompany muscular contractions. Muscular contractions that are not readily apparent by visual inspection still emanate electrical pulses that are detectable. The major shortcoming of the EMG, however, is that each of the body's muscle groups would require sensor attachments due to the limited detection range of the sensors. This factor presents obvious practical limitations and constrains the application of the EMG to only the most likely and least intrusive body sites.

With the ongoing progression from analog to digital polygraphs there is hope that other physiologic indicators of countermeasures might be discovered. Possibilities include the use of algorithms that are sensitive to the timeliness of reactions, patterns of reactions, or even relationships among responses in different channels. Published research on these possibilities is wanting.

### **Class II: Mental Countermeasures**

Mental countermeasures are those that draw upon psychological manipulations exclusively in order to alter or mediate the physiological responses concomitant to deception. Mental countermeasures employ selective attention, fantasy, conditioning, semantic transformations, selfdeception, relaxation, learned autonomic control, or personality characteristics to affect physiological responses. Class II countermeasures pose some unique problems for the practicing polygraph examiner. They typically do not produce any characteristic signature in the polygraph recordings, nor are most of them easily detected by behavioral cues or special sensors. The shear variety of mental countermeasures, as evidence by the length of this section of the paper, makes guarding against all of them a daunting task. All is not as bleak as it may appear, however. Most mental countermeasures are very difficult to perform consistently and effectively.

Some mental countermeasures require considerable practice while others can be performed without training or rehearsal. Preparatory mental countermeasures entail those that take place before a polygraph session with the aim of influencing the subject's mental state or arousal level during the examination. For example, learning to mediate autonomic responses requires a number of sessions with biofeedback equipment. Spontaneous countermeasures, as the name suggests, are those that can be performed without rehearsal or training in advance. Some Class II countermeasures can fall into both subgroups, such as when practice is used to enhance or test the effectiveness of a method that is normally done spontaneously. Generally speaking, however, the assignment into one of the other subgroup is relatively stable.

Class II countermeasures work differently from those in Class I. Class I methods use physical maneuvers to distort the physiological data. Class II techniques focus on manipulating the cognitive or emotional processes. By attenuating, shifting, or blocking the concern of detection, the attendant physiological responses will be altered, affecting, in turn, the polygraph recordings. Effectiveness depends on a number of elements. Factors that affect mental countermeasures will be included in the following review.

### Imagery

Envisioning exciting images in the mind's eye can evoke physiological arousal. The reader can demonstrate this on himself by creating or recollecting an image of something very disturbing or thrilling, and sensing the bodily changes it induces. Polygraphically, the physiological response to the image can be indistinguishable from other responses. Similarly, focusing on a calming mental scene can have the opposite effect, lowering physiological tonic levels. Imagery is considered a preparatory mental countermeasure because it is most often considered and practiced in advance of the polygraph session, though spontaneous efforts have been reported (Dawson, 1980).

Much like Class I countermeasures, haphazard use of imagery has not been found to be an effective approach for most subjects (Dawson, 1980; Honts, Raskin, Kircher & Hodes, 1988; Kunzendorf & Bradbury, 1983; More, 1966). Flat tracings or erratic recordings do not result in outcomes of truthfulness with the CQT. Moreover, the power of imagery to repeatedly prompt physiological responses is constrained by the effects of habituation. The tactical use of imagery to only relevant or control questions may be useful. Since most polygraph sessions render three to seven charts with several relevant and controls on each chart, however, it may be the exceptional test subject whose visualizations can mitigate the emotive power of the test questions over the entire course of the session. Kunzendorf *et al* found a relatively small number of subjects who normally use images in response to stimuli who could render their lies less detectable in a peak of tension (POT) format. An open question is whether they could be equally effective against more conventional tests.

### Hypnosis

Hypnosis is a method of inducing an altered state of consciousness that makes one very susceptible to suggestion. It might be useful before the testing session to implant or suppress thoughts, or as a method of altering attention during the polygraph session. Despite the obvious attractiveness of hypnosis as a mental countermeasure, researchers have given it only intermittent attention. Hypothetically, hypnosis holds promise in the induction of amnesia, reduced arousability, and in the conditioning of autonomic responses. One of the earlier tests of hypnosis as a countermeasure was conducted by Germann (1961). In his pilot study, 7 of 15 guilty subjects obtained inconclusive results after having amnesia hypnotically induced. In a similar pilot study, Weinstein, Abrams and Gibbons (1970) also recorded inconclusive results for their three guilty subjects who had received hypnotic suggestions of amnesia for their participation in a mock crime. Using a guilty knowledge test (GKT), a pilot study by Corcoran, Lewis and Garver (1978) found that hypnosis significantly reduced arousability and the ability to detect concealed information.

The small body of data, including the few pilot studies of Germann, Weinstein *et al.*, Corcoran *et al.*, and Berry (1961), along with individual case studies by Barland (1979), Mutter (1979) and the isolated anecdotal reports demonstrates how much remains to be done on the issue of hypnosis and the polygraph. In this handful of studies, subjects tended to be those who are exceptionally susceptible to hypnosis rather than subjects taken at random from the general population. Moreover, sample sizes, even if used as an aggregate, are too small to be meaningful. On whom does hypnosis work as a countermeasure, under what circumstances and with what types of tests might it be effective? How can it be detected or neutralized? At this writing all answers are unsubstantiated opinions.

#### Biofeedback

The use of a device to measure and convey physiological information back to the subject is called biofeedback. The feedback can serve as a reinforcer to teach subjects to regulate a variety of physiological functions. It has been used extensively in the control of autonomic stress responses, and as such, has obvious implications in the psychophysiological detection of deception.

#### Polygraph Countermeasures

Biofeedback training can take two different courses to manipulate physiological activity. It can regulate phasic (response) activity or tonic (baseline level) activity. The first concentrates on the responses, while the second focuses on the "noise" or background. Effectiveness against the polygraph may depend on which of the two methods the subject selects. Lykken (1960) taught his subjects to generate responses (phasic) to noncritical items on a GKT, and found that this countermeasure was ineffective. Conversely, a pilot study by Corcoran, Lewis and Garver (1978) found that biofeedback-conditioned generalized suppression of electrodermal activity (tonic) significantly recued detectability with the GKT. These studies need replication and are quite tentative, and merely suggest a trend. Absent the occasional field report, data on the impact of biofeedback on the control question test is incomplete.

#### Placebos

Placebos can be either preparatory or spontaneous, though most often it is a premeditated effort. The word placebo is Latin for "I shall be acceptable." The term is most frequently associated with the sugar pill or similar ineffectual devices used by the medical community to induce patients to believe they are being treated, when in fact the treatment's effectiveness lies solely in the suggestion of effectiveness. Parallels exist in the polygraph setting when a subject uses an object or procedure that he believes to be effective against the polygraph, and consequently alters his own psychophysiological responses with the belief.

Reid & Inbau (1977) reported a case of a police officer who placed bullets under the blood pressure cuff and pneumograph tube in the mistaken notion that it would diminish the discerning power of the polygraph (p. 215). In that case the officer's test recordings were unresponsive, an example of what may have been a placebo effect. Fortunately, the officer had been observed by the examiner placing the bullets, and so the motives had been obvious. There are other anecdotal reports of using incantations, good luck charms, spells, giant *Bibles*, rosary beads, and rituals to thwart the polygraph. The power of these methods reside in reducing the subject's concern of being detected. If the subject earnestly believes that the placebo will reduce his reactions to the test questions, such an outcome is theoretically possible.

Laboratory research has failed, however, to find this relationship (Timm, 1982; Waid, Orne, Cook & Orne, 1981). Similarly, in a mock crime paradigm (Honts, Raskin & Kircher, 1985), a subject's ability to defeat the polygraph was not correlated with the belief in his or her ability to do so. The sparse evidence does not support the contention that placebos reduce the efficacy of the polygraph.

Because of the inherent challenges in measuring the depth of belief in placebos, a scientific study to ultimately confirm or disconfirm placebo effects on the polygraph can be expected to be complex. A substantial body of field accounts suggests that a zealous belief in the placebo could be responsible for diminished responses, and this level of conviction is extremely difficult to induce in the laboratory.

### Desensitization

While more commonly used in the treatment of phobias, progressive desensitization has the potential to serve as an adjunct to a countermeasure strategy. desensitization is the process by which subjects are trained to become familiar with stimuli over time so that the stimuli no longer evoke strong emotional responses. Returning to the most common application, phobia reduction, subjects are exposed to the fear-inducing object or situation in ever increasing levels until the fear is controlled or eliminated. In the polygraph application, reducing the fear of detection could allow subjects to control or eliminate the physiological response during deception.

Polygraphists have long been wary of testing subjects who have been tested repeatedly by other examiners. The stated rationale is that subjects become inured to the process and no longer have the concern that their untruthfulness will be detected. Whether this worry on the part of examiners is well founded in unclear as it is based entirely on anecdotal reports. There are compelling reasons to be concerned that desensitization could impact the validity of the CQT, however, as the following example might suggest.

Let us assume that an unethical polygraph examiner were to participate in mock examinations of a guilty subject. The examiner could present to the subject the most likely working of the relevant questions, the most probable testing technique, and the method of analysis of the strip charts. The test subject could be afforded multiple sessions of a mock examination until he has become comfortable with the process. In addition, the examiner could coach the subject on inducing reactions on the control questions, and how to behave so to exude truthfulness. The systematic desensitization to the polygraph and relevant questions, in conjunction with training in creating reactions to control questions could provide the subject with enough to defeat conventional polygraphy.

Fortunately, finding unethical polygraph professionals or psychophysiologists to participate in this exercise would be difficult. Also, examiners have at their disposal a variety of techniques, including those that use concealed controls or no controls, and utilization of these methods to prevent predictability is prudent. Finally, regardless of the desensitization, the phenomenon of spontaneous recovery of the fear response is a problem for the subject that is resistant to training.

# Personality

An issue raised among polygraph critics is that certain personality or mental dispositions can interfere with the validity of the examination (Lykken, 1981). This argument has strong intuitive appeal. The polygraph test relies heavily on cognitive underpinnings to support the physiological events. Differences among individuals in temperament, gender, emotional lability, psychological history, intelligence, cultural norms and moral standards pose a serious challenge to the notion that the polygraph is effective equally across subjects.

Personality has not received any attention as a countermeasure, perhaps because it is viewed as an essentially stable characteristic. One has a limited capacity to alter one's essence

simply for a polygraph examination. Nevertheless, while individuals may be unable to effect a personality countermeasure, it might be employed by an organization attempting to penetrate the polygraph security barrier of another organization when a large population of individuals is available for the penetration effort. For example, organized crime groups hoping to gain access to law enforcement information or influence could direct selected members of their group to seek employment with police departments or federal law enforcement agencies. These agents might be chosen for this operation based on personality characteristics that make them resistant to the pre-employment polygraph. A similar scenario could be constructed with foreign agents trying to penetrate American military or civilian intelligence agencies that also rely on polygraph screening of applicants. Such a prospect has frightening implications.

Though the personality countermeasure is not addressed as such in the literature, inferences can be made from studies that attempted to correlate polygraph detection rates with personality characteristics. The following table encapsulates the body of research. Most of these studies have used the traditional polygraph instrument, though some have looked at the electrodermal channel alone.

It is difficult from these studies to identify which personality characteristics would provide the best defense for liars against the polygraph. Though the data point to some personality features that reduce detection compared to a control group or those without the features, problems arise for use as a countermeasure. First, the data indicate that detection rates may be reduced, but not to zero. Detection rates still exceed chance in most of these studies. Secondly, as mentioned earlier, these personality characteristics are not easily altered within a person for the sake of a polygraph examination. Finally, if one selects agents by these characteristics for the purpose of penetrating the security of a police or government agency, the same features for which they are selected make the agents undesirable for other reasons. The delusional introverted unsocialized criminal, even if able to defeat the polygraph, would likely be denied employment with the target agency simply by his employment, psychological or arrest history. Moreover, he may not be true to his clandestine mission even if hired. Taken as a whole, countermeasures using personality traits would probably not be the approach of first choice, though they might hold promise in selected cases or as an adjunct to other methods.

No single personality feature has yet been reported that endorses its use as a foolproof countermeasure. Personality as a countermeasure has not been fully explored, however, and it remains possible that there are other features or combinations of features that could substantially reduce polygraph efficacy without reducing the subject's effectiveness in other areas. The inclusion of psychometric tests as part of polygraph research might provide the answer.

Researcher	Variable	Format	Increase	Decrease	None
Gudjonsson (1979)	Criminality (high)	POT		x	
Buckley & Senese (1991)	Gender	CQT			х
Cutrow, Parks, Lucas & Thomas (1972)	Gender	GKT			х
Furedy, Davis, & Gurevich (1988)	Gender	GKT			х
Honts & Hodes (1982a, b)	Gender	СQТ			Х
Timm (1982)	Gender	GKT			х
Barland & Raskin (1973)	Intelligence	CQT			х
Kugelmass (1967)	Intelligence	GKT			х
Bradley & Janisse (1981)	Introversion	СQТ		х	
Gudjonsson & Haward (1982)	Introversion	GKT	х		
Steller, Haenert & Eiselt (1987)	Introversion	GKT		х	
Bradley & Klohn (1987)	Machiavellianism (high)	СQТ	х		
Kunzendorf & Bradbury (1983)	Prevalence of Visual Imagery (high)	POT			х
Raskin & Hare (1978)	Psychopathy	CQT			х
Patrick & Iacono (1989)	Psychopathy	CQT		х	
Heckel, Brokaw, Salzberg & Wiggins	Psychotic/Delusional	СQТ		Х	

# **INFLUENCE ON DETECTION**

Researcher	Variable	Format	Increase	Decrease	None
Iacono, Boisvenu & Fleming (1984)	Psychoticism	GQT			х
Buckley & Senese (1991)	Race	CQT			х
Windel & Hogan (1975)	Race	OTH			х
Balloun & Holmes (1978)	Socialization	GKT			Х
Honts, Raskin & Kircher (1985)	Socialization	CQT			х
Gudjonsson & Haward (1982)	Socialization	GKT			х
Waid, Orne & Wilson (1979a, 1979b)	Socialization (Low)	GKT		х	
	Tests: $CQT = Co$ POT = Pea GKT = Gu OTH = Oth	ntrol Question k of Tension ilty Knowledge her			

#### Rationalization

The potential use of rationalization as a countermeasure has long been recognized by polygraph practitioners (Reid & Inbau, 1977; Sack, 1993; Streepy). Rationalization is the process by which a verdically guilty subject convinces himself that he is truthful to the relevant questions. Since rationalization involves a measure of creativity, it is best developed well in advance of the polygraph session.

This countermeasure may entail intricate semantic maneuvering, or at times energetic redefining of terms. For example, consider the common case of a job applicant who is being tested on illegal drug use. A frequent report from the field is that subjects will often deny any "drug use" during the pretest interview, but confess in posttest to "trying" or "experimenting with" illegal drugs. These subjects relabel their behavior to be out of the scope of the test question in an attempt to skirt the issue.

No hard data exist regarding the effectiveness of rationalization, nor are there related studies on which to base an estimate. Field examiners appear to be aware that self-deception is a potential countermeasure ploy. However, since semantic games can be detected and neutralized during a professional pretest interview, examiners have not considered rationalization a serious threat.

#### Dissociation

Attention plays a central role in the evoking of physiologic responses used in the detection of deception (Day & Rourke, 1974; Waid, Orne, Cook & Orne, 1978). It is generally accepted that individuals exert significant control over their own attentional resources. It is to the advantage of a deceptive test subject to divert his or her attention away from the questions during a polygraph examination to preempt phasic activity. Imagery, discussed earlier in this paper, tries to exploit phasic physiologic activity through emotion-evoking images. By comparison, dissociation involves simply shifting one's attention away from the test to something neutral and thereby avoiding the cognitive or emotional impact of the questions altogether (Streepy, n.d.).

Dissociation is most potent against tests where subjects answer identically to questions that are very similar, where subjects do not need to attend the questions for content in order to give a rote answer. The GKT and POT are such formats. Even for formats that use both yes and no answers, predictability of question pattern could work in favor of dissociation. Since the outward appearance of a dissociating person is quite similar to that of a cooperating polygraph test subject, detection or observation is problematic. Moreover, polygraph tracings have not been helpful in unmasking this countermeasure (Honts, Raskin, Kircher & Hodes, 1988).

Methods of dissociating are simple. Subjects divert their attention by such ploys as emptying the mind of thoughts, concentrating on an object in the room, or mentally repeating a word or sound. It is perhaps because of the simplicity of dissociation that it is commonly reported among practicing examiners. Honts *et al.* (1988) found that dissociation accounted for 9 of 34 (26%) spontaneous mental countermeasures reported by volunteers in an analog lie detection study.

As a counter-countermeasure, some writers suggest that examiners use questions that include some with yes answers and others with no answers, and that question order be unpredictable to the subject (Sack, 1993; Streepy, n.d.). If a subject answers incorrectly to questions under these conditions, dissociation could be indicated. Another suggestion offered is to require the subject to use a key word from the question during the answer.

Though dissociation is inconspicuous and is easily and spontaneously performed, practicing examiners have not considered it a major threat to polygraph validity. Any method that ensures that the subject processes the content of the test questions appears to be adequate to neutralize this countermeasure. Dissociation can be readily countered with simple pretest instructions and good technique. There is evidence that attempting to dissociate only on particular questions actually enhances detection (Elaad & Ben-Shakhar, 1991) so that tactical and

selective use may be counterproductive as well. Used exclusively, dissociation is not a reliable countermeasure.

# **Cognitive Overloading**

Related to dissociation, cognitive overloading can be used to distract oneself from the polygraph questions. However, cognitive overloading evokes physiological responses in contrast to dampening them. One of the more common approaches is the concentration on arduous mathematic problems. The subject will listen to the test question and provide an answer, but meanwhile will attempt to perform complex arithmetic such as counting backwards from 1000 by 13s. The cognitive processing fully occupies the mind of the subject and results in a physiological arousal. This arousal could be used to amplify reactions anticipated by the subject, or to induce reactions to different questions.

Examiners have known for many years that complex questions evoke physiological responses. Polygraph examiner instruction includes admonitions against unnecessarily complicated wording of test questions since they tend to induce reactions irrespective of truthfulness on the subject's part. Some techniques have taken advantage of responses caused by cognitive processing by using mathematic or deliberately confusing questions during examinations to verify reaction capability within the subject. If the subject is found to produce a response to this type of question, the examiner has a basis for concluding that the subject was able to react to the relevant question, and this method is especially applicable to Relevant-Irrelevant test formats.

The current state of the art provides no reliable method for countering this type of countermeasure. It is also unclear how powerful this method is. Given the ease of use of this countermeasure and the difficulty of its detection, this would be an important avenue of research.

### Class III: Pharmacological/Chemical Countermeasure

Popular lore holds that drugs are effective against the polygraph. The rationale is straightforward and logical; if the polygraph depends on the detection of physiological arousal to relevant questions, dampening or eliminating the responses will help one pass the test even when lying. This view is supported by the work of researchers (Elaad, Bonwitt, Eisenberg & Meytes, 1982; Lienert & Traxel, 1959; Waid, Orne, Cook & Orne, 1981) in which drugs were shown to increase false negative rates with the GKT and POT. Because of the easy access to psychotropic drugs in the modern world and the low rate of laboratory drug testing before polygraph examinations, it is of great interest to the polygraph community to determine whether drugs and chemicals do threaten polygraph validity.

One of the assumptions regarding drugs as a countermeasure is irrefutable; drugs can heighten or dampen physiological arousal. For guilty knowledge tests, drugs would appear to be a significant problem. In those formats equal responding to all the test items results in a decision of truthfulness, and drugs can reduce responses equally to zero at some dosages. Nevertheless,

the evidence does not support the use of drugs as a reliable countermeasure. Contrary to the findings of Waid *et al.*, the effectiveness of drugs against the GKT has not been supported for common pharmaceuticals such as diazepam, meprobamate or propranolol (Iacono, Cerri, Patrick & Fleming, 1992), nor methylphenidate (Iacono, Boisvenu & Fleming, 1984). Because the studies' design by Iacono *et al.* more closely approximated real life circumstances then used by Waid, they call into serious question the power of drugs to neutralize the GKT.

Unlike the GKT, the CQT relies on differential responding to two types of questions, relevant and control. Equal responses to both types of questions during an examination would render an inconclusive outcome, versus a decision of truthfulness. This effect has been found at least with propranolol (Saxe, Dougherty & Cross, 1985). If a drug could be shown to have separate effects for relevant and control questions, the CQT would be clearly vulnerable. To date no drug has been identified with this ability.

Though the employment of Class III countermeasures would not be expected to significantly increase the likelihood of false negative results with the CQT, more inconclusive outcomes are likely. If the objective of the countermeasure user is strictly to avoid a true positive, an inconclusive results might be considered a success. This is pointedly true in circumstances where an action judged as adverse by the subject depends on an outcome of deception, but an inconclusive result would preclude or delay the action, or cause decision makers to rely on other (more favorable) information. Since drugs can produce inconclusive results, and these results are advantageous to some subjects, it is therefore reasonable to suggest a chemical test as an adjunct to a polygraph examination under some circumstances. Blood or urine tests might be advisable in cases such as court directed examinations, sex offender monitoring, and applicant testing for some agencies. The use of such intrusive measures must be balanced against pertinent legal and ethical considerations, but could be appropriate if inconclusive results served the interests of the guilty subject.

An interesting variation of Class III countermeasures is the intentional induction of an alcoholic state just prior to the commission of a crime. Bradley & Ainsworth (1984) programmed subjects to commit a mock crime while intoxicated by alcohol. Their deceptions were significantly less detectable with the polygraph than for those who committed the mock crime while sober. This held true for both the CQT and the GKT, though for different reasons. Bradley *et al.* proposed that alcohol may have interfered with the emotional impact of committing the crime for subjects, an element central to the CQT. The effect on the GKT was attributable to deficiencies in the encoding of the details of the crime during its commission, thereby reducing the signal value of the critical items. Bradley noted that a significant proportion of real crimes are committed under the influence of alcohol, and therefore alcohol's impact on polygraph validity is an important question. Replication of their work at this writing is wanting.

Besides the inhaling and ingesting of drugs and chemicals, it is also possible to mediate electrodermal responses with topical preparations. Subjects can reduce electrodermal activity directly with chemicals such as antiperspirants, or they can interfere with the coupling between the skin and sensor with substances like glue, hand creams and rubber cement. Fleming and

#### Polygraph Countermeasures

Logan (1976) found all of these types of substances reduced the magnitude of the recorded electrodermal responses. While none eliminated the phasic responses, some reduced their sizes to only 7% of the non-chemical comparison measurements. The constrained lability would make the strip charts more difficult to interpret, if not more suspicious in appearance, but there is no evidence that it would introduce errors into the decision process. And like the use of pharmaceuticals, these substances do not show different effects for relevant, irrelevant or control questions. Finally, this particular countermeasure is detectable by visual inspection of the recording sites, or neutralized by simple washing.

### Class IV: Behavioral Countermeasures

Despite repeated anecdotal reports in the polygraph literature and advice in the counterculture press, this last class of countermeasures is one for which there is a total absence of research. This may be because behavioral countermeasures are not a question in psychophysiology, but rather social psychology. Behavior countermeasures have two main functions. The principle function of behavioral countermeasure is to convince the examiner that the subject is not deceptive, irrespective of reactions on the strip charts. Another function is to affect the conduct of the examination so that the data will be inadequate to render a decision.

An example of the former can be found in a case study reported by Law, Schottgen & Pennington (1978). In this report the test subject employed perhaps three of the four categories of countermeasures. Noteworthy to the current point, Law, *et al.* wrote:

She also attempted to sway the examiner with her numerous marital, financial and emotional problems. (pg. 37).

Law considered the subject's statements an attempt to mitigate the interpretation of the polygraph recordings. Fortunately in this case the examiner remained objective and reported her test recordings as indicating deception, an outcome the author reported as confirmed.

While the subject of Law's case study may have initiated this maneuver on her own, there are polygraph countermeasure instruction books available that offer similar advice. In *Beat the Box: The Insider's Guide to Outwitting the Lie Detector* (Kalishnikov, c. 1985) the author reassures the potential polygraph subject that though "you can't beat the polygraph system (technique), but you can beat the operator" (parenthetical note added). Similar advice can be found in other guides (French & Van Houten; Lapin, 1983). The central theme is that examiners are human beings who can be influenced using a few simple methods, and that one can use these methods to defeat the polygraph through the polygraph examiner.

The second type of behavioral countermeasures focuses on attacking the polygraph system. In this approach the subject uses ostensibly valid reasons for interfering with some elements of the examinations. If, for example, a subject can exert control over his availability for the examination, he may be able to restrict the amount of time the test can last. He can demonstrate his "cooperation" by appearing at his appointed time, even participating in a portion of the

testing, but set time limits in which it is impossible to conduct a valid examination. This is a particularly potent countermeasure if the subject also knows that no adverse action will be taken if his results are inconclusive. He will have appeared to be cooperative, but actually be manipulating the examination to prevent a valid interpretation.

Another example of trying to defeat the polygraph process is the use of interference by legal representation. The aim of this countermeasure is to shape the examination in favor of the defendant. Clever defense attorneys will attempt to dictate the wording of relevant questions, restrict the type of format employed, or dominate the conduct of the polygraph session of their clients. Though attorneys are within their rights to use all legal means to defend the interests of their clients, the validity of the outcome can be diminished when non-examiners impose themselves on the conducting of a polygraph examination. A lowered accuracy serves the interests of a guilty subject, and any attempt to reduce the accuracy of the polygraph examination must necessarily be considered a countermeasure. Examiners are generally on guard for this tactic, though many attorneys will continue to present special challenges.

Though not specifically a polygraph countermeasure, another related method is to attack the system which includes the polygraph. Let's suppose that policies or legislation prevented a police department from disqualifying an applicant solely on a polygraph decision of deception. It is standard practice in the field to use the polygraph, not only to detect untruthfulness, but also to elicit background details from applicants that may be difficult or impossible to discover by other means. If the applicant knew of the prohibition against disqualifying candidates with only adverse polygraph test results, he could take the examination but provide no information that might be construed as disqualifying. He could lie about or withhold details of any number of criminal activities he had engaged in, but remain adamant about his innocence despite his deceptive responses on the strip charts. The net result would be that the deceptive applicant would remain a viable candidate for employment, and barring the discovery of derogatory information from other sources, could gain employment. As stated earlier, this is not a polygraph countermeasure by the definition set forth at the beginning of this paper, but rather a behavior that diminishes the ability of the polygraph to help uncover the truth, and one that policy makers should be mindful of.

Given the substantial amount of counter-polygraph advice offered by the counterculture press (and sometimes mainstream press) on how to behave during a polygraph examination, practicing examiners should remain sensitive to the possibility of behavioral countermeasures. The warm smile, light attitude, good eye contact, open gestures, and eager compliance may be merely studied or coached demeanor. The use of legalities could be a guise for a sophisticated manipulation of the polygraph process.

There are only two main defenses against the behavioral countermeasure. Examiners should adhere to these principles in every session to reduce the potential effect of behavioral countermeasures: They are:

1. Examiners should refuse to conduct any session where the conditions are not under his or her control. That includes the test coverage, time limits, question scoping, technique, instrumentation and any other essential elements of a competent examination.

2. Objective analysis of the test charts with a recognized system must be employed with every examination. Validated scoring systems and algorithms are not influenced by extraneous or misleading behaviors, and they should be the primary basis for polygraph decisions.

# Summary

This paper was written with the objective of bringing order to the vast array of countermeasures available to the test subject. Though every effort has been made to identify as many polygraph countermeasures as possible, others certainly exist. This writer suggests that, though this taxonomy is broad and encompassing, expansion of it may come about as the contest between deceivers and truth verifiers moves into the computer age, introducing both the potential for more powerful deception detection methods and new ways of countering them. Polygraphists must be ever vigilant because, despite their best efforts, the adage "what can be invented can be circumvented" will always apply.

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### **CORRECTION**

Please add the following line to the article by Eitan Elaad and Ilana Elaad. Question Technique in Vocational Search," which appeared in *Polygraph* (1996) <u>2</u> between the lines 20-22 from the top, the following information: "(M=1.54, SD: at all about the relevant question." This insert is just before the line "(M=0.08, S is necessary to understand the reported interaction. We regret the omission. [Ed.]

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### THE CONTROL QUESTION TECHNIQUE IN VOCATIONAL SEARCH

By

### Eitan Elaad and Ilana Elaad

#### Abstract

Ten men and sixteen women, randomly assigned to a guilty and an innocent condition, were presented a set of 10 Control Question Technique questions as a paper-and-pencil test. Subjects indicated up to three questions about which they felt most concern. Analysis indicated guilty subjects were more concerned about relevant questions and innocent subjects about control questions. This controversial Control Question Technique, commonly used in interrogative polygraphy, can be successfully applied in a vocational search context. It was suggested that the rationale underlying the procedure corresponds to a broader phenomenon than the polygraph examination.

The main tool in criminal polygraph investigations is the Control Question Technique (Reid & Inbau, 1977). The assumption is that innocent subjects, who are telling the truth when denying involvement with the crime, should be less attentive to relevant questions which refer directly to that crime. They should be more attentive to control questions which are designed to cause subjects to be doubtful and concerned about the veracity of their answers by raising past misdeeds. For example: "Before you joined the army, did you ever steal something valuable?" Guilty subjects, who are deceptive to both relevant and control questions, should be more responsive to the specific relevant questions than to the more general control questions. This rationale has often been criticized as implausible since for any subject, guilty and innocent alike, the relevant questions play a major role. It is, therefore, unlikely that relevant questions will be equivalent to control questions (Ben-Shakhar & Furedy, 1990; Lykken, 1974).

The present study was designed to examine the hypothesis that the rationale of the Control Question Technique can be effectively applied in situations other than interrogative polygraphy.

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### Method

Ten men and sixteen women, all students of the Hebrew University who applied individually for a vocational consultation, volunteered to take part in the study. Their mean age was 23.6 (SD=2.2) yr.

Half of these subjects were randomly assigned to a guilty condition and were asked to act in an hypothetical situation in which they are looking for a job and face the need to deceive the potential employer about their qualifications in order to enhance their prospects. The other half were asked to act in an innocent context according to which they posses the desired qualifications and therefore are telling the truth to the employer.

Both groups were invited to an hypothetical interview with their employer and were presented a set of 10 questions including two relevant questions asking about their qualifications (Nos. 5 and 8) and two unexpected control questions asking about hypothetical misdeeds of their prior employment (Nos. 6 and 9). After completing the Control Question Technique set subjects were asked questions about the hypothetical situation to indicate whether they understood their role. One additional question asked the subjects to indicate up to three questions about which they were mostly concerned. The mean number of each type of question mentioned by each group of subjects served as the dependent variable.

A two-way analysis of variance (2 conditions and 2 types of questions), with repeated measures for the questions, was conducted on the mean number of the most concerning questions. Of interest is the significance interaction ( $F_{1,24} = 40.2$ , p < .001) which indicated that guilty subjects were more concerned about relevant questions (M = 1.31, SD = 0.49) than about control questions (M = 0.62, SD = 0.49) and innocent subjects were concerned about control questions (M = 0.08, SD = 0.27).

Results confirmed the hypothesis based on the rationale for the Control Question Technique. Note that this was demonstrated in a vocational search context which is different in many respects from the usual context of polygraphic interrogation. The results may suggest that the rationale of the questioning technique corresponds to a general phenomenon which predicts differential attention of guilty and innocent subjects to relevant and control questions.

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## POLYGRAPH TESTING PROCEDURE IN MALAYSIA

#### By

#### Lee Ewe Kiang

#### Introduction

The Royal Malaysian Police (RMP) acquired a Lafayette LX2000W computer polygraph equipment in early 1995. With this purchase, the scientific technique of "lie detection" using polygraph was for the first time introduced in Malaysia as an investigative tool. This new method will solely be used in the Criminal Investigation Department (CID) for specific testing of criminal cases in the national Police Force. An officer was sent for basic training in polygraph examination at Maryland Institute of Criminal Justice from 10 April 1995 to 16 June 1995 (ten weeks). It is hoped that with the training of this officer, and possibly more officers will be undergoing similar training; the scientific "lie detection" using polygraph will start off in a proper and correct manner. This paper is put forward to stipulate a proper procedure for polygraph testing in Malaysia.

### **Polygraph Testing**

The polygraph is a simple instrument that monitors and records physiological changes occurring in the body. This includes changes in blood pressure/pulse rate, respiration pattern (breathing), and the resistance of the skin.

Blood pressure/pulse rate are measured by a standard sphygmomanometer. This is the same as used by doctors, using the blood pressure cuff which wraps around the arm and is pumped up. Respiration pattern (breathing) is measured and recorded by two bellow tubes. One attaches around the chest and one around the abdominal area. They will expand and contract with each inhalation and exhalation. The resistance of the skin - called "GSR" for galvanic skin response - is measured by placing two electrodes on subject's skin (usually two non-adjacent fingertips). These measure and record changes in the skin resistance as the test is in progress.

The author is a member of the American Polygraph Association and in charge of the development of a polygraph program in Malaysia. His discussion of polygraph testing and his manual on polygraph procedures in the Appendix may serve as a model for other law enforcement agencies developing a polygraph program. (Ed.) For reprints write to Lee Ewe Kiang, Royal Malaysian Police, Criminal Investigation Department, Federal Police Headquarters, Bukit Aman, 50560 Kuała Lumpur, Malaysia.

When the test is completed, the examiner will have four tracings to study and interpret: Two for respiration pattern (breathing) called the pneumograph, one for the GSR and one for blood pressure/pulse rate, the cardiograph.

The polygraph records the physiological changes on a "polygram" or chart paper, which moves under the recording pens at six inches per minute.

The operation of the polygraph technique depends upon a human phenomenon that was first discovered in the 1920's. That is the direct relation between a psychological simulation some condition perceived by the mind - and a physiological reaction, a condition manifested by the body. As an example, if you experience something frightening the wits out of you, feeling a cold chill, cold sweats, or a general quaver in your voice and muscles. These symptoms were caused by the danger your mind perceived.

If someone asks you a question about some wrongful conduct that you have in fact committed, you cannot help but remember what you have done. If you admit it, you are inviting punishment. If you deny it, knowing that you are lying, you risk getting caught. During a polygraph test, the risk is that your body will give you away.

# **Users of Polygraph Testing**

The polygraph technique is most widely used today by the law enforcement community in the United States. It is used as part of the pre-employment screening process for police candidates, and as a forensic technique to help resolve the investigation of criminal offenses.

According to a recent survey, about 60% of the large police departments in the United States use polygraph testing in the pre-employment screening process. Police agencies have found that polygraph testing is a very effective means by which to identify high-risk candidates. In a recent case study in Illinois, Ohio, Maryland, and Florida, it was found that out of 3576 police applicants given pre-employment examinations, 58% (2068) were identified as high-risk candidates for police work. They had behavioral histories of involvement in activities such as felony thefts, burglaries, robberies, the use of illegal drugs, bribery, car thefts, and various sexual offenses.

The law enforcement community has used polygraph testing as an investigative aid to:

- -- verify the statements of victims;
- -- establish the credibility of witnesses;
- -- evaluate the truthfulness of suspects.

However, polygraph testing results are not the sole basis on which decisions are made; polygraph results are used with other screening or investigative information.

#### Lee Ewe Kiang

### **Countries That Use Polygraph Testing**

Polygraph testings are used in many countries other than the United States. Of interest to note is Israel, Canada, Japan and India.

Israel, like India and some other nations, has a great diversity of cultures within its borders but applies polygraph testing to all of them. The results of polygraph tests are not admissible as evidence in criminal trials in Israel. However, prosecutors may be influenced by favorable test results. In civil trials the results of tests are admissible under stipulation. Israel is one of the few nations that has had the benefit of formal training of polygraph examiners. The others are the United States, Canada, Japan and Turkey.

Canada is a bilingual nation, and many polygraph examinations are conducted in French. The Canadians have a basic polygraph training course at the Canadian Police College in Ottawa. All Canadian law enforcement examiners are trained there. Many law enforcement examiners from the United States have also received their basic training at the Canadian Police College. Polygraph results are not admissible in Canada, however, they play a significant role in investigations.

In Japan, results of polygraph tests are very important as they are admissible in evidence in criminal trials.

India uses the polygraph extensively in law enforcement, despite the 15 languages and variety of cultures involved. India began the use of polygraph examinations in 1948 after an officer of the rank of inspector of the CID in Bangalore, completed a six-week course in the United States. It was said that polygraph was used in narrowing down suspects in the Mahatma Ghandi assassination plot. However, after some research and a few cases, polygraph testing ceased until 1974. The results of tests conducted by police officers are not generally accepted by the courts. There have been a few accepted. The courts are more likely to accept the results if the test is by a person other than a police officer and for the benefit of the defense. There is field research indicating a validity between 90% and 98%. Between 1974 and 1987, the Central Forensic Laboratory conducted over 3,000 examinations.

### Specific Issue Examination

The specific issue examination is designed to determine whether the subject is telling the truth regarding a specific alleged incident, *e.g.*, theft, sexual harassment, sabotage, arson, etc. During the pretest interview the examiner discusses, in a non-accusatory manner, the issue under investigation. He asks questions to develop investigative information from the suspect. This includes subject's opportunity, access, motives, or propensity to commit the crime. He will also ask behavior provoking questions that provide insight to the subject's truthfulness. This is by eliciting verbal and nonverbal "behavior symptoms" of truth or deception. The examiner also evaluates the subject's physical and emotional suitability for the examination. He assesses the presence of underlying emotional states known to affect the examination results such as anger,

#### Polygraph Testing Procedure in Malaysia

guilt through negligence, or emotional defeat. During the pretest interview the examiner formulates and reviews with the subject all of the questions that will eventually be asked during the examination. Of particular importance here is the development of the control questions. The selection and formulation of which will be dictated by the examiner's ability to determine whether or not the subject is uncertain in his answer to the control question. It is also to decide if the subject perceives the control questions a threat to their goal of the examination.

All of the questions will be reviewed with the subject. This is to make sure that he can answer each of them with just a "yes" or "no" response. The chart recording phase of the examination then begins. During a specific issue examination the examiner will conduct three to five separate polygraph tests, each contains the same questions. While the tests vary in purpose and design, the goal of the examiner is to select a test or stimulation statement (offered between tests), which will enhance the subject's discrimination between relevant and control questions.

When all tests have been completed, the final stage of the examination is the evaluation of the subject's polygraph charts. The examiner evaluates the consistency and degree of physiological arousal in deciding truth or deception. These are arousal occurring during the asking of the relevant and control questions. After reviewing the polygraph chart the examiner may decide that the charts clearly indicate truthfulness or deception. On the other hand, if the subject's responses to relevant and control questions are inconsistent or erratic, the examiner may render an inconclusive opinion. He must conduct further specialized tests, or withhold an opinion and schedule the subject for a reexamination.

### The Accuracy of Polygraph

In the past 75 years over 250 studies have been conducted on the accuracy of polygraph testing. It is difficult to draw from the data a precise figure for the accuracy of polygraph testing in all settings. There are many different conditions and factors involved in the research and a polygraph examination is a very complex process. Nevertheless, the available information indicates that a properly trained examiner using an established testing procedure can achieve an accuracy of 85-95% for specific issue investigations.

While the polygraph technique is highly accurate, it is not infallible and errors do occur. Polygraph errors may be caused by the examiner's failure to properly prepare the examinee for the examination, or by a misreading of the physiological data on the polygraph charts. Errors are usually either false positives or false negatives. A false positive occurs when a truthful examinee is reported as deceptive. A false negative occurs when a deceptive examinee is reported as truthful.

It is recognized that any error is damaging. Examiners use a variety of procedures to identify the presence of factors that may cause false responses, and to insure an unbiased review of the polygraph records. These include:

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- -- an assessment of the examinee's emotional state;
- -- medical information about the examinee's physical condition;
- -- specialized tests to identify the overly-responsive examinee and to calm the overly nervous;
- -- control questions to evaluate the examinee's response capabilities;
- -- factual analysis of the case information;
- -- a pretest interview and detailed review of the questions;
- -- quality control reviews.

# **Problems To Be Encountered**

In the infancy of the use of the polygraph as an investigative tool in criminal cases in Malaysia, it is inevitable to encounter some problems. The likely problem areas will be:

# Acceptability/resistance to change.

The Criminal Investigation Department of the Royal Malaysian Police had been investigating various criminal cases over the years with commendable results without the use of the polygraph. It will be some time before full acceptability being rendered to polygraph testing. Moreover, most people will not accept changes to new things/ideas. Without a positive attitude to change, current investigators might be purposely uncooperative. In so doing a fit subject may become unfit for testing if excessive interrogation is purposely done before that.

# Reliability of Polygraph Testing has to be proven first.

The starting phase of the use of polygraph is most crucial here. This technique must prove to be valid and reliable in the different cultural and environmental background in Malaysia. It needs a trial period for its reliability is to be realized.

# Insufficient number of examiners and equipment.

It is insufficient to have only one instrument and one examiner trained to provide polygraph examinations in the whole country. Only selected category of cases will be subjected to the use of this new technique. Program must provide for training of more officers to become polygraph examiners and acquiring more equipment in the future.

# Problem of language.

Most officers in the Royal Malaysian Police write and speak more than one language. However, there is a need to bear in mind the diverse racial mix of the Malaysian population. The population is made up of Malays, Chinese, Indians and some minority races. The application of polygraph testing must consider this point. The training of more officers of different racial mixes and officers with different language capabilities will solve this problem. The use of interpreters must also be considered.

### **Polygraph Procedures**

Polygraph technique is not a substitute for good police work. It is only an investigative tool. With the polygraph technique, the investigator should be satisfied if it helps determine whether the subject is lying or telling the truth regarding the primary issue.

It is important that proper Guidelines/Procedures for Polygraph Testing be implemented right at the start of the polygraph program in Malaysia. A suggested procedure format is attached as an Appendix. These procedures will, hopefully, recognize the inherent limitations, prevent the misuse of the work product, and in particular, protect the basic human rights and well-being of those tested. It is also hoped that it will promote professionalism and a high standard of practice.

# APPENDIX

# **POLYGRAPH PROCEDURES**

#### I. PURPOSE

To establish guidelines and policy for the use of polygraph in support of the investigative activities of the polygraph department.

### II. DISCUSSION

Polygraph will be used as an investigative tool in the resolution of criminal cases and other matters reasonable within the jurisdiction of the police department. Polygraph will serve as an adjunct to, but not a substitute for, other investigative efforts. Examinations are conducted for determining the veracity of the person tested regarding the issue under investigation, and to arrive at the truth concerning that issue.

### III. PERSONAL QUALIFICATIONS

- A. Personnel assigned as polygraph examiners shall:
  - 1. Have successfully completed a basic course of polygraph instruction at a recognized polygraph school;
  - 2. Maintain and demonstrate proficiency as an examiner and satisfy established quality assurance procedures in the conduct of these examinations;

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3. Conduct his official duties in a way that reflects the highest standards of ethical conduct as a polygraph examiner and as a police officer.

# IV. EQUIPMENT

- A. Polygraph instruments used shall be of commercial manufacture, and shall have not less than three (3) functioning recording channels.
- B. Instruments shall record, as a minimum, respiratory activity, galvanic skin resistance or conductance, and cardiovascular activity.
- C. Procedures outlined by the instrument manufacturer will be followed on a regularly scheduled basis. This is to insure the proper function and calibration of the instrument. Instruments that fail to meet such standards will not be used for testing.

# V. ENVIRONMENT

- A. Tests and interviews will be conducted in a clean, neat environment, free of audible and visual distractions.
- B. Examiners will be neat and well groomed. Dress will be consistent with the standards of the business or professional community in the area.
- C. Uniforms will not be worn, and emblems of authority (badges, etc.) will not be openly displayed. Weapons will not be carried into any polygraph room. This is to safeguard the safety of both examiner and examinee.

# VI. PROCEDURES

- A. Appointments:
  - 1. Appointments will be scheduled and approved in keeping with command policies of the police department. Priorities should be established based upon the seriousness of the crimes involved, and most likely suspects should be scheduled first.
  - 2. Document of details of the crime, including but not limited to the initial report of the incident, prior statements of the potential examinee, and information supporting and/or contradicting those statements, should be provided to the examiner at the time of scheduling. Known pertinent information will not be withheld from the examiner.

- 3. Examinations will not be scheduled until investigation has developed adequate specific information to serve as a basis for the examination, and examinations will not be scheduled in lieu of other investigative effort.
- 4. Not less than three (3) hours will be scheduled for any examination.
  - a. Recognizing the possible detrimental effect of examiner fatigue upon accuracy, not more than two (2) appointments will routinely be made for any examiner during any duty day.
  - b. Although exceptional circumstances may dictate the conduct of a third examination during a given day, this will only be attempted with command approval, and will not be a matter of general practice.
- 5. Persons will not be scheduled for examination immediately following extensive or accusatory interview or interrogation, or who have indicated they are not willing to submit to the process.
- 6. Persons will not be scheduled for examination at a time when they:
  - a. are obviously fatigued or in ill health,
  - b. are physically injured or in pain,
  - c. whose judgement is obviously influenced by alcohol or drugs,
  - d. or who have just suffered physical or emotional trauma.
- Lacking physical evidence and/or witness that contradicts the allegations, the suspect will be asked to submit to examination before the victim in the case. Victims will not be scheduled for examination if adequate physical evidence exists to support their allegations.
- 8. Persons under the age of 18 will not be scheduled for examination until formal, written, and informed consent has been obtained from the individual's parent or legal guardian.
- B. Pre-Examination Activity

Pre-examination activity is defined as the actions of the examiner in preparation of the arrival of the examinee.

 Before attempting an examination, the examiner will review all existing reports and statements pertinent to the issue under investigation. Conferences with involved investigators may be held if deemed appropriate. Based on this information, coupled with the legal "elements of the crime" which must be proven or disproved, targets or issue(s) to be resolved will be selected.

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- 2. Necessary waivers and consent forms will be prepared, specifically identifying the incident to be addressed by the examination.
- 3. Procedures to calibrate the instruments to be used will be followed as required.
- C. Pre-Test Activity

Pre-test activity is defined as the contact between the examiner and the examinee prior to administering the polygraph test.

- 1. When brought into the room used for the examination, the examinee will first be advised of the recording and/or observation procedures in use, and will verbally consent to those procedures before proceeding.
- 2. The examiner will explain the purpose of the examination to the examinee, that participation in every aspect of the examination process is voluntary, and that:
  - a. the examinee may not be forced or in any way required to submit to the examination or make any statements or answer any questions concerning the issue under investigation;
  - b. the examinee may terminate the examination process any time for any reason whatsoever;
  - c. the examinee may consult with legal counsel any time prior to or during the examination process;
  - all statements of the examinee pertinent to the issue under investigation and the results of the examination can and will be made available to persons and agencies involved in the investigation and/or adjudication of the issue to be resolved; and
  - e. any other legal requirements or conditions imposed by law.
- 3. Personal data to adequate identify the examinee will be obtained and recorded in writing. This will include, but not necessarily be limited to, the full name of the examinee, any alias(s) used, date and place of birth, address, and usual or present occupation.
- 4. The examinee will be queried concerning recent or ongoing health problems and general physical condition at the time of the examination. This will include, but not necessarily be limited to:
  - a. the examinee's opinion concerning his/her general physical condition;
  - b. any ongoing pain or physical discomfort;
  - c. any recent or ongoing psychiatric care;
  - d. and in the case of women, pregnancy.

- 5. The examinee will be queried with regard to his/her medical history, including but not limited to:
  - a. recent major medical problems that required hospitalization;
  - b. cardiovascular disease;
  - c. neurological problems (stroke, seizures, or epilepsy);
  - d. and, past psychiatric care.
- 6. The examinee will be queried about the use of medicines, drugs, or alcohol during the period preceding the examination.
- 7. The examiner shall not proceed with the examination if he has reason to believe the process could be detrimental to the physical or emotional well-being of the examinee without first obtaining the advice of competent medical authority.
- 8. The issue under investigation will be discussed in detail with the examinee. Information concerning the examinee's knowledge of the issue will be elicited, as well as the claimed source of that knowledge. Minor discrepancies between previous statements of the examinee and those made at the time of this interview will be noted. The interview will not be conducted in an accusatory manner. If major discrepancies are uncovered during the interview, the examiner may attempt to resolve those discrepancies before attempting the examination.
- 9. When the issue to be resolved is the veracity of a police officer with regard to an internal investigation:
  - a. Questioning in relevant areas will be limited to the specific area(s) of inquiry which are the focus of the investigation.
  - b. The polygraph examination process will not be used as a "fishing expedition" to develop information in areas that are not included in the allegations under investigation.
  - c. The examiner will strictly comply with the police department's established policy, procedures, and the provision of law.
- 10. The theory of polygraph will be discussed in a manner understandable to the examinee. Questions in the mind of the examinee concerning the technique and/or process will be elicited, and will be answered in as far as possible.

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# D. Test Activity

Test activity is defined as that portion of the examination process that involves the actual use of the polygraph instrument.

- 1. Only standardized and widely accepted techniques will be used during the course of the examination. The basic structure of a technique will not be altered. Question function and sequence will be in keeping with the technique employed.
- 2. The final formulation of questions to be used will be based upon the statements of the examinee during the interview.
- No question will be asked during the test that has not been discussed and reviewed with the examinee. The examinee will agree to the exact phraseology of each question to be asked before such a changed question is asked.
- 4. Question pacing and spacing will be in keeping with the standards of the technique being used.
- 5. The type of physical activity recorded will be identified for each tracing. If electronically enhanced equipment is used, the amplification or "sensitivity" being used will be recorded at the beginning of each chart.
- 6. The amount of pressure in pressurized systems will be recorded at the beginning and end of the tracing.
- 7. Changed and adjustments to tracings during the course of the examination will be marked or recorded using a standardized procedure.
- 8. At the end of the test (or end) of each chart, the time of the beginning (or end) will be recorded on the chart.
- 9. At the beginning of the test (or the end of each chart), the examinee will be asked to sign the chart for purposes of identification of that chart.
- 10. As a minimum, all charts will be marked with an identifying case or file number, the name of the examinee, the date of the examination, and the signature or initials of the examiner.
- 11. An opinion concerning the veracity of the examinee (truth or deception) will be based on not less than two (2) charts or repetitions of the questions used to form that opinion.

12. Opinions will be based upon a standardized system of numerical evaluation or other formalized procedure validated through research.

E. Post-Test Activity:

Post-Test activity is defined as the events that follow the actual use of the polygraph instrument.

- 1. The examinee will be advised of the examiner's opinion resulting from the evaluation of the charts obtained.
- If the resulting opinion is one of deception, the examinee will be given an opportunity to explain the recorded reactions indicating the deception. Absent of any feasible explanation, interview techniques will be employed to arrive at the truth of the issue addressed by the examination.

# VII. RECORDS AND REPORTS

- A. Records of examinations, including the charts obtained, will be subjected to quality assurance procedures established by the police department and/or the responsible regional or state agency. Should those procedures not support the opinion of the testing examiner, the examinee will be given an opportunity to resubmit to the examination.
- B. Information obtained from the examinee that is not directly related to the issue under investigation which could disadvantage or creates legal liability for the examinee will not be reported without first obtaining the consent of the examinee.
- C. The results of an examination and information obtained from the examinee concerning the issue under investigation will not be released to any person or agency other than those authorized by the examinee. Written reports of the examination will be annotated to that effect.
- D. Records, documents, and recordings obtained during the course of an examination will be maintained for not less than three (3) years (or as otherwise required by law) in a manner which protects their confidentiality.
  - 1. Charts produced during calibration procedures may be maintained with the records of the first examination of the day.

# VIII. USE OF INTERPRETERS

A. An interpreter is necessary whenever a language barrier exists between the examiner and the subject.
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# B. Selection

- 1. Whenever possible, it is desirable to make use of an interpreter whose services are available on, more or less, a permanent basis.
- 2. The interpreter must be briefed on, and understand thoroughly, polygraph examination technique.
  - a. Use of same identical delivery of each question.
  - b. Purpose and value of the pretest interview.
  - c. He must be able to translate precisely for interrogation purposes.
    - (i) If possible, should have interpreter who is an experienced interrogator who can take over if the point is reached where the subject is ready to make a statement.
- 3. The interpreter must be a person whom you can trust completely.
  - a. There must be no question of loyalty to the examiner. He/she must not sympathize with the subject, be dishonest, or be partial in any respect.
  - b. He/she must translate the exact connotations and nuances of both parties.
- C. To conduct an Examination through an interpreter.
  - 1. Seat the interpreter at the left side of the examiner so he/she can see the examiner, the question sheet, and the polygram as it is being created while simultaneously, looking at the subject.
    - a. The interpreter is never placed in front of the subject, even during interrogation.
  - 2. The examiner is to remain completely silent during the actual examination.
    - a. The subject might understand part or all of any comment by the examiner and react to that question as well as its repetition by the interpreter, thus causing a confused polygram.
    - b. The examiner should point to each question to be asked in advance of its use.
      - (i) This familiarizes the interpreter when he wants each question asked.
    - c. The examiner signals to the interpreter when he wants each question asked.

- d. The examiner controls the entire examination using the interpreter as an aid.
- 3. Interrogation

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- a. It is recommended that the interpreter be placed to the right of the examiner who sits in front of and faces the subject.
  - (i) This allows the examiner to talk directly to the subject and note any physical manifestations that may present themselves.

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Stehney v. Perry 1995 WL 688283 Fed Supp (D.N.J.)

Ann K. Stehney, Plaintiff,

v.

William J. Perry et al., Defendants

No. CIV. 94-6306(GEB).

United States District Court,

D. New Jersey.

Nov. 6, 1995.

ORDER

## **BROWN**, District Judge.

\*1 This matter comes before the Court on the motion of federal defendants, William J. Perry, Secretary of Defense, J. Michael McConnell, Director, National Security Agency/Central Security Service ("NSA"), Lee Hanna, Chief of Management Services for NSA, Jeanne Zimmer, current Chief of Management Services for NSA, to dismiss plaintiff's complaint pursuant to FED. R. Cry. P. 12(b)(1) & (6), and on the motion of nonfederal defendants, The Institute for Defense Analysis, Center for Communications Research ("IDA/CCR"), and David M. Goldschmidt, Director of IDA/CCR, for summary judgment pursuant to FED. R. CIV. P. 56. For the reasons set forth in this Memorandum Opinion, this Court will grant federal defendants' motion to dismiss Counts I through V of the Complaint. Further, this Court will deny nonfederal defendants' motion for summary judgment pursuant to FED. R. Civ. P. 56 and, instead, will dismiss Count VI of the Complaint pursuant to 28 U.S.C. sec. 1367.

The case is printed in its entirity because it may be useful to federal, state, and local law enforcement agencies officials who find their polygraph programs challenged. While the Federal regulations differ here because clearance for access to classified information was involved, many of the fundamental rulings have broad application. [Ed.]

### I. BACKGROUND

## A. The Polygraph Policy

NSA is an agency within the Department of Defense ("D.O.D.") charged with protecting and gathering sensitive information relating to national security. See 50 U.S.C.A. sec. 402. IDA/CCR, a non-profit "think tank" located in Princeton, New Jersey, assists NSA by performing extremely sensitive research in cryptology--the making and breaking of codes and other secure communications. Compl. para. 4. To conduct this research, IDA/CCR employees must have access to top-secret classified information, "the unauthorized disclosure of which reasonably could be expected to cause exceptionally grave damage to the national security." Executive Order ("E.O.") 12356, sec. 1.1(a)(1); 3 C.F.R. 174 (1983). Because this material is "particularly sensitive information" pertaining to intelligence activities and "intelligence sources or methods," it is restricted to a "special access program," E.O. 12356, sec. 4.2, known as "Sensitive Compartmented Information" (SCI").

Access to SCI may be granted only after "a determination of trustworthiness has been made by agency heads or designated officials." *Id.* sec. 4.1(a). This judgment is intended to be "an overall common sense determination," see Director of Central Intelligence Directive No. 1/14 ("DCID No. 1/14") Annex A at 9 (Jan. 22, 1992), annexed to Declaration of Paul W. Naper ("Naper Dec.") as Exh. A1, made after a "thorough" background investigation "designed to develop information as to whether the individual clearly meets the SCI personnel standards." *Id.* para. 7.a. at 3. The background investigation includes "records checks and personal interviews of various sources by trained investigative personnel," *Id.* para. 7.b. at 3, in the aid of which the subject is required to furnish fingerprints, and a personal-history statement delving into the subject's personal life. *Id.* at para. 7.c. at 3. The subject is also required to sign releases, "as necessary," of "police, credit, financial, education, and medical records," and may be required to provide photographs of herself. *Id.*. In all cases, at least one interview of the subject is required, and "[a]n additional personal interview will be conducted when necessary to resolve any significant adverse information and/or inconsistencies developed during the investigation." *Id.* para. 8.d. at 4.

\*2 Reinvestigations to determine continued eligibility for access to classified information must be conducted at least once every 5 years. *Id.* para. 10.a. at 5. To facilitate the reinvestigation, the subject must furnish an updated personal history statement and sign appropriate releases. *Id.* para. 10.b. at 5-6. "In all cases," the reinvestigation requires a "personal interview" addressing such matters as foreign assignments, connections and associations; approaches by foreign intelligence agencies; unreported breaches of security procedures; drug use; and criminal activities. *Id.* 

Since 1953, NSA has conducted all security-clearance interviews of agency employees with the aid of a polygraph. Department of Defense, The Accuracy and Utility of Polygraph Testing 11, annexed to Naper Dec. as Exh. A12. When IDA/CCR was created in 1959, however, D.O.D. allowed an exception for professional employees. See Memorandum of Louis J. Bonanni,

Deputy Director for Administration at 1 (Dec. 11, 1980), annexed to Naper Dec. as Exh. A6. Non-professional employees, including administrators, clerical workers and security personnel, were required to undergo polygraphs. *Id*.

D.O.D. reversed this policy in 1982, however, and authorized the use of polygraph interviews on an aperiodic basis, and in connection with security-clearance reinvestigations, for all personnel with access to SCI, including all contract employees. Periodic Reinvestigation Procedures for Individuals Cleared for Access to Sensitive Compartmented Information (SCCI), Art. 1 at 1-2 to Memorandum of Frank Carlucci (Aug. 6, 1982), annexed to Naper Dec. as Exh. AT. One month later, NSA issued a directive that all "[c]ivilian, military and contractor personnel cleared for access to NSA SCI shall be requested to take polygraph examinations on an aperiodic basis at any time after their initial clearance," Memorandum of Lincoln D. Faurer at 1 (Sept. 27, 1982), annexed to Naper Dec. as Exh. AS, and IDA/CCR was instructed to inform its employees that the policy would go into effect on March 7, 1983. Letter of Philip T. Pease at 1 (Feb. 4, 1983), annexed to Naper Dec. as Exh. A9. The first use of the polygraph interview for professional personnel began on August 5, 1983. Memorandum of Louis J. Bonanni at 1 (Aug. 5, 1983), annexed to Naper Dec. as Exh. A10.

#### B. The Polygraph

The polygraph measures changes in blood pressure, pulse respiration, muscular activity and electrodermal activity (perspiration on fingertips) in reaction to the questions asked during the interview. See John E. Reid & Fred E. Inbau, *Truth and Deception* 4 (1966). These patterns are simultaneously recorded on pen registers while the subject wears a pressure cuff on her arm, a light tube across her chest and abdomen, and painless electrodes on two fingertips. *Id.* at 4-5. The changes provide subtle indications of "stress or anxiety," *Anderson v. Philadelphia*, 845 F.2d 1216, 1218 (3d Cir. 1988), that might not otherwise be apparent to the interviewer. The theory of lie detection can be summarized as follows: The act of lying leads to conscious conflict; conflict induces fear or anxiety, which in turn results in clearly measurable physiological change. M.K. Saks & R. Hastie, *Social Psychology in Court* 192 (1978).

\*3 Polygraph examinations are intended to be "supplementary to, not ... a substitute for, other forms of investigation." D.O.D. Directive No. 5210.48, par. 6 at 2, annexed to Naper Dec. as Exh. A4; D.O.D. Reg. No. 5210.48-R, Ch. 1, par. A.5 at 1-1, annexed to Naper Dec. as Exh. AS. The results of the polygraph chart are "used during the security interview as an investigative tool with which to gather leads, encourage relevant disclosures, and identify areas of questioning that may need further development." See D.O.D. Reg. 5210, 1 9 at 3. Therefore, whether favorable or unfavorable, "[a]ny final administrative determinations rendered in cases in which a polygraph examination is taken shall not be based on the results of an analysis of the polygraph charts," NSA/CSS Reg. No. 122-3 sec. III, par. 6.a at 4, annexed to Naper Dec. as Exh. A3, but on information gathered independently.

Two types of polygraph interviews are used by the NSA in the background screening process. For an initial clearance, a "full-scope" interview is conducted with respect to the following areas:

- (1) verification of the person being interviewed;
- (2) counterintelligence questions; and
- (3) clarification or elaborations of information provided on completed security forms or other information pertaining to the person's eligibility for a clearance.

*Id.*, sec. IV, par. 7.a (1)(a)-(c). For aperiodic and reinvestigation examinations, a shorter "counterintelligence ("CI")-scope" interview is used. *Id.* sec. III, par. 7.b(1). This interview focuses narrowly on:

- (1) espionage or sabotage activities against the United States;
- (2) deliberate damage to any government information system;
- (3) deliberate disclosure of classified information to unauthorized persons; and
- (4) undisclosed contacts with foreign nationals or representatives.

Memorandum of David H. Schachnovsky at 1 (May 26, 1992), annexed to Naper Dec. as Exh. A11.

Access to SCI "must be clearly consistent with the national security." NSA/CSS Reg. No. 122-06, par. 4 at 2, annexed to Naper Dec. as Exh. A2, and "[a]ny doubt concerning a person's continued eligibility will be resolved in favor of the national security." *Id.* par. 5 at 3. Because non-cooperation by the subject is an intolerable impediment to completion of the background investigation, "[f]ailure to provide required security forms, releases, and other data," or "refusing to undergo the required security processing or medical or psychological testing will normally result in a denial, suspension, or revocation of access [to SCI]." DCID No. 1/14 Annex A at 14. Specifically, "[p]ersons who refuse to take a polygraph examination in connection with determining their continued eligibility for access to specifically designated information in special access programs ... may be denied access," D.O.D. Reg. No. 5210.48-R, Ch. 1, par. A.5 at 1-1, regardless of any other information developed during the background investigation process.

C. The Plaintiff

\*4 In 1982, plaintiff Dr. Ann K. Stehney was a tenured mathematics professor at Wellesley College. Compl. par. 11. Stehney accepted a part-time consulting position with IDA/CCR in the summer of 1982. Before beginning her work for IDA/CCR, however, NSA conducted a security investigation into Stehney's background. At the time of plaintiff's background check, the polygraph requirement for IDA professional personnel was not in effect. Stehney received access to SCI on June 8, 1982, and soon accepted a permanent, full-time position with IDA/CCR.

In or around 1989, Stehney was advised that she was the subject of a routine background reinvestigation for continued access to SCI. Compl. par. 19. Stehney was asked to submit to a polygraph and was informed that the polygraph examination was in connection with her 1989 reinvestigation. Compl. par. 20. In August 1992, and at all subsequent times, Stehney conscientiously refused to submit to a polygraph examination in connection with her continued access to SCI. *Id.* Instead, Stehney asked that she be treated as if she had taken the polygraph examination and failed. *Id.* 

In or around May 1993, Stehney was informed that NSA had decided to deny her continued access to SCI because she refused to submit to a polygraph examination. Compl. par. 21. In June 1993, plaintiff appealed the proposed revocation of her SCI access to the Director of NSA's Office of Security. Compl. par. 23. Stehney filed a second appeal to defendant Hanna, Chief of Management Services in September 1993, and made her final appeal to defendant Vice Admiral McConnell in January 1994, thereby exhausting all available administrative remedies. Compl. par. 22-23. Stehney's SCI clearance was terminated on January 15, 1994, and her employment by IDA/CCR was terminated shortly thereafter. Compl. par. 1, 14.

Eleven months after her clearance was terminated, plaintiff filed suit in this court. Plaintiff's complaint sets forth six counts for relief. First, plaintiff argues that she is entitled to mandamus relief to force NSA officials to carry out certain duties alleged to be owed to her by regulation. Compl. 1 52. In the second count of the Complaint, plaintiff maintains that "the procedures used to deprive [her] of her access to SCI and to deny her appeals thereof ... deprived [her] of a property interest without due process of law." Compl. par. 58-65. The third count of the Complaint alleges that defendants' requirement that plaintiff submit to a polygraph examination was in contravention of the Fourth Amendment of the United States Constitution. Compl. par. 66-73. In Count IV, plaintiff avers that defendants' limited exemption from the polygraph examination lacked any rational basis and was granted solely to male employees in violation of the United States Constitution's guarantee of equal protection under the law, Compl., par. 74. Plaintiff alleges in Count V that defendants' polygraph requirement violates New Jersey law and public policy. Compl. par. 85-86. Finally, in Count VI, plaintiff maintains that defendants violated New Jersey employment discrimination law by failing to assist plaintiff in her attempt to secure an exemption in the same manner defendants assisted male employees. Compl. par. 89-91.

# II. DISCUSSION

## A. STANDARD FOR A MOTION TO DISMISS

\*5 A district court may grant a motion to dismiss for lack of subject matter jurisdiction pursuant to FED. R. CIV. P. 12(b)(1) based on the legal insufficiency of a claim. Dismissal pursuant to FED. R. CIV. P. 12(b)(1) is only proper, however, when the claim " 'clearly appears to be immaterial and made solely for the purpose of obtaining jurisdiction or ... is wholly insubstantial and frivolous.' " *Kehr Packages, Inc. v. Fidelcor, Inc.*, 926 F.2d 1406, 1408-09 (3d Cir.), cert. denied, 501 U.S. 1222 (1991)(quoting *Bell v. Hood*, 327 U.S. 678, 683 (1946)). On a FED. R. CIV. P. 12(b)(1) motion, plaintiff bears the burden of persuading the Court that subject matter jurisdiction exists. *Id.* at 1409. The factual allegations of plaintiff's complaint must be accepted as true. *Mortensen v. First Federal S & L Ass'n*, 549 F.2d 884, 891 (3d Cir. 1977).

Federal defendants also move to dismiss certain claims in plaintiff's Complaint pursuant to Fed. R. CIV. P. 12(b)(6). Such a motion may be granted only if, accepting all well pleaded allegations in the complaint as true, and viewing them in the light most favorable to plaintiff, plaintiff is not entitled to relief. *Bartholomew v. Fischl*, 782 F.2d 1148, 1152 (3d Cir. 1986); *Angelastro v. Prudential-Bache Securities, Inc.*, 764 F.2d 939, 944 (3d Cir.), cert. denied, 474 U.S. 935 (1985). The Court may not dismiss a complaint unless plaintiff can prove no set of facts which would entitle him to relief. *Conley v. Gibson*, 355 U.S. 41, 4546 (1957); *Angelastro*, 764 F.2d at 944. "The issue is not whether a plaintiff will ultimately prevail but whether the claimant is entitled to offer evidence to support the claims." *Scheuer v. Rhodes*, 416 U.S. 232, 236 (1974). In setting forth a valid claim, a party is required only to plead "a short plain statement of the claim showing that the pleader is entitled to relief." FED. R. CIV. P. 8(a).

#### B. COUNT I: MANDAMUS

In Count I of her complaint, plaintiff alleges that defendants failed to process and decide the proposed revocation of her SCI access or appeal thereof in accordance with applicable D.O.D. regulations. Compl., par. 56. Plaintiff argues that "[t]his failure included, but is not limited to, the failure to treat Ms. Stehney as if she had taken the polygraph examination and failed, and the failure to make a finding as to whether Ms. Stehney met the qualifications for SCI access stated in DCID 1/14, sec. 5." *Id.* Plaintiff maintains that as a result of this failure, she lost her job with IDA/CCR. In her prayer for relief, plaintiff asks this Court to issue a writ of mandamus ordering (1) defendants Hanna and/or Zimmer to evaluate her appear in accordance with applicable regulations, including but not limited to Annex B of DCID 1/14; and (2) defendants Hanna, Zimmer, Perry, and McConnell to ensure that the proposed revocation of plaintiff's access to SCI and any appears are decided in accordance with applicable regulations, including but not limited to Annex B of DCID 1/14 and DCID 1/14, sec. 5.[FN1] Compl. par. 20-21.

\*6 In response to plaintiff's request for relief, defendants argue: (1) plaintiff lacks standing to bring her claim because she is no longer employed by IDA/CCR and, thus, she no longer has a need for classified information that may only be released on a "need to know basis"; (2) plaintiff is asking this Court to become embroiled in a nonjusticiable political question; and (3) the type of relief plaintiff seeks, *i.e.*, a writ of mandamus, cannot be granted by the Court because the federal government has not unequivocally waived its sovereign immunity. Each of these three arguments will be addressed seriatim.

## 1. Standing

To establish standing to sue, plaintiff must demonstrate that (1) she has suffered some actual or threatened injury, (2) her injury is "fairly traceable" to the defendants' allegedly unlawful conduct, and (3) her injury is likely to be redressed by the requested relief. Alien v.

Wright, 468 U.S. 737, 752 (1984). In the present case, plaintiff does not allege that the injunctive relief she seeks, *i.e.*, an order that restores her security clearance, or at least instruct NSA to conduct new administrative proceedings, can be lawfully granted without an ongoing "need to know" classified information. E.O. 12356, sec. 4.1(a), 3 C.F.R. 174 (1983). Moreover, plaintiff does not deny that her need for access to SCI ceased when she lost her job at IDA/CCR, nor does she contend that her former employer would be under any legal obligation to rehire her if her clearance were restored. In the absence of such an obligation, plaintiff's claim to standing is premised on nothing more than legally insufficient "someday" speculations about what a third-party might do in hypothetical future circumstances. Lujan v. Defenders of Wildlife, 504 U.S. 555, 564 (1992); see also Greene v. United States, 376 U.S. 149, 150 (1964) (finding that an injunctive claim for access to classified information was moot after the employment-related need for access ceased.) Therefore, until plaintiff establishes, presumably in state court, her right to reinstatement by IDA/CCR, she lacks standing to seek restoration of her security clearance in federal court. Accordingly, defendants' motion to dismiss Count I pursuant to FED. R. CIV. P. 12(b)(1) will be granted.

### 2. Political Question

Even if plaintiff has standing to bring this action, her claim is nonjusticiable because it requires the Court to become embroiled in a political question. The Supreme Court has held that certain types of issues, regardless of their merits, are reserved by the Constitution exclusively to the political process. Among other things, such questions exist where there is "a textually demonstrable constitutional commitment of the issue to the coordinate political department." *Baker v. Carr*, 369 U.S. 186, 217 (1962). Under this test, it has long been the "generally accepted view ... that foreign policy [is] the province of and responsibility of the Executive," and outside the purview of the courts. *Haig v. Agee*, 453 U.S. 280, 293-94 (1981); see also *Cafeteria & Restaurant Workers Union v. McElroy*, 367 U.S. 886, 890 (1961) (recognizing that the executive branch "has traditionally exercised unfettered control" of access to military bases); *Chicago & Southern Air Lines v. Waterman S.S. Corp.*, 333 U.S. 103, 111 (1948) ("[T]he very nature of executive decisions as to foreign policy is political, not judicial" because "[t]hey are decisions of a kind for which the Judiciary has neither aptitude, facilities nor responsibility and which has long been held to belong to the domain of political power not subject to judicial intrusion or inquiry").

\*7 The same principle logically applies to the protection of national-security secrets used in aid of foreign and military policy. *Dorfmont v. Brown*, 913, F.2d 1399, 1404-05 (9th Cir. 1990) (Kozinski, J., concurring), cert. denied, 499 U.S. 905 (1991); see also *New York Acmes v. United States*, 403 U.S. 713, 728-29 (1971) (Stewart, J., concurring) ("The responsibility [for protecting classified information] must be where the power is. If the Constitution gives the Executive a large degree of unshared power in the conduct of foreign affairs and the maintenance of our national defense, then under the Constitution the Executive must have the largely unshared duty to determine and preserve the degree of internal security necessary to exercise that power successfully.") This conclusion is based on the fact that the text of the Constitution expressly confers on the President exclusive authority to take action as "Commander in Chief of the Army and navy of the United States." U.S. CONST., Art. II, sec. 1. The authority to

classify and control access to information bearing on national security and to determine whether an individual is sufficiently trustworthy to occupy a position ... that will give that person access to such information flows primarily from this constitutional investment of power and exists quite apart from any explicit congressional grant.

\* \* \*

For reasons 'too obvious to call for enlarged discussion,' the protection of classified information must be committed to the broad discretion of the agency responsible, and this must include broad discretion to determine who may have access to it. Certainly, it is not reasonably possible for an outside nonexpert body to review the substance of such a judgment. .... Nor can such a body determine what constitutes an acceptable margin of error in assessing the potential risk. ....

\* \* \*

Thus, unless Congress specifically has provided otherwise, courts have traditionally been reluctant to intrude upon the authority of the Executive in military and national security affairs.

Dep't of the Navy v. Egan, 484 U.S. 518, 526-29 (1988) (quoting CIA v. Sims, 471 U.S. 159 (1985)). Because of this "textually demonstrable constitutional commitment" of power to the Executive, Baker, 369 U.S. at 217,

there is a reasonable basis for the view that an agency head who must bear the responsibility for the protection of classified information committed to his custody should have the final say in deciding whether to repose his trust in an employee who has access to such information.

Egan, 484 U.S. at 529 (quoting Cole v. Young, 351 U.S. 536, 546 (1956)). For the judiciary to attempt to review the President's final say in matters of access to national security secrets would therefore violate "fundamental principles of separation of powers." Dorfmont, 913 F.2d at 1404 (Kozinski, J., concurring); see also Marbury v. Madison, 5 U.S. (1 Cranch) 137, 170-71 (1803) ("Where the head of a department acts in a case, in which executive discretion is to be exercised; in which he is the mere organ of executive will; it is again repeated, that any application to a court to control, in any respect, his conduct would be rejected without hesitation.").

\*8 A federal court would violate these fundamental principles of separation of powers if it were to review the merits of security clearance decisions. In *Egan*, the Supreme Court held that the Merit System Appeals Board did not have the statutory authority to review the substantive decisions of the Navy to revoke the plaintiff's security clearance. 484 U.S. at 526-29. In its subsequent decision in *Webster v. Doe*, 486 U.S. 592 (1988), the Supreme Court confirmed that federal courts lack jurisdiction to review the merits of security clearance. See also *Dorfmont*, 913 F.2 at 1401 (reasoning that the Supreme Court's reasoning on the reviewability of security clearance decisions "applie[d] no less to the federal courts than to [administrative review boards].").

In the present matter, plaintiff argues that the political question doctrine is inapplicable because she is not asking this Court to review the merits of NSA's decision to revoke her access to SCI. Instead, plaintiff asserts that she is asking this Court to review whether or not NSA followed its own internal guidelines when deciding to revoke plaintiff's security clearance. Stehney charges that NSA never reached the merits of her security review because it refused to find that plaintiff's refusal to submit to a polygraph examination was equivalent to taking and failing a polygraph examination. This refusal, according to plaintiff, led the NSA to revoke her access to SCI before making any merit findings pursuant to paragraphs 5, 12 and Annex B of DCID 1/14.

Paragraphs 5, 12 and Annex B of DCID 1/14 provide, in pertinent part:

# 5. Personnel Security Standards

Criteria for security approval of an individual on a need-to-know basis for access to SCI follow:

a. The individual must be stable; trustworthy; reliable; of excellent character, judgment, and discretion; and of unquestioned loyalty to the United States.

b. The individual requiring access to SCI must be a U.S. Citizen.

c. The individual's immediate family must also be U.S. citizens. ...

d. Members of the individual's immediate family and any other persons to whom he or she is bound by affection or obligation should neither be subject to physical, mental, or other forms of duress by a foreign power or by persons who may be or have been engaged in criminal activity, nor advocate the use of force or violence to overthrow the Government of the United States or the alteration of the form of Government of the United States by unconstitutional means.

12. Determination of Access Eligibility

The evaluation of the information developed by investigation of an individual's loyalty and suitability will be accomplished under the cognizance of the SOIC concerned by analysts of broad knowledge, good judgment, and wide experience in personnel security and/or counterintelligence. When all other information developed on an individual is favorable, a minor investigation requirement that has not been met should not preclude favorable adjudication. In all evaluations, the protection of the national interest is paramount. Any doubt concerning personnel having access to SCI should be resolved in favor of the national security, and the access should be denied or revoked. The ultimate determination of whether the granting of access is clearly consistent with the interest of national security will be an overall common sense determination based on all available information.

\*9 Annex B: Appeals

Any individual who has been considered for initial or continued access to SCI pursuant to the provisions of DCID 1/14 shall, to the extent provided below, be afforded an opportunity to appeal the denial or revocation of such access. DCID 1/14 par. 5, 12, and Annex B.

In essence, plaintiff argues that because NSA's guidelines provide that access to SCI should not be revoked solely for failing a polygraph examination, it necessarily follows that NSA cannot revoke plaintiff's access to SCI based on her refusal to submit to a polygraph examination. See Compl. par. 20. Plaintiff's premise that she is similarly situation to a person who took the polygraph examination and failed, however, is nothing more than a thinly disguised effort to review the merits of the NSA's revocation action. Plaintiff asks this Court to substitute NSA's criteria for granting top-secret security clearances with her own self-serving criteria. This is precisely the type of second-guessing that is prohibited by the political question doctrine.

Moreover, this Court finds that NSA did, in fact, render a decision on the merits in this case. The relevant regulations and policy memoranda not only authorize revocation of a security clearance based solely on a failure to cooperate with the polygraph interview, D.O.D. Reg. No. 5210.48-R, Ch. 1, par. A.5 at 101; NSA/CSS Reg. No. 122-06, par. 6 at 3, they expressly envision that revocation "normally" will be the appropriate result of such a refusal. DCID No. 1/14 Annex at 14. Therefore, there was no need for the NSA to consider paragraphs 5, 12 and Annex B of DCID 1/14 once plaintiff refused to submit to a polygraph examination. Accordingly, plaintiff's claim involves a nonjusticiable political question and federal defendant's motion to dismiss this court pursuant to FED. R. CIV. P. 12(b)(1) is granted.

Finally, there is no merit to plaintiff's contention that, because she had an alleged "constitutionally protected interest in the procedures to evaluate her eligibility for continued access to SCI, and in the appeal procedures," Plaintiffs Brief at 6, this Court must look beyond the political question doctrine and compel NSA to evaluate plaintiff according to paragraphs 5, 12 and Annex B of DCID 1/14. If the Constitution gives the President that "final say" over who may be allowed access to classified information, Egan, 484 U.S. at 529, then such plenary

authority cannot, by definition, be exercised unconstitutionally. See also *Hill v. Dep't of Air Force*, 844 F.2d 1407, 1409 (10th Cir.) (authority of Egan may not be bypassed by invoking alleged constitutional rights), cert. denied, 488 U.S. 825 (1988); *Williams v. Reilly*, 743 F.Supp. 168, 171 (S.D.N.Y. 1990) ("This threshold jurisdictional determination is not affected by the fact that the challenge is made on the grounds of a constitutional deprivation.").

Furthermore, plaintiff's reliance on Greene v. McElroy, 360 U.S. 474 (1959); Vitarelli v. Seaton, 359 U.S. 535 (1959); and Service v. Dulles, 354 U.S. 363 (1957) is misplaced and does not persuade this Court that judicial intrusion into security-clearance decisions is warranted because she raised alleged constitutional concerns. These decisions did not address any jurisdictional or constitutional issue, let alone the political question doctrine as it applies to the revocation of a security clearance. In Vitarelli and Service, career government employees challenged their terminations under the old Civil Service Act. Vitarelli, 359 U.S. at 536-46; Service, 354 U.S. at 531. Moreover, although in Greene the Supreme Court reviewed whether an agency had been delegated the authority to deny a contractor employee's security clearance without providing an opportunity to respond, no justiciability issue was raised or addressed. 360 U.S. at 493. Finally, the Supreme Court's decision in Webster, 486 U.S. at 601-02, to allow a "colorable" constitutional challenge to the termination of CIA employment to proceed on the In Webster, the Court merely concluded that review of merits is not to the contrary. constitutional challenges to employee termination decisions of the Director of Central Intelligence was not precluded under 5 U.S.C. sec. 701(a)(2), because such matters were not committed by Congress to agency discretion by law by the language of 50 U.S.C. sec. 403(c). The holding was strictly "a matter of statutory construction, not constitutional interpretation." Dorfmont, 913 F.2d at 1405 (Kozinski, J., concurring).

\*10 Even if the political question doctrine did not preclude review of constitutional concerns, plaintiff has no such constitutional right to protect in this case. It is well settled that there is no constitutional interest in a security clearance. *Egan*, 484 U.S. at 529. Nor is there such an interest in the procedural rules under which clearance determinations are made and appealed administratively. *Hill*, 844 F.2d at 1411-12. Therefore, plaintiff cannot demonstrate that NSA's actions contravened her alleged due process rights because she has no such rights. Accordingly, federal defendants' motion to dismiss Count I of the Complaint is granted.

#### 3. Sovereign Immunity

Assuming that this Court had constitutional authority to entertain any of plaintiff's claims, her request for a "writ of mandamus" [FN2] to force the NSA to correct certain purported errors in its handling of her security-clearance revocation is barred by the doctrine of sovereign immunity. The doctrine of sovereign immunity provides that the United States cannot be sued unless it gives its consent, and this consent defines a court's jurisdiction to hear a particular case. United States v. Sherwood, 312 U.S. 584, 586 (1941). In United States v. Testan, 424 U.S. 392 (1976), the Supreme Court confirmed this principle when it declared that "except as Congress has consented to a cause of action against the United States, 'there is no jurisdiction ... to entertain suits against the United States.'" Id. at 399 (quoting Sherwood, 312 U.S. at 587-88). "Absent

consent to sue, dismissal of the action is required." Hutchinson v. United States, 677 F.2d 1322, 1327 (9th Cir. 1982) (citations omitted). Moreover, the Constitution itself does not contain a waiver of sovereign immunity. Arnsberg v. United States, 757 F.2d 971, 980 (9th Cir. 1984), cert. denied, 475 U.S. 1010 (1986). "Such [a] waiver [of sovereign immunity] cannot be implied, but must be unequivocally expressed." FDIC v. Meyer, 114 S.Ct. 996, 1000 (1994). Finally, a suit for injunctive relief to force NSA officials to carry out certain duties alleged to be owed to plaintiff by regulation is "[a] suit against federal officers in their official capacity" and therefore "a suit against the United States." Blase v. Kaplan, 852 F.Supp. 268, 284 n. 14 (D.N.J. 1994) (citing Kentucky v. Graham, 473 U.S. 159, 166 (1985)).

Plaintiff fails to identify any statute in which the United States is purported to have unequivocally consented to be used for failure to follow Defense Department or NSA securityclearance regulations. The only statute on which plaintiff relies, the Mandamus Act, 28 U.S.C. sec. 1361, is a jurisdictional provision, which, standing alone, creates no "cause of action," *Mattern v. Weinberger*, 519 F.2d 150, 156 (3d Cir. 1975), vacated on other grounds, 425 U.S. 987 (1976), let alone a cause of action expressly waiving sovereign immunity. *Pit River Home & Agricultural Co-op Ass'n v. United States*, 30 F.3d 1088, 1098 (9th Cir. 1994). Furthermore, plaintiff cannot rely on the waiver of sovereign immunity in the Administrative Procedure Act, 5 U.S.C. sec.. 701-706, because judicial review of NSA security-clearance decisions is expressly precluded under 50 U.S.C. sec. 685, see 5 U.S.C. sec. 701(a)(1), and committed to agency discretion by law. *Egan*, 484 U.S. at 530.

\*11 Even if a putative cause of action and wavier of sovereign immunity were present, however, the Mandamus Act provides only that "[t]he district courts shall have original jurisdiction of any action in the nature of mandamus to compel an officer or employee of the United States or any agency thereof to perform a duty owed to the plaintiff." 28 U.S.C. sec. 1361. This language creates potential subject-matter jurisdiction in only two circumstances. The first is where a government official is required to perform "a clear, ministerial and nondiscretionary duty," *Mattern*, 519 F.2d at 156, that is "preemptory and unmistakable." *ICC v. New York, New Haven & Hartford Railroad*, 287 U.S. 178, 191 (1932), "certain," *Id.* at 194, "inflexible," *Id.* at 199, "clear beyond debate," *Id.* at 204, "positively commanded and so plainly prescribed as to be free from doubt." *Mattern*, 519 F.2d at 156 (quotation omitted). The second is where the plaintiff seeks to compel an official to undertake a neglected action that requires the exercise of discretion to carry out. In this second context, mandamus relief is available only to "compel [the] action" itself, 'but not to direct the exercise of discretion in a particular way nor to direct the retraction or reversal of action already taken." *ICC v. Humbolt S.S. Co.*, 224 U.S. 474, 484 (1912).

The Supreme Court has held that "it should be obvious that no one has a 'right' to a security clearance," *Egan*, 484 U.S. at 529, and that revocation of a clearance is a "discretionary" action. *Id.* at 630. What plaintiff seeks here is merely an order reversing NSA's decision to revoke her clearance and directing NSA to exercise its discretion in a different way to reach a different outcome. Because plaintiff is not seeking the performance of a non-discretionary,

ministerial duty withheld, her claim does not fall within the scope of the Mandamus Act. Therefore, Count I of plaintiff's Complaint is dismissed.

# C. COUNT II: DUE PROCESS CLAIM

In Count II of her complaint, plaintiff alleges defendants denied her due process by failing to (1) allow her to confront witnesses against her, (2) provide her with the information collected during her 1989 re-investigation; and (3) give her the opportunity to present live testimony at a hearing. Compl. par. 60. Plaintiff further alleges that she had a property interest in her continued access to SCI; her job at IDA/CCR; the procedures involved in reinvestigating her background, proposing the revocation of her access to SCI, and evaluating any appeals regarding her access to SCI; and the remedies available to her after the decision was made to revoke her access to SCI. Compl. par. 61-62. Moreover, plaintiff contends that she has a liberty interest in being able to practice her chosen profession. Compl. par. 63.

"The requirements of procedural due process apply only to the deprivation of interests" in life, "liberty and property." Board Regents v. Roth, 408 U.S. 564, 571 (1972). According to the Supreme Court, "it should be obvious that no one has a 'right' to a security clearance." Egan. 484 U.S. at 529. Thus, there is no property interest in a security clearance, Hodge v. Jones, 31 F.2d 157, 165 (4th Cir.), cert. denied, 115 S.Ct. 581 (1994); Greenwood v. FAA, 28 F.3d 971, 976 (9th Cir. 1994), or in a job that requires a security clearance, Mangino v. Dep't of Army, 1994 WL 55606, \*2 (10th Cir.), cert. denied, 115 S.Ct. 275 (1994); Dorfmont, 913 F.2d at 1403, or in the procedural rules under which clearance determinations are made and appealed administratively. Hill, 844 F.2d at 1411-12, that is protected by due process.

\*12 Nor does plaintiff have a liberty interest in a security clearance. To have a liberty interest, plaintiff must show that (1) the government changed her employment status; (2) the change occurred as a result of derogatory allegations that created a stigma on the plaintiff; (3) the derogatory allegations were publicized by the government; and (4) this stigmatizing publication significantly reduced her ability to pursue her chosen profession. *Siegert v. Gilley*, 500 U.S. 226, 233-34 (1991). The denial of a security clearance "does not equate with passing judgment upon an individual's character" and "in no way implies disloyalty or any other repugnant characteristic." *Egan*, 484 U.S. at 529 (citation omitted). Therefore, courts have universally held that denial of a clearance does not stigmatize the person in any way that implicates a liberty interest. See, e.g., *Hodge*, 31 F.3d at 165; *Mangino*, 1994 WL 55606 at \*2; *NFFE v. Greenberg*, 983 F.2d 286, 289 (D.C. Cir. 1993).

Moreover, even if a property or liberty interest protected by due process were present here, plaintiff does not identify any additional procedures that would have improved the fairness of the decision-making process. "[D]ue process is flexible and calls for such procedural protections as the particular situation demands," *Morrissey v. Brewer*, 408 U.S. 471, 481 (1972), to afford a meaningful opportunity to be heard at a meaningful time. *Mathews v. Eldridge*, 423 U.S. 319, 335 (1976). Contrary to plaintiff's assertions to the contrary, see Compl. par. 60, "[t]he Fifth Amendment does not require a trial-type hearing in every conceivable case of government impairment of a private interest." Cafeteria Workers, 367 U.S. at 894. Where the interest involved is "a mere privilege subject to the Executive's plenary power, it has traditionally been held that notice and hearing are not constitutionally required," *Id.* at 895; see also *Hill*, 844 F.2d at 1410 ("[An Agency's internal] procedures [relating to revocation of an existing security clearance] are not the type of rules or understandings that secure certain benefits and that support claims of entitlement to those benefits. The procedures are administrative devices which are intended to promote fairness and safeguard the rights of individual employees, but are not intended thereby to diminish Executive authority rooted in Executive responsibility."])

In this case, prior to the revocation of her clearance, plaintiff was afforded both notice and an opportunity to present detailed arguments and supporting documents. This procedure is more than sufficient to satisfy due process. *Doe v. Cheney*, 885 F.2d 898, 910 (D.C. Cir. 1989). Furthermore, inasmuch as the only relevant fact--plaintiff's refusal to cooperate with the polygraph interview--was uncontested, it is impossible to see what point would have been served by allowing her "to confront witnesses against her" or be "provided with the information collected during her 1989 reinvestigation." Compl. par. 60. The purpose of allowing cross-examination and discovery in an administrative hearing is to provide "an opportunity to show that [relevant information] is untrue" in situations where "the evidence consists of the testimony of individuals whose memory might be faulty or who, in fact, might be perjurers or persons motivated by malice, vindictiveness, intolerance, prejudice, or jealously." *Greene*, 360 U.S. at 496. Where the facts are not in dispute, due process no more requires an evidentiary hearing in the administrative context than it does in the judicial context. Accordingly, this Court finds that Count II of plaintiff's complaint has no merit, and defendants' motion to dismiss this claim pursuant to FED. R. CIV. P. 12(b)(6) is granted.

## D. COUNT III: FOURTH AMENDMENT CLAIM

\*13 Plaintiff next claims that the polygraph interview is a search that violates the Fourth Amendment when it is not based on probable cause. Compl. para. 72-73. Specifically, plaintiff argues that the polygraph examination closely resembles the search of a person's private papers and diaries. Plaintiff's Brief at 37. Plaintiff suggests that "[i]t is difficult for such an examination to be limited because it concerns the most private and cherished of our possessions-personal thoughts and ideas." *Id.* at 38-39. Plaintiff adds that "[b]ecause polygraph examinations constitute searches within the meaning of the Fourth Amendment, they should presumably take place only after the issuance of a warrant based upon probable cause." *Id.* at 40. Finally, plaintiff contends that "the government interest is no longer as compelling as it once was. ... With altered security needs engendered by the close of the Cold War, there is no longer any credible justification for abridging Fourth Amendment safeguards of Americans. The national security needs envisioned by the courts during the Cold War are no longer relevant to the current state of world affairs." *Id.* at 43.

The Fourth Amendment of the United States Constitution provides for the "right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures." U.S. CONST., Amend. 4. The essential purpose of the proscriptions in the Fourth

Amendment is to "impose a standard of 'reasonableness' upon the exercise of discretion by government officials. ..." Delaware v. Prouse, 440 U.S. 648 (1979). Thus, the Fourth Amendment protects individuals from "unreasonable government intrusions into their legitimate expectations of privacy." United States v. Chadwick, 433 U.S. 1, 7 (1977). As the Supreme Court has noted:

[Reasonableness] is not capable of precise definition or mechanical application. In each case it requires a balancing of the need for the particular search against the invasion of personal rights that the search entails. Courts must consider the scope of the particular intrusion, the manner in which it is conducted, the justification for initiating it, and the place in which it is conducted. *Bell v. Wolfish*, 441 U.S. 520, 559 (1979).

No person with access to classified information, however, can have a reasonable expectation that she may refuse to give "an accounting of [her] use or abuse of the public trust," Uniformed Sanitation Men Ass'n v. Commissioner of Sanitation of City of New York, 392 U.S. 280, 283 (1968), or fail "to answer relevant questions about [her] official duties." Gardner v. Broderick, 392 U.S. 273, 278 (1968). Nor can plaintiff have a reasonable expectation that this inquiry will be conducted "on her own informational terms, Wyman v. James, 400 U.S. 309, 321-22 (1971), so as to minimize the ability of the questioner to gather possibly adverse information from the surroundings.

\*14 Moreover, a polygraph does not constitute a search within the meaning of the Fourth While "penetrat[ion] beneath the skin," Skinner, 489 U.S. at 616, to extract Amendment. inorganic material, Winston v. Lee, 470 U.S. 753, 760 (1985) (bullet), bodily fluid, Skinner, 489 U.S. at 616-17 (urine); Schmerber v. California, 384 U.S. 757, 769 (1966) (blood), or "deep lung" breath, Skinner, 489 U.S. at 616, has been held to be a search within the meaning of the Fourth Amendment, the Supreme Court also has held that involuntary production of recorded voice samples is not a search because there is no reasonable expectation of privacy in the "physical characteristics of a person's voice, its tone and manner" or in "his facial characteristics" during speech. United States v. Dionisio, 410 U.S. 1, 14 (1973). The same is true of handwriting samples. United States v. Mara, 410 U.S. 19, 20-22 (1973). Similarly, the taking of a fingerprint is not a search, *Dionisio*, 410 U.S. at 15, even though it involves touching and pressing, and reveals physiological traits too minute to be considered exposed to public view in any meaningful sense. Id. Further, a dental examination to see if a tooth is missing is not a search, even though it involved an intrusion into a body cavity to identify a disfiguring physical feature that most people would tend to conceal. United States v. Holland, 378 F.Supp. 144, 154 (E.D.Pa.), aff'd, 506 F.2d 1050 (3d Cir. 1974), cert. denied, 420 U.S. 994 (1975). The incidental contact involved in attaching polygraph equipment and the rather innocuous readings of heart rate, respiration and perspiration changes are hardly more intrusive than a dental examination. See United States v. Haynes, 24 C.M.R. (AFBR 1957) ("If there is anything hidden in the mind of the person subjected to such an examination, the machines does not produce it, though it appears to be evidence that the examination and the results thereof are not infrequently cogent factors which lead the subject to reveal his secrets.").

Furthermore, with respect to physical and psychological stress, "[q]uestions, however unfriendly," simply "do not constitute an unreasonable search" as a matter of law. Goerlich v. Davis, 1991 WL 195772, at \*4 (N.D. Ill. 1991). A polygraph, like a voice exemplar, cannot plausibly be viewed as "an annoying, frightening, and perhaps humiliating experience," Dionisio, 410 U.S. at 14 (citation omitted), and certainly cannot be compared to a pat-down search while spread-eagled against a wall by a police officer in public. Terry v. Ohio, 392 U.S. 1, 24-25 (1968). Refusal to take a polygraph, therefore, does not give rise to a cause of action under the Fourth Amendment. Chesna v. Dep't of Defense, 850 F.Supp. 110, 116-17 (D. Conn. 1994).

Even assuming that a polygraph is deemed to be a search within the meaning of the Fourth Amendment, a polygraph used for the purpose of a national security background reinvestigation is hardly unreasonable. It is a "longstanding principle that neither a warrant or probable cause, nor, indeed, any measure of individualized suspicion, is an indispensable component of reasonableness in every circumstance." *NTEU v. Von Raab*, 489 U.S. 656, 665 (1989). "[W]here a Fourth Amendment intrusion serves special needs, beyond the normal need for law enforcement, it is necessary to balance the individual's privacy expectations against the Government's interests to determine whether it is impractical to require a warrant or some level of individualized suspicion in the particular context." *Id.* at 665-66. In this case, the compelling interest in protecting national security outweighs whatever minor intrusion may be occasioned by a polygraph interview. It is "obvious and unarguable" that there is no government interest as great as the security of the country. *Haig*, 453 U.S. at 293-94. Moreover, there can be no question that polygraphing is rationally related to the "compelling interest in national security." *Chesna*, 850 F.Supp. at 118. Accordingly, defendant's motion to dismiss Count III of plaintiff's complaint pursuant to FED. R. CIV. P. 12(b)6) is granted.

# E. COUNT IV: EQUAL PROTECTION CLAIM

\*15 In Court IV of her complaint, plaintiff argues that a limited exception from the polygraph requirement for "world class mathematicians" violates the equal protection component found to exist in the Fifth Amendment. See *Bolling v. Sharpe*, 347 U.S. 497, 499-500 (1954). Under the relevant regulations, "[i]n extremely rare instances," agency heads "may approve one-time, limited access to SCI" for a period not to exceed 90 days, when such access "is deemed necessary to accomplish unique mission requirements." DCID No. 1/14, par. 9.b. at 5. Pursuant to this authority, NSA permits "[a] very limited number of consultants to IDA who are certified by senior Agency officials as being World Class Mathematicians ... [to] be exempted from the polygraph requirement." NSA Memorandum Serial M5-151-91E ("NSA Mem.") at 1 (Aug. 2, 1991), annexed as Exh. A35 to Naper Dec. Plaintiff claims that this policy irrationally discriminates against less capable mathematicians, and has an indirect, discriminatory effect on women. Compl. par. 76-77.

Since there is no fundamental right to a security clearance, *Chesna*, 850 F.Supp. at 118, a classification distinguishing world-class mathematicians from their less distinguished peers "must be upheld against equal protection challenge if there is any reasonably conceivable state of facts that could provide a rational basis" for it. FCC v. Beach Communications, 113 S.Ct.

2096, 2101 (1993). Under this standard, "A statute or regulation should not be overturned on equal protection grounds 'unless the varying treatment of different groups or persons is so unrelated to the achievement of any combination of legitimate purposes that we can only conclude that the [government's] actions were irrational." *Anderson*, 845 F.2d at 1223 (quoting *Vance v. Bradley*, 440 U.S. 93, 97 (1979)).

The purpose of the "world-class mathematician" exemption is to allow "a very limited number of individuals," who are recognized "as being among the highest echelon of internationally renowned mathematicians" and whose unique abilities are needed on a short-term consulting basis, to be "exempted from the NSA polygraph requirement to facilitate their recruitment." NSA Mem. Att. 2 at 1. In light of the recognized potential for "lost talent when suitable individuals refuse to participate in a polygraph examination," see *Redefining Security, A Report to the Secretary of Defense and the Director of Central Intelligence, Joint Security Commission* at 65 (Feb. 28, 1994), annexed as Exh. A13 to Naper Dec., it is hardly irrational to think that there may be rare and singular circumstances where the unique talents of an especially gifted cryptologist expert may be so important to the protection of national security--and needed so desperately and immediately--that the interest in procuring his or her services outweighs the increase in security risks occasioned by foregoing a polygraph on a one time basis. Clearly, such an exemption "can arguably be said to result in a better-qualified group" of applicants for particularly important positions, *Anderson*, 845 F.2d at 1223, and therefore is consistent with equal protection.

\*16 Finally, plaintiff's claim that the "world-class mathematician" policy has an indirect discriminatory effect on women is also unpersuasive. It is well settled that a facially-neutral classification does not violate equal protection merely because "it may affect a greater proportion of one [group] than of another." *Washington v. Davis*, 426 U.S. 229, 242 (1976). To state an equal protection claim, plaintiff must allege that the classification was selected "because of,' not merely 'in spite of,' its adverse effects upon an identifiable group." *Personnel Admin. of Mass. v. Feeney*, 442 U.S. 256, 271-72 (1979); see *Chesna*, 850 F.Supp. at 117-18 (dismissing equal-protection challenge to security-clearance polygraph testing based on alleged disparate impact on blacks). In the present case, no such allegation appears in plaintiff's complaint. Accordingly, this count of the Complaint will also be dismissed.

# F. STATE POLYGRAPH CLAIM

In Count V of her Complaint, plaintiff brings a pendant state law claim against defendants, alleging that the polygraph requirement she was asked to submit to violated N.J.S.A. 2C:40 A-1. Compl. par. 84-86. State regulation in the area of national security is expressly preempted by Article I, sec. 8 and Article II, sec. 2 of the Constitution. *Pennsylvania v. Nelson*, 350 U.S. 497, 504-05 (1956). Likewise, there can be no state regulation of a President's constitutionally granted powers to "classify and control access to information bearing on national security and to determine whether an individual is sufficiently trustworthy to occupy a position ... that will give that person access to such information." *Egan*, 484 U.S. at 527.

Moreover, state interference with national-security polygraphing is also preempted by federal statute. Although the Employee Polygraph Protection Act of 1988, 29 U.S.C. sec. 2001-2209, generally prohibits employers engaged in interstate commerce from requiring lie-detector tests, 29 U.S. C. sec. 2002(1), it expressly exempts "the administration, by the Federal government, in the performance of any intelligence or counterintelligence function, of any lie detector test to ... any employee of [an NSA[ contractor," 29 U.S.C. sec. 2006(b)(2)(iii), or "any individual assigned to a space where sensitive cryptographic information produced, processed, or stored for" NSA. 29 U.S. C. sec. 2006(b)(2)(A)(v). The Act further provides that it "shall not preempt any provision of any State or local law or of any negotiated collective bargaining agreement that prohibits lie detector tests or is more restrictive with respect to lie detector tests," "[e]xcept as provided in" 29 U.S.C. sec. 2006(a)-(c). 29 U.S.C. sec. 2009. Thus, both the Constitution and federal law expressly preempt states from prohibiting the use of polygraphs as part of a security-clearance background investigation. Therefore, this Court will grant federal defendants' motion to dismiss this count pursuant to FED. R. CIV. P. 12(b)(6).

# G. STATE LAW DISCRIMINATION CLAIM

\*17 Finally, in Count VI of her complaint, plaintiff alleges that nonfederal defendants Goldschmidt and IDA/CCR did not assist her in securing an exemption or waiver of the polygraph examination, and that this failure to assist was because plaintiff is a female. Since this Court has granted defendants' motion to dismiss on the federal counts (Counts I through V), only the state law claim remains. Under the 1990 enactment of the supplemental jurisdiction statute, 28 U.S. C. sec. 1367, a federal district court may decline to exercise its supplemental jurisdiction over state law claims if all federal claims are dismissed. 28 U.S.C. sec. 1367(c)(3); Growth Horizons, Inc. v. Delaware County, PA., 983 F.2d 1277, 1285 N. 14 (3d Cir. 1993). In exercising its discretion, the district court should take into account principles of judicial economy, convenience, and fairness to the litigants. Id. at 1984 (citing United Mine Workers v. Gibbs, 383 U.S. 715, 726 (1966)). As one legal scholar has observed:

Whether a dismissal of the touchstone claim should bring about a dismissal ... of the dependent claim for want of supplemental jurisdiction should hinge on the moment within the litigation when the dismissal of the touchstone claim takes place and on the other surrounding circumstances. ... [1]f the dismissal of the main claim occurs late in the action, after there has indeed been substantial expenditure in time, effort and money in preparing the dependent claims, knocking them down with a belated rejection of supplemental jurisdiction may not be fair. Nor is it by any means necessary.

David D. Siegel, Practice Commentary, appended to 28 U.S.C.A. sec. 1367 (cited in *Growth Horizons*, 983 F.2d at 1284).

In this case, the Court has dismissed every claim over which it had original subject matter jurisdiction, and sees no reason to exercise supplemental jurisdiction over a claim arising under state law. This case is at an early stage of litigation, and there is no concern that dismissal at this juncture would be unfair. Moreover, plaintiff's state law claim for discrimination has little, if anything, in common with her federal claims. Accordingly, Court VI of the Complaint shall be dismissed pursuant to 28 U.S.C. sec. 1367.

### **III. CONCLUSION**

For the reasons set forth in this Memorandum Opinion, this Court will grant federal defendants' motion to dismiss Counts I through V. Further, this Court will deny nonfederal defendants' motion for summary judgment and, instead, will dismiss Count VI of the Complaint pursuant to 28 U.S.C. sec. 1367. An appropriate form of Order is filed herewith.

FN1. In her opposition to Defendants' Motions to Dismiss for Failure to State a Claim (Plaintiff's Brier) plaintiff abandons her Bivens-style claims, *id.* at 45, and recasts her pendent, state-law claim as one alleging wrongful termination of some new kind of federal employment. *Id.* at 14-20. She therefore no longer asserts any conceivable claim against federal defendants in their individual capacities.

FN2. The writ of mandamus has been abolished. FED. R. CIV. P. 81(b). This Court will assume that, instead, plaintiff is seeking an injunction in the nature of mandamus. See Charles Alan Wright & Arthur R. Miller, 12 Federal Practice and Procedure sec. 3134, at 202-03 (1973).

\* \* \* \* \* \*