

Department of Defense

POLYGRAPH PROGRAM



ANNUAL REPORT TO CONGRESS

Fiscal Year 1992

**OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE
(COMMAND, CONTROL, COMMUNICATIONS, AND INTELLIGENCE)**

**FISCAL YEAR 1992 REPORT TO CONGRESS
ON THE
DEPARTMENT OF DEFENSE POLYGRAPH PROGRAM**

TABLE OF CONTENTS

	page
I The Polygraph: Background Information	1
II Fiscal Year 1992 Counterintelligence-scope Polygraph Examinations	2
III Refusals	3
IV Polygraph Examinations Requiring More Than Two Series or More Than One Day	3
V Examination Results	4
VI Utility of the Polygraph	7
VII Qualification Standards for Department of Defense Forensic Psychophysicologists (Polygraph Examiners)	8
VIII Polygraph Research	9
Department of Defense Polygraph Program Statistics: 1988-Present	APPENDIX A
Examples of How the Polygraph Was Used in Fiscal Year 1992	APPENDIX B

I**The Polygraph: Background Information**

The Department of Defense has used the polygraph effectively for almost half a century. It is used mainly in criminal investigations, counterintelligence cases, foreign intelligence and counterintelligence operations, exculpation requests, and now, counterintelligence-scope screening. The polygraph is a tool of proven value that greatly enhances the interview and interrogation process. Often it is the only investigative technique capable of providing essential information to resolve national security issues and criminal investigations.

The following report illustrates how the Department of Defense Polygraph Program is managed, and it documents specific examples of polygraph utility, with particular emphasis on the Department of Defense Counterintelligence-scope Polygraph Program.

The fiscal Year 1985 Defense Authorization Act authorized the Department of Defense to implement a counterintelligence-scope polygraph "test program," to be restricted to 3,500 examinations. The restriction did not affect Department of Defense use of the polygraph in criminal investigations or any other use authorized by Department of Defense policy effective as of 1 August 1982. The test program was structured to address persons who: 1) required access to specifically designated information in Special Access Programs; 2) held Critical Intelligence Positions in the Defense Intelligence Agency; and 3) required emergency interim access to Sensitive Compartment Information.

The Counterintelligence-scope Polygraph Program was continued by Congress for fiscal years 1986 and 1987, with restrictions of 3,500 and 7,000 examinations respectively. Congress specifically exempted from the numerical restrictions the individuals assigned or detailed to the Central Intelligence Agency, the National Security Agency, and individuals assigned to positions where cryptographic information is process, stored, or produced.

In fiscal year 1988, Congress granted the Department of Defense permanent authority to administer counterintelligence-scope polygraph examinations, restricting the yearly total to 10,000 for fiscal years 1988 through 1990 and 5,000 for fiscal year 1991 and the years thereafter. Congress also added to the exempted category individuals involved in the collection of specialized national foreign intelligence through reconnaissance programs.

The purpose of the Counterintelligence-scope Polygraph Program is to deter and detect espionage and sabotage. The counterintelligence-scope polygraph examination questions focus on whether the examinee has ever engaged in espionage or sabotage; has ever given or sold classified material to unauthorized persons or been approached to do so; has ever had any unauthorized contact with a representative of foreign government; or has ever had any knowledge of anyone who had been involved in any of the above.

II

Fiscal Year 1992 Counterintelligence-scope Polygraph Examinations

The following information is provided in accordance with Section 1121 of Public Law 100-180, 101 Stat. 1147.

(1) Special Access Programs	3,235
(2) DIA Critical Intelligence Positions	812
(3) TOP SECRET	666
(4) Examination for Interim access to Sensitive Compartmented Information	<u>0</u>
Total Examinations Conducted Under the Congressional Ceiling	
	4,713
Exempted Examinations	<u>13,917</u>
DoD Counterintelligence-scope Polygraph Program	
TOTAL*	18,630

* NOTE: Does not include counterintelligence-scope polygraph examinations conducted by National Security Agency (NSA). A breakout of polygraph examinations conducted by NSA is contained in a classified annex to this report.

III Refusals

In fiscal year 1992, a total of 39 persons declined polygraph testing. That total, coincidentally, is the same number that declined in fiscal year 1991. The two most often-stated reasons for declining the counterintelligence-scope polygraph screening examination are: 1) the examination is an intrusive device that violates the right of privacy; and 2) the examinee decided against assuming a job that required a high-level security clearance and a polygraph examination. In fiscal year 1992, the refusal rate was two tenths of one percent of the total number of examinations administered. The evidence suggests that the refusal rate is minuscule because the examination does not include lifestyle questions. The rate has remained relatively constant since the implementation of the Counterintelligence-scope Polygraph Program eight years ago. In accordance with Department of Defense policy, those persons who declined to take the examination were subsequently denied access to the classified material in question, but retained their position or were transferred to other positions in the organization of equal pay and responsibility, commensurate with the clearance level held before the declination.

IV Examinations Requiring More Than Two Series or More Than One Day

Of the total polygraph examination population of 18,630 individuals, 1,252 required more than two series (a series is defined as the collection of at least two polygraph charts on an examinee). A total of 844 examinations required more than one day to complete.

Of the individuals for whom the examination lasted more than one day or required more than two series, 416 yielded deceptive, inconclusive, or non-deceptive results with admissions. These results are documented in more detail later in this report. The remaining extended examinations were subsequently determined to be non-deceptive. The non-deceptive examinees were given access or continued access to the programs requiring the polygraph examination.

V Examination Results

The polygraph examination results of the 18,630 individuals tested under the Department of Defense Counterintelligence-scope Polygraph Program are as follows:

There were 30 individuals who, because of medical or psychological considerations, were unable to complete the polygraph examination, resulting in insufficient data with which to form an opinion. None of these individuals made any admissions relevant to the issues being tested.

There were 31 individuals whose polygraph examination results were evaluated as inconclusive, i.e., after a review of the physiological data, it was not possible to determine whether the results indicated deception or non-deception. Additional examinations were conducted on many of these individuals. Some of the examinations were administered on two or more consecutive days by different examiners. None of the individuals made any admissions relevant to the issues being tested.

There were 18,184 individuals whose polygraph examination results were evaluated as non-deceptive.

There were an additional 356 individuals who made admissions relevant to the issues being tested, and through further testing, the examiner was able to resolve all relevant issues.

There were 22 individuals whose polygraph examination results were evaluated as deceptive and who made no admissions to the relevant issues.

There were seven individuals who made admissions relevant to the issues being tested but continued to be evaluated as deceptive during further testing.

The following are some examples of information developed during counterintelligence-scope polygraph examinations. It should be noted that all these individuals had been interviewed previously by security professionals and investigated thoroughly. These cases demonstrate the effectiveness of the polygraph. Without its use, it is doubtful that the information would have been developed.



An enlisted Navy member admitted disclosing Secret Codeword information to a civilian female acquaintance while home on leave. The disclosure pertained to his assigned

duties in the communications field. Continued polygraph testing did not reveal any additional unauthorized disclosures.

A senior enlisted Navy member admitted to disclosing Top Secret Codeword information to his spouse and immediate family members relative to a Navy Special Access Program to which he is assigned. Continued polygraph testing did not reveal any additional disclosures.

A senior enlisted Navy member admitted to the unauthorized disclosure of classified information to a civilian acquaintance, and the removal of a Secret Codeword document from a secure space and later destroying the document by burning it. He also admitted that he was notified that he had borrowed two Secret publications from a research library in 1991 and stated he could not account for the whereabouts of the publications. He also reported a previously unreported contact with two Polish citizens whom he met in 1989 while in Italy. The investigation is continuing.

A Navy officer admitted to disclosing Secret information regarding foreign missile capabilities to a former Navy member who is a civilian defense contractor who was not cleared for access to the information at the time of the disclosure. Continued polygraph testing did not reveal any additional disclosures.

A senior enlisted Navy member admitted disclosing classified Top Secret information to his girlfriend. Continued discussion following polygraph testing disclosed additional unauthorized Top Secret disclosures. In addition, written Confidential information was recovered from the Navy member's residence. Continued polygraph testing did not reveal any additional disclosures.

An Air Force Non-commissioned Officer (NCO) was administered a counter-intelligence-scope polygraph examination for access to a special facility. The polygraph examination disclosed deception in his denial that he had improperly removed classified information. The NCO then provided an oral statement detailing how he had removed and retained several photographs of a foreign military aircraft that contained Confidential information. He further claimed that the classified material was in his baggage that was being shipped to his current location. The NCO also admitted that he had removed a Secret message that outlined application procedures for a Special Access Program. After these

admissions, the NCO requested legal counsel. Several days later, the NCO made a suicide gesture to the base chaplain. Upon responding to the gesture, investigators discovered the classified information that the NCO admitting removing from the Air Force facilities. The investigation is continuing.

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An Air Force officer stated, that while engaged in an advanced studies course, a fellow student officer asked him to review a master's degree thesis. The thesis concerned a foreign government's military activities in a third country. After reviewing the thesis, the officer provided nine pages of notes concerning it. His knowledge of the countries came from access to classified information gained through military assignments. Following subsequent polygraph testing, the officer also stated that he used Confidential information to prepare a research thesis for a course he attended. The officer admitted disclosing classified information to his neighbors (a military officer and spouse) in 1991, concerning a military team sent to a foreign country. He also discussed work-related incidents involving sensitive or classified material with his wife. The case was referred for re-adjudication of the officer's security clearance.

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A DoD civilian employee admitted redirecting sensitive national assets to obtain classified information for friends and relatives. He admitted using his duty position to obtain sensitive classified information which had no bearing on mission requirements or office operations. The matter is still under investigation.

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A DoD civilian employee admitted during a polygraph examination that he told a German national of certain classified military capabilities. He met the German national while both were on military duty with NATO and had security clearances. He stated the German national came to the United States on a visit and he took him to into a SCIF (Sensitive Compartmented Information Facility) area in the Pentagon. He denied disclosing any classified material to the individual. During additional polygraph testing, he admitted briefly displaying a view graph to the German national, bearing the marking of Top Secret. He also indicated that while on a temporary-duty trip to Europe, his first stop was at NATO Headquarters, Belgium, and then via train to Karlsruhe, Germany. He was supposed to proceed directly to Ramstein Air Base, Germany but made plans to visit with the German national's family. Since he was not able to get to Ramstein Air Base that day, he kept SECRET material in his possession overnight at the German national's home. He stressed that at no time was the material out of his physical control. The case was referred for re-adjudication of the civilian's security clearance.

An Army officer with access to Army Special Access Programs admitted, when confronted with his deceptive polygraph test results, that he had continuing and previously unreported contact with a foreign national known to have close contact with foreign government and foreign military personnel. During extended testing, the officer denied providing the foreign national any classified material or information. Although he attributed the contacts to his initiative in attempting to fulfill the unit's sensitive mission, he admitted the contacts continued after he departed that assignment. After his return to the United States, the foreign national located him and the contacts continued. The contacts have included a request by the foreign national for a sum of money for payment of medical bills. Confirmatory testing failed to resolve the matter and the investigation is continuing.

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A DoD civilian employee with access to Army Special Access Programs admitted, when confronted with his deceptive polygraph examination results, that on multiple occasions he had provided uncleared persons with classified technical material without proper authority, including certain foreign government representatives. The employee terminated the interview when questioned further about his activities. The case was referred to the FBI for investigation.

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An Army sergeant who was assigned to sensitive duties in Europe requiring access to Top Secret information, admitted, when confronted with his deceptive polygraph results on a counterintelligence-scope polygraph examination, that he had unauthorized contacts with Soviet Army officers assigned to the Soviet Mission in Berlin. During extended testing, the sergeant related that he had been a dinner guest in the home of one of the Soviets, and that a variety of political and cultural topics were discussed in general terms. He insisted that no military topics were discussed and that the Soviets did not ask him about military matters. Confirmatory testing failed to resolve the matter and the investigation is continuing.

VI Utility of the Polygraph

During fiscal year 1992, as previously illustrated in the report, the utility of the polygraph in national security investigations was demonstrated to be unique and significant. At Appendix B are various accounts of interviews conducted with the aid of the polygraph. In all illustrated instances, the polygraph examination process produced significant security or criminal information which would not otherwise have been obtained. It was also invaluable in helping to establish the innocence of persons charged with serious infractions.

VII

Qualification Standards for Department of Defense Forensic Psychophysicologists (Polygraph Examiners)

The Department of Defense maintains very stringent standards for polygraph examiners. The Department of Defense Polygraph Institute's basic polygraph program is the only program known to base its curriculum on forensic psychophysiology, and conceptual, abstract, and applied knowledge that meet the requirements of a master's degree-level of study. Candidates selected for Department of Defense polygraph positions must meet the following minimum requirements:

1. Be a United States citizen.
2. Be at least 25 years of age.
3. Be a graduate of an accredited four-year college or have equivalent experience that demonstrates the ability to master graduate-level academic courses.
4. Have two years of experience as an investigator with a Federal or other law enforcement agency. Two years of comparable experience may be substituted for the requirement of investigative experience with a Federal or other law enforcement agency.
5. Be of high moral character and sound emotional temperament, as confirmed by a background investigation.
6. Complete a Department of Defense-approved course of polygraph instruction.
7. Be adjudged suitable for the position after being administered a polygraph examination designed to ensure that the candidate realizes, and is sensitive to, the personal impact of such examinations.

After completing basic polygraph training, the individual must serve an internship consisting of a minimum of six months on-the-job-training and conduct at least 25 polygraph examinations under the supervision of a certified polygraph examiner before being certified as a Department of Defense polygraph examiner.

Department of Defense Forensic Psychophysicologists (Polygraph Examiners)

FY YEAR	AVERAGE NUMBER OF EXAMINERS	NUMBER DECERTIFIED*	PERCENT ATTRITION
1988.....	235.....	34.....	14.5%
1989.....	261.....	26.....	10.0%
1990.....	270.....	17.....	6.3%
1991.....	269.....	40.....	14.9%
1992.....	269.....	48.....	17.8%

*Decertification denotes all persons released from polygraph duties regardless of the reason. Some of the reasons for decertification are retirement, transfer, request for release from polygraph duties, and failure to maintain standards.

VIII

Polygraph (Forensic Psychophysiology) Research

Department of Defense Polygraph Institute

The Department of Defense Polygraph Institute was established in 1986. Its research mission reflects the Congressional mandate to the Department of Defense to: 1) evaluate the validity of polygraph techniques; 2) conduct research on polygraph countermeasures; and 3) conduct developmental research on polygraph techniques, instrumentation, and analytical methods. The institute opted to give top priority to developmental research to improve polygraph technology. This option was suggested in 1991 by the Polygraph Research Subcommittee of the Personnel Security Committee.

Small Grants Program

The Institute began a program to provide grants of up to \$3,000 for master's degree students, \$10,000 for doctoral degree students, and \$20,000 to academic and private institutions for research in the emerging scientific discipline of forensic psychophysiology. The program has resulted in stimulating scientific investigation of the problems and issues of

psychological and psychophysiological detection of deception. It is administered through the Defense Personnel Security Research Center in Monterey, CA.

The Small Grants Program is extremely cost effective. A \$10,000 grant to a doctoral degree student can produce research that might cost 10 times that amount if contracted through the normal channels. The savings are realized because the students' advisors and the university contribute considerable expertise and resources. In its first year, the Institute's grant program funded four of the eight research proposals it received:

Subliminal Conditioning in the Detection of Deception. This study explores the use of supraliminal and subliminal classical conditioning on the autonomic nervous system responses measured during sub-threshold presentations of the conditioned stimulus. This study explores a technique that might negate many types of countermeasure strategies.

Saccadic Eye Movement in Deception. This grant pays for the analysis of data collected in a previous study of eye movements during deception. In that study, electro-oculographic recordings were made while subjects read a series of questions on a video screen and answered either truthfully or deceptively.

Comparison of Control Question Test (CQT) Effectiveness in Mock Crimes and Real Events. This study compares the effectiveness of the CQT in a mock crime situation and on idiosyncratic real-life events, such as not paying a utility bill.

Bootstrap Decision-making for Polygraph Examinations. This study compares the accuracy of conventional human numerical evaluation of polygraph charts against two statistical approaches to decision-making: discriminant analysis and bootstrapping.

<p style="text-align: center;">Department of Defense Polygraph Institute Studies Completed in Fiscal Year 1992</p>

Bootstrap decision-making for Polygraph Examinations. For the last 30 years, Federal polygraph examiners have evaluated polygraph charts using a semi-objective field numerical scoring system. A researcher at the University of Utah developed a computerized evaluation program that uses discriminant analysis to categorize subjects as truthful or deceptive. The discriminant analysis system produces decisions that are about as accurate as the field numerical scoring system.

Under a \$20,000 grant from the Institute, a University of North Dakota researcher evaluated the accuracy of decisions using discriminant analysis and a computerized statistical decision-making technique, known as bootstrapping. Unlike discriminant analysis, bootstrapping analyzes only a person's own pattern of reactions; it does not

compare his reactions against those of other people. Using eight physiological parameters from 200 mock-crime subjects (100 innocent, 100 guilty), the researcher found that all three decision-making methods were equally accurate.

Guilty Knowledge Test (GKT). The GKT is similar to a multiple-choice test. It identifies subjects who know specific details of a crime that only a person involved in the crime would know, either as a witness or as the actual perpetrator. A typical question in a GKT is, "regarding the murder weapon, do you know if it was a pipe? An ax? A rock? A Knife? A rifle?" The GKT has long been advocated by many scientists because: 1) it protects the innocent suspect; 2) the probability of a false positive error can be controlled; and 3) it can be precisely calculated.

The GKT has seldom been used in the field, and has not been taught routinely at any polygraph school in the United States. One reason is that the research used only one of the four physiological measures normally used in psychophysiological detection of deception tests. A forensic psychophysiological (polygraph examiner) at the Institute designed and conducted an analog GKT study. His study assessed the accuracy of the technique with Federally-trained forensic psychophysiologicals in a mock-crime setting, using computerized polygraphs that recorded two respiratory measures, skin conductance and cardiovascular activity. One of the major purposes of the study was to develop and validate a field scoring system for use with non-computerized polygraphs.

The Institute forensic psychophysiological found that with the conventional scoring system, using the standard physiological measure in the mock-crime setting, the GKT had an overall accuracy rate of 62 percent with no inconclusive results. It was 25 percent accurate with the guilty subjects and 100 percent accurate with the innocent subjects. Using the multi-channel scoring system he developed, the GKT had one inconclusive result, and an overall decision accuracy of 82 percent (excluding the inconclusive outcome). It was 75 percent accurate with the guilty subjects and 89 percent accurate with the innocent subjects. The Institute has begun teaching the GKT in its basic course.

Numbers test Location. Many polygraph examiners conduct a numbers test at some point during a polygraph examination. In this test, the subject is instructed to deny which of several numbers he or she selected. The polygraph charts, showing reactions to that number, are often then shown to the subject to demonstrate the test's accuracy. It is generally believed that the numbers test reduces the potential for errors on the main test by lowering the anxiety level of the innocent suspect, while stimulating the fear responses of the guilty suspect.

The location of the numbers test within the polygraph examination has been a matter of some discussion. Some examiners prefer to place it between the first two charts of the main test, to determine the effect the numbers test had on the size and pattern of the subject's reaction. Other examiners hold the opinion that if the numbers test enhances accuracy, it should be conducted prior to the first chart of the main test.

The study compared the outcome of real-life polygraph examinations of suspects, victims, and witnesses. Half of the examinations had the numbers test conducted prior to the first chart; the other half had the numbers test located between the first and second charts of the main test. The study found that the location of the numbers test had no discernible effect on the outcome of the polygraph examination. Thus, it was recommended that the decision regarding the placement of the numbers test is one that is best made by the examiner.

Counternarcotics Polygraph Examination (CNP-5). The Institute was directed to develop a polygraph examination to screen DoD drug interdiction task force members to determine if the members had been recruited by the drug cartels to compromise the activities of the task force.

After conducting a series of exploratory studies, the Institute completed the CNP-5 study to assess the accuracy of counternarcotics screening tests in an analog screening situation. Under the experimental conditions, 20 percent of the examinations were inconclusive. Excluding the inconclusive results, the CNP test correctly categorized 81 percent of the innocent and 75 percent of the mock-guilty subjects. A field test is required to determine the inconclusive, non-deceptive and deceptive rates in a real-life situation.

Rankings of relevant Questions on Multi-issue Tests. When several issues are being covered in a single polygraph test, it is not uncommon for the examinee to lie on one or more of the questions while answering the remainder truthfully. Several studies have shown the polygraph is very accurate at grossly differentiating between the totally truthful person and the person who is deceptive. However, those studies have also shown that it is much more difficult to determine precisely the relevant question(s) to which the person is deceptive. This was the outcome of a multi-issue study conducted at the Institute in 1988. The data from that study were re-analyzed in fiscal year 1992 to see if additional analyses could better identify the specific questions about which the mock-guilty subjects had lied. The additional analyses were no more effective than the original ones had been.

Bibliography. During fiscal year 1992, the Institute and NSA completed the creation of a computerized data base of the literature regarding forensic psychophysiology, the detection of deception, honesty tests, behavior analysis, and credibility assessment. A total of 5,934 items are in the data base, which is stored on Pro-Cite software. The data base will be updated continually to keep abreast of the literature.

Diagnostic Value of Tonic Galvanic Skin Response and Heart Rate Levels. This study sought to determine whether knowledge of an examinee's overall level of skin resistance and heart rate could help discriminate between truthful and deceptive suspects. The study has been terminated, as research on computerized chart interpretation has overtaken this approach.

<p style="text-align: center;">Department of Defense Polygraph Institute Studies Pending in Fiscal Year 1992</p>
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Systolic Time Intervals. A potential marker of deception being investigated by the Institute consists of increases in the speed and strength of the heart beat as indexed by changes in systolic time intervals. All relevant data regarding this project have been collected and a report is being prepared.

Event-related Potentials (ERPs) in Prisoners. Research at a number of laboratories has shown that P300 and N400 brain waves can be used to identify deceptive subjects. Analysis of event-related potentials using an odd-ball paradigm shows particular promise. In this paradigm, three types of stimuli, usually words or phrases, are presented on a CRT monitor to a subject: *probe* stimuli pertaining to an event which the "guilty" person knows about; *target* stimuli which all subjects, guilty and innocent, have been instructed to look for; and *irrelevant* stimuli. The probe stimuli appear irrelevant to the innocent subject, who thus reacts only to the target stimuli. For the guilty subject, however, both the probe and target stimuli are relevant. Computer analysis of the brain wave patterns calculates the probability that the probe-evoked brain potentials look more like the target than the irrelevant stimuli. This study is being conducted in coordination with the CIA.

Evoked Potentials for Identifying Training. The Institute is collaborating with the FBI in a study of how brain waves can be used to identify people who have been trained in espionage. The goal is to develop a security screening test to identify persons who have been trained in espionage by foreign countries. A feasibility study is now in progress using evoked potentials to distinguish between two groups of subjects: FBI special agents, and non-agents.

Evaluation of Computerized Polygraphs. Several computerized polygraphs have come on the market in recent months. These include the Axciton polygraph and the Computerized Polygraph System. The new Modern Polygraph System will be available in fiscal year 1993. The Institute does not have the resources to test and evaluate each new polygraph system as soon as it enters the market. Thus, in fiscal year 1993 the Institute will contract for the evaluation of computerized polygraphs. The Institute conducted a preliminary assessment of the Axciton polygraph in fiscal year 1992. The official evaluation of the Axciton will be made by a contractor in fiscal year 1993. Three benefits are expected to flow from the change in the evaluation process: 1) The evaluations will be conducted more quickly. 2) The evaluations will be more thorough, as they will include technical aspects currently beyond the Institute's capability. 3) By having a disinterested party conduct the evaluations, the reports will avoid the appearance of bias or partiality.

Development of Data Analysis Software. The Institute continued to monitor and assist NSA's efforts to create software to analyze psychophysiological detection of deception

tests. The software is expected to be delivered to the Institute for evaluation in fiscal year 1993.

Designing a Validation Study Using Criminal Cases. The purpose of this study is to design a better field validation methodology to estimate polygraph accuracy. The contractor has completed a substudy to determine the type and size of a "jury" best suited to help establish the ground truth criteria against which the accuracy of the polygraph can be measured. The final report was submitted on 30 September 1992, but was not accepted by the Institute. The contractor is completing additional analyses and expanding the report.

Diverse Sensors. This study compared the various methods of recording respiration, electrodermal, and cardiovascular activity. The data analysis is completed. The report is presently under review at the Institute.

Demographic and Situational Variables. A number of demographic variables, such as age, race, gender, or education could affect polygraph accuracy. Similarly, situational variables such as the presence of medication or lack of sleep, might also have an effect. This study examined those variables. Data collection has been completed, and the data are now being analyzed.

Due to resource limitations, little progress was made in fiscal year 1992 on several lower-priority projects. These include the Countermeasure Program, Skin Resistance vs. Conductance-2, Numerical Evaluation Threshold for Decisions, and the Diagnostic Value of the Sacrifice Relevant Question. Countermeasure research is expected to resume in fiscal year 1993 on a contract basis. The other studies are in the final stages of data analysis. Work on them will continue in fiscal year 1993.

<p style="text-align: center;">National Security Agency Studies Completed in FY 1992</p>

Algorithm to Analyze Polygraph Results. In fiscal year 1992, the National Security Agency (NSA) completed the first phase of a major research effort to develop algorithms to analyze polygraph results. The Applied Physics Laboratory of Johns Hopkins University (APL/JHU) delivered a working algorithm to NSA on 28 September 1992. The algorithm is designed to analyze zone comparison tests. Initial field trials indicate that it may also be useful in analyzing some other specific-issue test formats. The algorithm, the Polygraph Automated Scoring System (PASS), is being tested now with several hundred disks of criminal cases from computerized polygraph instruments. Many of these are confirmed cases of truth or deception and all have been conducted with specific-issue test formats by cooperating examiners in the FBI, the Drug Enforcement Administration, the South Carolina Law Enforcement Division, the Vermont State Police, the Birmingham, Alabama,

Police Department, the Clayton County, Georgia, Police Department, and the Marion County, Florida, Sheriff's Office. Field trials of the algorithm by these participating agencies will be started soon, and distribution of the algorithm to all Federal agencies that have polygraph programs will be accomplished in January 1993. The algorithm is also being provided to the Department of Defense Polygraph Institute to use in basic and specialized training courses.

Component Contribution and Criterion Frequency. A study has been completed in which 11 experienced examiners who were graduates of eight different polygraph schools or courses, and who now work in Federal programs, local law enforcement, or in private practice, independently scored 40 sets of confirmed zone comparison charts. In scoring the charts, the examiners described in detail the process by which they determined each score.

The results have been useful in developing algorithms that analyze computer-polygraph results. The results are also being used to revise significantly the lesson plans now used to teach chart interpretation.

Nonverbal Detection of Deception. Research has been completed on nonverbal indicators of deception in fiscal year 1992. The research used videotapes of real interrogations of persons suspected of theft and subsequently verified as truthful or deceptive by confessions of the suspects or the confession of someone else. Specific behaviors, when taken individually, were ineffective in distinguishing the truthful from the deceptive subjects. Some of the categories of paralingual responses did include indicators of deception that were useful, with results significantly above chance. The results of this research call into question much that has been taught in interrogation courses about nonverbal indicators of deception. While there is a possibility that some patterns or combinations of behaviors may be useful, the notion that certain behaviors normally exhibited by deceptive subjects during interrogation could be quantified was not supported by this research.

<p style="text-align: center;">National Security Agency Studies Pending in FY 1992</p>

The Applied Physics Laboratory of Johns Hopkins University continues its work on the specific-issue algorithm by enlarging the data base and refining the software of PASS. The Applied Physics Laboratory is beginning the research on an algorithm to analyze relevant/irrelevant formats used in security screening examinations. The data base will be developed from disks of applicant-screening cases contributed by the cooperating law enforcement agencies and with disks from screening examinations conducted by Federal agencies. All identifying features and the wording of questions are stripped from the disks before they are made available for research. Other statistical approaches to algorithm

development are in progress or about to begin at three other universities on a contract basis, exploring the potential utility of time series, fuzzy logic, and neural net approaches. Pilot studies of these and some other approaches have been completed at the Research, Development, Test and Evaluation Division of the Naval Command, Control and Ocean Surveillance Center, and the results are encouraging.

Betrayal of Trust. In this study the focus is on betrayal of trust as a primary factor in espionage. Betrayal of trust was selected because it is measurable in some personality tests, and it has been used in past studies of persons guilty of embezzlement and in certain computer crimes. The first phase, a literature search, has been completed and leading psychometrists and criminologists have been consulted. The second phase, involving the gathering of data on scale scores and item responses from psychological instruments such as the Minnesota Multiphasic Personality Inventory and California Personality Inventory tests of police officers, is in the collection phase. Over 60 police departments are supplying data on officers who committed serious betrayals of trust and on officers who have not committed such betrayals. The psychological tests were administered before the officers were hired.

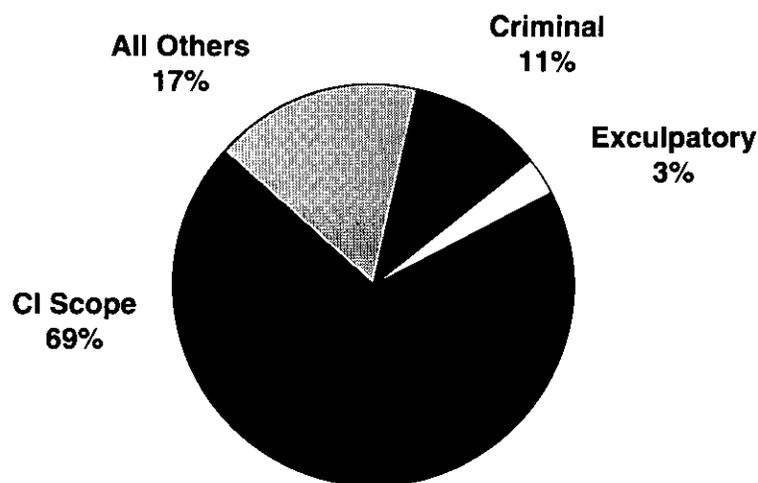
The Evaluation of Symptomatic Questions. Symptomatic questions are a distinctive feature of the standard zone comparison test that is widely used in the Federal Government. No other test format includes symptomatic questions. To date, their utility is unproved. Symptomatic questions involve asking the examinee if he or she believes the examiner when the examiner said no questions would be asked during the examination that had not been reviewed with the examinee. The research will compare the results of a large number of zone comparison charts which include symptomatic questions with the results of an identical number of zone comparison charts that exclude symptomatic questions.

APPENDIX A

DEPARTMENT OF DEFENSE POLYGRAPH PROGRAM STATISTICS: FY 1988 - PRESENT

	1988	1989	1990	1991	1992	Totals
Criminal	5,101	5,356	4,089	3,649	3,804	21,999
Exculpatory	1,884	1,503	1,167	889	1,125	6,568
CI Scope *	21,000	21,028	26,014	23,071	23,975	115,088
All Others **	11,970	9,681	7,516	5,951	5,884	41,002
Totals	39,955	37,568	38,786	33,560	34,788	184,657

FY 1992 DoD Polygraph Activity



- * Represents all counterintelligence-scope polygraphy examinations to include those conducted by the National Security Agency for continued access.
- ** Includes screening examinations conducted by the National Security Agency, specific issue examinations conducted in support of personnel security, counterintelligence and intelligence operations, and all other examinations that are not reported under the Criminal, Exculpatory, or Counterintelligence-scope categories.

APPENDIX B
EXAMPLES OF HOW THE POLYGRAPH WAS USED IN
FISCAL YEAR 1992

Polygraph Utility in Counterintelligence and Security Matters

A source in an intelligence operation admitted, when confronted with his deceptive polygraph test results, that he had discussed his role in the operation with unauthorized third parties. The source also revealed several previously unreported contacts with certain representatives of a foreign intelligence service. All relevant areas were subsequently resolved favorably through confirmatory testing.

A civilian employee with six years of government service was administered a reinvestigation polygraph examination upon returning from an overseas assignment. The employee advised that his foreign national housekeeper had been approached by the host country intelligence service to provide personal information about the employee. He said that his housekeeper had refused to provide the information. According to the housekeeper, the intelligence service wanted information regarding the employee's consumption of alcohol, his finances, if there was any unusual sexual behavior, and his daily routine. Prior to hiring the housekeeper, the employee was aware that the intelligence service had previously attempted to recruit the housekeeper when she was employed by another U.S. Government employee. The housekeeper was not offered any form of compensation and agreed to report any further attempts by the intelligence service to obtain information from her.

A civilian employee with five years of government service was administered a polygraph examination as part of his reinvestigation processing. When queried about his reactions to question regarding deliberate damage to U.S. Government information systems, the employee admitted that he brought his personal commercial software into his secure work area to assist him in performing his job. He also surreptitiously removed some of his personal and government floppy disks from his work area by concealing them in his jacket pocket, by-passing the security guard check. He copied two government software programs for his personal use at home. He discontinued removing and introducing the software into his work area because he knew that his reinvestigation was due in the near future and he would be required to undergo a polygraph examination. The employee felt he was having difficulty successfully completing the polygraph test because his government computer and another computer in his office were found infected with the Michelangelo

virus. The employee said that he did not believe he was responsible for the virus because he scanned all the software for viruses before introducing them into his work area. He was subsequently charged with a major security violation and was referred to the personnel office for adverse action consideration.

A DoD civilian employee with six years of government service was administered a polygraph examination as part of the required processing for assignment to a sensitive location. The employee consistently reacted to the question regarding divulgence of classified information. He later admitted that since he began working for the government, he told his wife, various family members and associates, classified information regarding his duties and the sensitive locations where he was considering assignments. His consideration for reassignment was discontinued and he was counseled regarding his obligation to protect classified information.

Through source information, it was developed that a civilian employee with ten years of government service had unauthorized discussions with a foreign national counterpart. It was also alleged that the employee had additional contact with the counterpart outside the employee's official duties. The employee was interviewed and denied the allegations. Upon realizing that he would be subjected to a polygraph examination to verify his statements, the employee admitted that while he was on an overseas temporary duty assignment he met the foreign national on several occasions outside his official duties. He also admitted to engaging in sexual activity with the foreign national on two occasions. They exchanged letters and engaged in telephone conversations. It was during one of these exchanges that the foreign national expressed her desire to continue the association. The employee was reassigned to another office, counseled regarding his association, and advised to cease the relationship.

A civilian Government employee, who was the subject of a personnel security investigation, admitted when confronted with his deceptive polygraph test results, that he had withheld information concerning his foreign intelligence service contacts. When asked to provide pertinent details of these contacts, the individual terminated the interview and refused to participate any further in the examination process. The matter was referred for security clearance adjudication.

A source in an intelligence operation was tested regarding the veracity of his previous intelligence reports. It became clear through the examination process that the source did not have direct knowledge of certain events reported previously as fact, but rather drew

liberal inferences from indirect comments by others which suggested the possibility that certain information was true. When questioned further, the source changed his story considerably. The source was released to the requester when confirmatory testing continued to show deceptive responses in the areas of relevant interest.

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A source in an intelligence operation admitted, when confronted with his deceptive polygraph results, that he had discussed his role in the operation with numerous unauthorized third parties. All relevant issues were subsequently resolved through confirmatory testing.

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Two Army personnel, suspected of involvement in an espionage ring, were tested to verify their denial of any involvement. The ring was broken up in 1988. The examination resolved all the relevant issues to thereby allow the investigating agency to narrow its field of inquiry.

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Allegations were made during a background investigation by the ex-wife of a DoD contractor employee that the employee: 1) had burned two cabins owned by her father; 2) had threatened to shoot her; 3) was guilty of voyeurism; 4) had made obscene telephone calls and 5) had abused his four-year old son by making him stay outside in severe winter weather for extended periods of time. The employee admitted, during the course of the examination, that he set both cabin fires, poured acid on vehicles belonging to his ex-wife's friends, broke windows and slashed tires of other cars belonging to her friends and threatened her life on several occasions. He also admitted beating and kicking her, throwing her out of the house naked in winter weather, threatening her through obscene phone calls, setting fire to a fence by her house, breaking windows in her house, pouring sugar into the gas tank of her present husband's car, abusing his son as alleged and participating in 20 to 30 acts of voyeurism. The statute of limitations precluded prosecution for these offenses; however, the employee was denied a security clearance.

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During the background investigation of an Air Force non-commissioned officer, information was developed that he had a sexual relationship with his step-daughter from the time she was 14 years old. He admitted that he had the sexual relationship with his step-daughter but only after she turned 18. He agreed to undergo a polygraph examination; however, on the day of the scheduled examination, he decided against it. Subsequently he admitted to the polygraph examiner that he had sexual intercourse with his step-daughter, beginning in her sophomore year of high school. Administrative action by the Air Force is pending.

It was learned during the course of a background investigation that a Navy petty officer and her spouse resided in Federally subsidized housing while she was drawing her Navy salary, including quarters allowance. It was further alleged that the couple vacated the residence while still owing rent and cleaning money when she was transferred to another state. Had her Navy income been reported, they would have been ineligible for Federal housing assistance. In a sworn statement, subject denied knowing that her husband was receiving the housing assistance, and moving away while knowingly owing rent and cleaning money. She agreed to a polygraph examination to support her claim. During the examination, she admitted to knowingly defrauding the Federal Housing Authority and the Navy of approximately \$5,000. The Housing and Urban Development Agency has taken steps to recover the money it is owed, and the Navy has initiated an independent investigation.

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During the background investigation of a civilian contractor employee, information was developed that, while stationed in Europe as an Army military police officer, the employee was suspected of being involved in black market activities. He was also suspected of obstructing justice by informing black market suspects that they were under surveillance by the military police. He denied the allegations, stating that he was cleared by the Army in Europe. He agreed to a polygraph examination to support his denial. During the examination, he confessed to earning between \$2,000 and \$3,000 by black-marketing cigarettes. He also admitted that he had, in fact, tipped off the suspects about the military police surveillance. It is not known at this time if any action has been taken against the subject.

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It was learned, during a background investigation of a civilian contractor employee, that the employee had allegedly inflated the value of items stolen from his home during a burglary, thereby defrauding the insurance company. It was also alleged that the employee video-taped his sexual intercourse with a girlfriend and showed the tape to a group of friends just before the girlfriend's wedding to another person. The employee denied the allegations and agreed to undergo a polygraph examination to support his denial. When the polygraph examination noted deception, he confessed to defrauding the insurance company out of approximately \$3,000 in inflated claims following the burglary. He also admitted video-taping the sexual act with the girlfriend, but claimed to have shown it only to one other person, and not to a group as alleged. It is not known at this time if any action has been taken against the employee.

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During the background investigation of a civilian contractor employee, it was reported that the employee was arrested in 1991 following complaints by six or seven girls, ranging in age from eight to eleven, that during a slumber party at his house, he sexually fondled

them. Later the charges were dismissed due to lack of evidence. When interviewed during the background investigation, the employee denied the allegations and agreed to undergo a polygraph examination. Following an indication of deception in the examination process, he confessed to fondling all the girls. He also confessed to numerous acts of group sex over many years. The case is under investigation by the civilian authorities.

Polygraph Utility in Criminal Matters

It was alleged that an Army specialist negotiated eight stolen money orders in the amount of \$500 each. The money orders were determined to have been part of a shipment of 5,000 money orders previously stolen. The soldier claimed that he had received the money orders from a friend as payment for a debt and agreed to a polygraph examination. After a polygraph examination indicated deception, the soldier admitted that he had lied about the money orders and identified the actual source of the money orders. He was subsequently tried, convicted, and sentenced to six months probation and fined \$3,000.



An investigation into a possible fraud scheme, involving military pay, developed information alleging that a soldier had received over \$6,000 in fraudulent advance payments. Following a polygraph examination, the soldier admitted to receiving the funds and paying a clerk \$600 for each \$2,000 payment received. The clerk agreed to alter or destroy accountability of the payment. The investigation, which is still pending, identified a total theft from the government of \$430,500.



An investigation was conducted into alleged cost overcharging/mischarging by a DoD contractor. The prime contractor allegedly defrauded the government of approximately \$100,000,000 over a period of several years and had agreed to a civil settlement of \$55,000,000. The contractor contended that any activity that took place was the result corporate practices and not the acts of any individual. A polygraph examination was administered to the company's director of bidding, who was granted immunity. He subsequently admitted that the company maintained two sets of books, one for use by the government and an internal set which reflected actual cost and profit. At the direction of senior corporate officers, a six percent fee was added to a number of sole source bids to cover potential losses in negotiations over contracts with government officials. Additionally, the company paid a five percent commission to a representative of a foreign company in violation of the Foreign Corrupt Practices Act. The individual admitted that a significant number of the best estimates provided to the government were false, since they were illegally inflated. Criminal charges are now pending.

A 16 year old civilian female alleged that she had been raped by a service member who threatened her life and beat her until she submitted to sexual intercourse. The soldier denied any force was used and alleged consensual intercourse. The local civilian prosecutor reviewed the case and declined civilian prosecution. The soldier, who was on terminal leave, pending release from the Army, was administered a polygraph examination and found deceptive. He subsequently admitted to threatening the victim's life and raping her as alleged. The investigation is still pending.

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A Navy enlisted member was suspected of physically abusing his 18-month old daughter, resulting in the daughter's sustaining facial injuries. The Navy member denied that he had caused the bruises to his daughter's face and agreed to a polygraph examination. The polygraph examination results indicated that he was deceptive in his responses. When questioned further, the Navy member admitted that he had struck his daughter in anger on three occasions and caused the facial bruises.

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A Navy enlisted member was suspected of engaging in sexual intercourse with his dependent step daughter, who was a minor. The Navy member denied the allegation and agreed to a polygraph examination. Following the deception-indicated results of the polygraph examination, the member admitted to attempting sexual intercourse with his step-daughter while she was asleep. He admitted that he subsequently completed intercourse with the step daughter following minor resistance from her.

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It was alleged that while on a weekend camping trip with a couple and the couple's teenage daughter, a Navy enlisted member fondled the teenage daughter. The Navy member denied the allegation and agreed to undergo a polygraph examination. The polygraph examination results indicated that the Navy member was being deceptive in his responses. When confronted with the results, the member admitted that he had fondled the teenager as alleged.

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A Navy non-commissioned officer was suspected of arson in the burning of his privately-owned vehicle. He agreed to undergo a polygraph examination. The polygraph examination results indicated that the member was being deceptive in his responses. When confronted with the polygraph examination results, he admitted driving the car off base, setting the interior portion of the car afire using lighter fluid, and reporting it stolen to the police. He admitted that his objective was to have the insurance company assume payment of the car because he could no longer afford the payments.

An investigation was initiated following a medical diagnosis that a Navy dependent (baby) was suffering from a blunt trauma injury to the head and "shaken baby syndrome." The civilian baby-sitter denied any knowledge of the child's injuries and agreed to undergo a polygraph examination. The polygraph examination results indicated that she was being deceptive in her responses to questions regarding the allegation. When confronted with the polygraph examination results, the baby-sitter admitted to continually shaking the baby with both hands to stop the baby from crying. The baby-sitter also admitted that the baby's head accidentally struck a bookcase during an instance while she was shaking the baby.



A six-month old infant was initially seen at the emergency room with a head injury allegedly suffered from a fall while in his father's care. The father claimed he was sitting in a chair tossing the infant in the air when he was momentarily distracted and the infant fell to the floor. X-rays disclosed a possible skull fracture. The child was hospitalized for seven days and returned to the care of its parents. Two weeks later, the child was admitted to the hospital with severe swelling and raised intercranial pressure. Despite surgical attempts to intercede, the infant has permanent brain damage. During the hospitalization of the infant, the parent displayed little concern for the child's welfare. The father agreed to a polygraph examination to verify how the infant was injured. The polygraph examination results indicated that the father was deceptive in his responses regarding the injuries. When confronted with the polygraph examination results, the father admitted that he had tossed the baby in anger because it would not stop crying. The father is now pending court-martial.



Two cashier keys to the bill changers on more than 60 slot machines at a European base were reported missing. A cash count conducted on the slot machines disclosed four machines were short approximately \$3,913. Investigation disclosed that the individual who performed the maintenance did not turn in the key ring containing the cashier keys. During interview, the maintenance man denied any involvement in the missing money and agreed to undergo a polygraph examination to support his denial. The polygraph examination subsequently indicated that the individual was being deceptive in his denial of his involvement in the theft. When confronted with the polygraph examination results, he admitted taking the money. He returned \$1,680 and signed a promissory note to repay the remaining \$2,233.



An individual alleged that false claims and false certifications were being made in an Air Force contract to remove and replace 4,500 feet of runway at a major Air Force base. The individual claimed that significant shortcuts were taken by the contractor to qualify for an early completion bonus of \$298,000. According to the individual, the end result would be that the runway would be much weaker than that provided for in the contract. The total

value of the contract, with modifications, was \$3,349,577. The individual was subsequently administered a polygraph examination to verify the allegations before costly repairs to the runway were undertaken. The polygraph examination results indicated that the individual was deceptive. The investigation is continuing.

An Air Force non-commissioned officer's (NCO) daughter alleged that she had engaged in sexual intercourse with him on one occasion. The daughter denied any further sexual contact with the NCO. The investigation developed no further information. During the pre-test interview, the NCO admitted to significant sexual contact with his daughter. Following additional polygraph testing, he admitted having sexual contact with eleven other children, most of whom were under the age of five, and were in the care of his wife, a registered home care provider. In addition, he advised that his daughter had been molested by another NCO who was his neighbor. The neighbor was subsequently administered a polygraph examination and admitted that he had molested the daughter. Both NCOs are now awaiting courts-martial.

Armored truck personnel mistakenly delivered a commercial firm's money bag containing \$16,000 to the commissary of an Air Force base. The three civilian commissary office workers opened the bag and upon discovering that the money had been delivered in error, contacted the armored truck company to return the money. When the armored truck company audited the money bag contents, it found that \$2,000 was missing. The three commissary employees were interviewed and denied stealing any of the money and agreed to undergo a polygraph examination. The polygraph examination results of the first two employees indicated no deception. The polygraph examination of the third employee indicated deception, and the employee subsequently admitted taking the money when the other two employees were not looking.

Several dependent children were suspected of burglarizing quarters on an Air Force base. During one of the burglaries, a .45 caliber pistol was stolen. The investigation centered on a dependent friend of the family from whose house the pistol was stolen. The friend apparently knew when the quarters were occupied and that the home was often unlocked. The friend denied stealing the pistol or burglarizing the quarters. During the pre-test interview of the polygraph examination, the friend admitted stealing the pistol. He also identified the fellow student to whom he sold the pistol. The pistol was subsequently recovered and action is now pending against the dependent.

A civilian in Alaska reported that he had discovered a bomb attached to his car. The civilian advised that he suspected the former husband of his spouse because he had been constantly harassed by the former husband. The civilian advised that he had filed numerous Congressional and Inspector General complaints but had not obtained any relief. The former husband would not cooperate in the investigation and a polygraph examination was offered to the civilian to substantiate his allegation. After the polygraph examination, the civilian admitted that he had planted the bomb himself to draw attention to the harassment by the former husband. The civilian is now awaiting action by the local courts.



An Army Air Force Exchange Service (AAFES) employee, the dependent wife of an Army non-commissioned officer, reported to her supervisor that she was late for work because she had been abducted from the AAFES parking lot the previous night. She claimed that the abductor took her to the countryside and raped and sodomized her. She claimed further that she was picked up by a policeman and taken to an unknown hospital. Investigation disclosed no suspects or physical evidence to corroborate her story. Following a polygraph examination, in which she was found deceptive, she admitted to fabricating the entire story. She advised that she had been at the local jail the entire night, attempting to obtain bail for her civilian boyfriend. The investigation was referred to local authorities for disposition.



The body of a 15-year old dependent son was found in a field behind a school in a military housing area by a jogger. Investigation disclosed that the deceased had been missing for three days and the body was in an advanced state of decomposition. Initial observations indicated that the deceased had died of multiple stab and gunshot wounds and was possibly killed where he was found. Further investigation revealed that the deceased was last seen with other dependents in the family housing area a few blocks from where he was found. The dependents advised that they all had been drinking and the deceased had been involved in an altercation. According to the dependents, the deceased was seen leaving the family housing area with strangers. As the investigation progressed, it became focused on the two individuals (Air Force dependent sons) with whom the deceased had been involved in the altercation. Both of the individuals agreed to undergo polygraph examinations. During the examination of the first individual, he admitted that he had been present when the deceased was killed and identified the second individual as the murderer. During the pre-test phase of the polygraph examination, the second individual subsequently confessed to the murder. Both individuals are awaiting trial.



An airman's death was allegedly caused by hangar doors closing on him. The death was initially ruled as accidental. The parents of the deceased expressed great concern over the thoroughness of the investigation. A witness subsequently came forward and alleged

that he was told by another airman that a non-commissioned officer had intentionally closed the doors on the deceased causing his death. Both the airman and the non-commissioned officer denied any knowledge or involvement in the death of the deceased. However, they both declined to undergo a polygraph examination. The witness agreed to undergo the examination. Subsequent to the polygraph examination, the witness admitted that the airman had not implicated anyone in the deceased death and that he, the witness, had fabricated the entire story.



It was reported to the security police at an Air Force base on the west coast that \$6,200 had been stolen from a safe. The safe was used by personnel to store their valuables while on special missions in the Pacific. Seven individuals had placed advanced travel funds in separate envelopes in the safe. Two senior non-commissioned officers and a clerk were the only ones with the combination to the safe. The three individuals denied stealing the money or having knowledge of anyone who may have stolen it and agreed to undergo polygraph examinations to substantiate their denials. The two NCOs' polygraph examinations indicated they were not deceptive in their responses to relevant questions. During the pre-test phase of her polygraph examination, the clerk admitted that she had stolen the money, taking an envelope each day. She said that she had used the money to pay bills and to buy other necessities for her family. The clerk is now facing court-martial.



A female airman claimed she was raped in her dormitory room. The woman said that she and two male airmen were in her room talking and subsequently one of the airmen held her down while the other forcibly raped her. The investigation did not disclose any evidence of forcible sexual intercourse. The two accused airmen denied engaging in intercourse with her and agreed to undergo polygraph examinations. The polygraph examination results corroborated their denial. The woman was then interviewed further with the cooperation and support of her mother. She initially stated that she had experienced recurring dreams since the age of 11 of being assaulted and for reasons unknown to her, the attackers assumed the voices and the appearance of the airmen whom she accused of rape. She stated further that she had engaged in consensual sex with another airman and, because of her deep religious conviction, she had to acknowledge that she had engaged in sexual intercourse with someone. She was referred to mental health professionals and eventually separated from the Air Force.



Over 90 pairs of night vision goggles, valued at more than \$531,000, were stolen from a sensitive items storage room in Germany. There were no signs of forced entry. A German woman reported to the Army that her American boyfriend, a soldier, had admitted stealing a pair of goggles. The soldier denied stealing the goggles and agreed to undergo a polygraph examination. After the polygraph examination results indicated that the soldier

was deceptive, he admitted stealing the goggles and identified another soldier who was also involved in the theft of the goggles. The goggles were allegedly sold to a Turkish national. As a result of the polygraph examination and subsequent investigation, 18 pairs of the goggles were recovered. The recovered goggles were valued at more than \$99,000. Legal action against the soldiers is pending.

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An investigation into the operations of a Contract Operated Parts Store disclosed that between 1989 and 1992, tires and batteries valued at more than \$100,000 had been illegally requisitioned and subsequently sold to local civilian merchants. Two soldiers were identified as suspects in the investigation. Another soldier was identified as an accomplice and was suspected of actually delivering the merchandise to the merchants. When interviewed, the suspected accomplice denied any involvement in the scheme and agreed to a polygraph examination. During the pre-test phase of the polygraph examination, the suspected accomplice admitted to having conspired with the other suspects to deliver the merchandise to the civilian merchants. He also stated that one of the other suspects had written him letters of recommendation and did not report his marihuana use to the authorities as part of his complicity in the matter. The investigation is pending.

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A dependent wife reported that her husband, a non-commissioned officer, had sexually molested their 11-year old daughter. The wife claimed she overheard the daughter tell the father, "I won't tell, but don't do that anymore." During further questioning by the wife, the daughter claimed that the non-commissioned officer had been molesting her for several years. The father initially denied the allegations and agreed to undergo a polygraph examination, the results of which indicated deception. The non-commissioned officer subsequently admitted that the allegations were true. He pled guilty in a court-martial and received three years confinement.

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An investigation was initiated after two privately-owned vehicles were discovered burned. Because of the extensive damage, it appeared that a bomb had been involved. Investigation revealed that a 13-year old dependent was suspected of starting fires in the apartment complex in which he lived. No information linking the dependent to the vehicle fires was found. The dependent, with the concurrence of his father, agreed to undergo a polygraph examination. Following an indication of deception on the polygraph examination, the dependent admitted that he had burned the vehicles. He also admitted that he had started the fires in his apartment complex.

A 16-year old family member reported that as a young child she was sexually molested by her father, an Army non-commissioned officer. When interviewed, the father, admitted molesting his other daughter for a period of six years, but he denied that he had molested his youngest daughter and consented to a polygraph examination. The polygraph examination results indicated that his responses were deceptive. When confronted with the polygraph examination results, the non-commissioned officer admitted sexually abusing both his daughters. He also admitted that he needed psychological counseling to prevent future recurrence. The investigation of the case is pending.

Polygraph Utility in Exculpation

A Navy enlisted member was suspected of fondling and kissing a four-year old girl at the enlisted member's home. The enlisted member's wife operated a child-care business in the home and was caring for the young girl. The Navy member denied the allegation and requested an exculpatory polygraph examination. The polygraph examination results indicated that he was deceptive in his responses to questions about the matter. During the post-test interrogation, the Navy member admitted fondling and kissing the child as alleged.



A seven-year old family member reported to his mother that his father, a non-commissioned officer, had forced him to engage in anal sodomy with him against his will. A medical examination was unable to support the accusation as there were no signs of rectal trauma. Additionally, interviews of neighbors and associates determined that the boy had a history of making up stories, most of which had sexual connotations. The sergeant, since divorced from the mother, denied the accusations and claimed that the allegations were the result of current custody negotiations with his former wife. The sergeant was administered a polygraph examination at the suggestion of his lawyer. The examination results were non-deceptive. The charges against the sergeant were dropped.



A Marine Corps enlisted member was suspected of stealing blank American Express money orders and negotiating them for various amounts of money. He denied the allegations and requested an exculpatory polygraph examination. During the pre-test phase of the examination, the enlisted Marine admitted stealing and negotiating the missing money orders, totaling \$3,000.

A Navy enlisted member was identified by a civilian police informant as a user of cocaine. The enlisted member denied the allegation and requested an exculpatory polygraph examination. The polygraph examination results indicated that he was deceptive in his responses to questions concerning the allegation. When confronted with the polygraph examination results, the member admitted that he did use cocaine while on active duty.

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In 1990 the dependent wife of an airman was discovered murdered in their off-base mobile home. The deceased had been stabbed 14 times, strangled with an electric cord and hit on the head with an iron. Local authorities identified a civilian suspect and after a polygraph examination, the suspect admitted he had stabbed the deceased. He also said that the airman husband was present during the murder and had offered to pay him to kill the deceased. The suspect was offered a pre-trial agreement in which he would testify against the airman in return for a sentence of 22 years. The airman was arrested by local authorities and incarcerated for approximately nine months. The Air Force requested and received prosecutorial jurisdiction over the airman. Prior to trial, the airman's defense counsel requested an exculpatory polygraph examination. The polygraph examination results indicated that the airman was not deceptive in his responses to questions regarding the murder, i.e., that he did not ask the suspect to kill his wife; that he did not offer the suspect any money to kill his wife; that he did not participate in the murder; and that he was not present in the mobile home when his wife was murdered. Based on the results of the airman's polygraph examination, further polygraph testing of the civilian suspect was requested. During further examination and the subsequent interrogation, the suspect admitted that he had acted alone. The suspect advised that the week prior to the murder, he had sexual intercourse with the deceased and had returned to ask her to leave the airman for him. When the deceased refused, he then murdered her. The airman was cleared of murder charges.



**OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE
(COMMAND, CONTROL, COMMUNICATIONS, AND INTELLIGENCE)**

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**FISCAL YEAR 1993 REPORT TO CONGRESS
ON THE
DEPARTMENT OF DEFENSE POLYGRAPH PROGRAM**

TABLE OF CONTENTS

	<u>page</u>
I The Polygraph: Background Information	1
II.. Fiscal Year 1993 Counterintelligence-scope Polygraph Examinations	2
III Refusals	3
IV Polygraph Examinations Requiring More Than Two Series or More Than One Day	3
V Examination Results	4
VI Utility of the Polygraph	7
VII Qualification Standards for Department of Defense Forensic Psychophysicologist (Polygraph Examiners)	8
VIII Polygraph Research	9
Department of Defense Polygraph Program Statistics 1988 - Present	APPENDIX A
Examples of How the Polygraph Was Used in Fiscal Year 1993	APPENDIX B

I
THE POLYGRAPH: BACKGROUND INFORMATION

The Department of Defense has used the polygraph effectively for almost half a century. It is used mainly in criminal investigations, counterintelligence cases, foreign intelligence and counterintelligence operations, exculpation requests, and now, counterintelligence-scope screening. The polygraph is a tool of proven value that greatly enhances the interview and interrogation process. Often it is the only investigative technique capable of providing essential information to resolve national security issues and criminal investigations.

Section 1121 of the National Defense Authorization Act for Fiscal Years 1988 and 1989 (Public Law 100-180, December 4, 1987; 101 Stat. at 1147) authorizes the Department of Defense to conduct Counterintelligence-scope Polygraph examinations in support of security and counterintelligence matters. The following report illustrates how the Department of Defense Polygraph Program is managed. It also documents specific examples of polygraph utility.

The purpose of the Counterintelligence-scope Polygraph Program is to deter and detect espionage and sabotage. The counterintelligence-scope polygraph examination questions focus on whether the examinee has ever engaged in espionage or sabotage; has ever given or sold classified material to unauthorized persons or has been approached to do so; has ever had any unauthorized contact with a representative of a foreign government; or has ever had knowledge of anyone who had been involved in any of the above.

The importance of the Counterintelligence-scope Polygraph Program as a deterrent to espionage is well documented in the recorded interviews of convicted spies. Most of these individuals say they would not have spied if they had been required to take a polygraph examination or would not have taken a job that required a polygraph examination. They simply felt that they would not have been able to pass a polygraph examination.

The polygraph being such an effective deterrent, it is not surprising to find a very low base rate for deception in those individuals being tested. It should also be noted that while the polygraph is very good at detecting deception about past and present actions, it cannot determine future intentions.

II

Fiscal Year 1993 Counterintelligence-scope Polygraph Examinations

The following information is provided in accordance with Section 1121 of Public Law 100-180, 101 Stat. 1147.

(1) Special Access Programs	2,990
(2) DIA Critical Intelligence Positions	798
(3) TOP SECRET	436
(4) Examinations for Interim Access to Sensitive Compartmented Information	2
Total Examinations Conducted Under the Congressional Ceiling	4,226
Exempted Examinations	<u>13,744</u>
DoD Counterintelligence-scope Polygraph Program TOTAL*	17,970

*NOTE: Does not include counterintelligence-scope polygraph examinations conducted by the National Security Agency (NSA). A breakout of polygraph examinations conducted by NSA is contained in a classified annex to this report.

III Refusals

In fiscal year 1993, a total of 24 persons declined polygraph testing. The two most often stated reasons for declining the counterintelligence-scope polygraph screening examination are: 1) the examination is an intrusive device that violates the right of privacy; and 2) the examinee decided against assuming a job that required a high-level security clearance and a polygraph examination. In fiscal year 1993, the refusal rate was one tenth of one percent of the total number of examinations administered. The evidence suggests that the refusal rate is minuscule because the examination does not include lifestyle questions. The rate has remained relatively constant since the implementation of the Counterintelligence-scope Polygraph Program nine years ago. In accordance with Department of Defense policy, those persons who declined to take the examination were subsequently denied access to the classified material in question, but retained their position or were transferred to other positions in the organization of equal pay and responsibility, commensurate with the clearance level held before the declination.

IV

EXAMINATIONS REQUIRING MORE THAN TWO SERIES OR MORE THAN ONE DAY

Of the total examination population of 17,970 individuals, 1,103 required more than two series (a series is defined as the collection of at least two polygraph charts on an examinee). A total of 728 examinations required more than one day to complete.

Of the individuals for whom the examination lasted more than one day or required more than two series, 791 yielded deceptive, inconclusive, or non-deceptive results with admissions. These results are documented in more detail later in this report. The remaining extended examinations were subsequently determined to be non-deceptive. The non-deceptive examinees were given access or continued access to the programs requiring the polygraph examination.

V EXAMINATION RESULTS

The polygraph examination results of the 17,970 individuals tested under the Department of Defense Counterintelligence-scope Polygraph Program are as follows:

There were 15 individuals who, because of medical or psychological considerations, were unable to complete the polygraph examination, resulting in insufficient data with which to form an opinion. None of these individuals made any admissions relevant to the issues being tested.

There were 22 individuals whose polygraph examination results were evaluated as inconclusive, i.e., after a review of the physiological data, it was not possible to determine whether the results indicated deception or non-deception. Additional examinations were conducted on many of these individuals. Some of the examinations were administered on two or more consecutive days by different examiners. Two of these individuals made admissions relevant to the issues being tested.

There were 17,164 individuals whose polygraph examination results were evaluated as non-deceptive.

There were an additional 729 individuals who made admissions relevant to the issues being tested, and through further testing, the examiner was able to resolve all relevant issues.

There were 23 individuals whose polygraph examination results were evaluated as deceptive and who made no admissions to the relevant issues.

There were 17 individuals who made admissions relevant to the issues being tested but continued to be evaluated as deceptive during further testing.

The following are some examples of information developed during counterintelligence-scope polygraph examinations. It should be noted that all these individuals had been interviewed previously by security professionals and investigated thoroughly. These cases demonstrate the effectiveness of the polygraph. Without its use, it is doubtful that the information would have been developed.

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An individual assigned to an extremely sensitive classified Special Access Program admitted to unauthorized oral disclosures of information classified at the SECRET and TOP SECRET (CODE WORD) level. He denied any wrongful or inadvertent removals of classified information. During subsequent examinations he admitted to the removal of TOP SECRET (CODE WORD) material, and transporting a computer disk to and from a Special Compartmented Information Facility and additional oral disclosures of information protected within his Special Access Program.

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An individual admitted disclosing his involvement in "Black Projects" and Special Access Programs to his wife and several members of a social group with which he was involved. The group, which believed in witchcraft and ancient Celtic gods, was critical of his involvement in the classified projects and was opposed to military activities. During the polygraph examination the individual reported that he had previously been tested by the National Security Agency and had not passed that examination. The case was referred to the Federal Bureau of Investigation.

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An individual admitted that he had told unauthorized persons details of his involvement in Special Access Programs. Additionally, he provided information regarding specific activities related to approved special operations which he felt were questionable and which caused him concern during the testing.

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An individual admitted not reporting that he had occasional contact with a member of a foreign intelligence service. He met the individual during a joint training exercise and maintained occasional contact through correspondence.

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An individual with access to several Special Access Programs admitted that he had provided classified material to liaison counterparts without proper authorization.

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An individual admitted that he had provided classified information to an uncleared person and had unreported contacts with an individual from a former east-bloc country from 1980 to the

present. The individual had visited the individual's home in that country in the past year.

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An individual admitted discussing interrogation techniques and investigative activity relating to a specific classified espionage investigation and classified Department of Defense counternarcotics activities with friends.

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An individual admitted to disclosing classified information to his spouse on approximately nine occasions. One disclosure involved a Russian ship monitoring activity off the U.S. coast.

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An individual admitted not reporting requests for classified or defense information by unauthorized persons while in attendance at liaison functions and seminars, both in an official and unofficial capacity.

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An individual who was a naturalized citizen from the Federal Republic of Germany, admitted intentionally withholding information from U.S. officials during her naturalization process as well as during previous background investigations regarding a relative who lived in East Germany. Additionally, she acknowledged confirming to her foreign born relatives the fact that her counterintelligence duties included investigating the former East German Intelligence Service.

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An individual admitted that in 1979, he was introduced by a family member in New York to a man later identified as being the KGB Chief in the United States. In 1990, while visiting a relative's home in New York, he was introduced to the Soviet Trade Consul for the United Nations. He stated he was queried by the Soviet official concerning personalities at the Defense Language Institute in Monterey, California.

VI UTILITY OF THE POLYGRAPH

During fiscal year 1993, as previously illustrated in the report, the utility of the polygraph in national security investigations was demonstrated to be unique and significant. At Appendix B are various accounts of interviews conducted with the aid of the polygraph. In all illustrated instances, the polygraph examination process produced significant security or criminal information which would not otherwise have been obtained. It was also valuable in helping to establish the innocence of persons charged with serious infractions.

VII Qualification Standards for Department of Defense Forensic Psychophysicologist (Polygraph Examiners)

The Department of Defense maintains very stringent standards for polygraph examiners. The Department of Defense Polygraph Institute's basic polygraph program is the only program known to base its curriculum on forensic psychophysiology, and conceptual, abstract, and applied knowledge that meet the requirements of a master's degree-level of study. Candidates selected for the Department of Defense polygraph positions must meet the following minimum requirements:

1. Be a United States citizen.
2. Be at least 25 years of age.

3. Be a graduate of an accredited four-year college or have equivalent experience that demonstrates the ability to master graduate-level academic courses.

4. Have two years of experience as an investigator with a Federal or other law enforcement agency. Two years of comparable experience may be substituted for the requirement of investigative experience with a Federal or other law enforcement agency.

5. Be of high moral character and sound emotional temperament, as confirmed by a background investigation.

6. Complete a Department of Defense-approved course of polygraph instruction.

7. Be adjudged suitable for the position after being administered a polygraph examination designed to ensure that the candidate realizes, and is sensitive to, the personal impact of such examinations.

After completing the basic polygraph training, the individual must serve an internship consisting of a minimum of six months on-the-job-training and conduct at least 25 polygraph examinations under the supervision of a certified polygraph examiner before being certified as a Department of Defense polygraph examiner.

Department of Defense Forensic Psychophysicologists
(Polygraph Examiners)

<i>Fiscal Year</i>	<i>Average Number Of Examiners</i>	<i>Attrition Rate</i>
1988	235	14.5%
1989	261	10.0%
1990	270	6.3%
1991	269	14.9%
1992	269	17.8%
1993	254	17.3%

VIII

Polygraph (Forensic Psychophysiology) Research

Department of Defense Polygraph Institute

The Department of Defense Polygraph Institute established in 1986, has three Congressionally mandated research areas: 1) evaluate the validity of polygraph techniques; 2) conduct research on polygraph countermeasures; and 3) conduct developmental research to improve polygraph technology.

Small Grants Program

In fiscal year 1992, the Institute began a program to provide grants of up to \$3,000 for master's degree students, \$10,000 for doctoral degree students, and \$20,000 to academic and private institutions for research in forensic psychophysiology. This program has proven to be so responsive to our needs, and so cost effective, that in fiscal year 1993 it was enlarged. Grant limits are now \$5,000, \$15,000 and \$50,000 for master's, doctoral, and institutional awards. This has increased both the quantity and quality of research proposals. In fiscal year 1993, the Institute funded 13 of the 19 proposals received, as compared to 4 of 8 proposals received in fiscal year 1992. The funded proposals fall into four major categories: computerization of polygraph test results, new physiological measures and equipment, new test formats and procedures, and miscellaneous grants.

Computerization of polygraph test results. The Institute is funding four grants exploring different methods of analyzing test results for determining truth and deception. All involve analysis of the same set of data from verified truthful and deceptive criminal suspects who were administered tests on computerized polygraphs.

The University of Washington is assessing the effectiveness of decision trees. An earlier approach, known as step-wise discriminant analysis, draws one vertical line to best discriminate between truthful and deceptive populations of polygraph subjects. Decision trees, on the other hand, can use a large number of lines at differing angles, to discriminate between the populations. This may prove to be more accurate than the earlier approach.

Claremont Graduate School in California is exploring artificial neural networks. This approach uses massive parallel

processing, similar to how the human brain works, to identify the different scoring criteria and weighting for each factor used to discriminate between the guilty and innocent subjects. Because the computer determines how to evaluate the charts in the data base, rather than examiners using a priori decision rules, this computerized method may prove to be better than human analysis.

The University of California at San Jose is exploring fuzzy logic to solve problems. Traditional solutions have relied on probabilistic statistics to determine deception. Fuzzy logic uses the domain of possibilistic statistics. The success of fuzzy logic at solving related types of problems suggests it may be useful in polygraph chart interpretation.

Johns Hopkins University's Applied Physics Laboratory (APL) has a contract to develop an algorithm to distinguish between genuine reactions caused by deception versus a spurious reaction caused by sophisticated countermeasures. The ability to detect countermeasures on a polygraph test should increase our ability to detect foreign agents who have received countermeasure training.

New physiological measures and equipment. The Institute is pursuing four efforts to develop new indices of deception or new equipment to detect deception.

Brain waves. The University of Ottawa in Canada is investigating the use of two types of brain wave measure, the P300 and N400. These waves occur immediately after hearing a statement that is false or a question requiring a lie. Brain waves may be particularly resistant to countermeasures, because they occur as soon as the subject recognizes the critical item, before he or she decide whether to apply a countermeasure.

The cardio cuff on the present polygraph is uncomfortable. This limits the number of questions that can be asked on the test. The Institute is supporting several studies trying to replace it with another cardiovascular measure which will be at least as accurate, without causing discomfort. One such study is being conducted by a researcher in California who is using a new type of plethysmograph to study cardiovascular changes during deception.

The State University of New York at Stony Brook is studying several different measures of cardiovascular activity.

The University of Maryland is working a new type of polygraph that may include cardiovascular and respiratory measures such as vagal tone and the respiratory ramp. This will provide us information about the interaction between the brain and the rest of the body which should be helpful in detecting deception.

New techniques and methods.

A Minnesota researcher is conducting a study to see if classical conditioning can make it easier to detect lies. It has long been known that a loud noise will cause a big reaction. Just before taking a polygraph exam, the subject will undergo a conditioning procedure. He will be instructed to lie. Just as he does, he will hear a loud noise, creating a very large reaction. This conditioning procedure continues until he gives a large response whenever he lies, even when the noise does not appear. The standard polygraph test will then be given. The experiment will determine whether the lies of the conditioned subjects are easier to detect than the lies of subjects who have not gone through the conditioning procedures.

The guilty knowledge test (GKT) is praised by most scientists, who consider it a much better test than the control question test. They consider it to be more scientific, to have a strong theoretical base, and to be accurate with innocent subjects. The GKT has long been used by Israeli, Japanese, and Balkan polygraph examiners, yet it has never gained acceptance by U.S. examiners, because they believe it could seldom be used. This study explores the feasibility of the FBI's using the GKT. Researchers from the Institute working with FBI polygraph examiners will conduct a field test of the GKT.

Does the guilty person react more when lying about what he knows, or about what he did? The guilty knowledge test asks a series of questions about what a person knows: "Regarding the type of store held up last night, do you know if it was the ABC liquor store? Do you know if it was the Walmart?...etc." A Canadian researcher has developed a related test, the Guilty Action Test (GAT), in which the questions relate to what the guilty person did: "Regarding the robbery last night, did you hold up the ABC liquor store? Did you hold up the Walmart?...etc." This study compares the effectiveness of the two types of questions.

Miscellaneous grants.

Research data base. It is important that researchers be able to retrieve all studies pertaining to a topic of interest, such as demographic and personality variables or accuracy as a function of examiner training. For example, to examine factors that might cause inconclusive test results, a researcher may wish to review all studies reporting unusually high or low inconclusive rates. There is no easy way of doing this at present. The Institute is funding a researcher at the University of Northern Michigan to construct a computerized data base of a standardized set of over seventy variables and statistics from all known polygraph studies. This will increase both the speed and thoroughness with which the literature

can be searched, and lays the groundwork for meta-analyses of the scientific literature.

Espionage Data base. Project Slammer is studying incarcerated espionage agents to learn why and how they became involved in espionage. It is limited to living persons. To provide examiners a broader background into historical trends and personalities, the Institute has awarded a grant to a researcher in Maryland to extract details from books detailing personalia and modus operandi of persons involved in espionage. This data base will be shared with PERSEREC. As part of this grant, the researcher will assemble a library of 300 books dealing with espionage for the Institute's library, for use in training examiners.

Ethics curriculum. Ethics is a cornerstone for scientific and research endeavors. For forensic psychophysiology to become a scientific discipline, and for polygraph examiners and researchers to understand their responsibilities to society and the persons they examine, the Institute must develop and promulgate ethical considerations. The Institute has awarded a grant to an ethicist to develop a 3 credit graduate level ethics course leading toward an eventual degree in forensic psychophysiology. The course will be taught at the Polygraph Institute.

<p style="text-align: center;">DOD POLYGRAPH INSTITUTE STUDIES COMPLETED IN FISCAL YEAR 1993</p>

New physiological measures and equipment:

Eye Movement in Deception. Another agency conducted a major study of how eyes move during deception. Their funding expired before all the data could be analyzed. The Institute funded the analysis of the most promising of the remaining data. The additional analysis failed to find a useful relationship between eye movement and deception.

Axciton Evaluation. The Institute has evaluated several computerized polygraphs. This year the Institute completed its evaluation of the Axciton polygraph. The Institute found the equipment and applications software to be user friendly and effective. However, the analytical software for ranking the size of reactions needs some improvement.

Diverse Sensors. Sensors on the traditional polygraph are much the same as they were in the 1930's despite important advances in biomedical technology. This study compared a number of different methods for recording respiration, electrodermal reactions, and

cardiovascular activity. The Institute found that the traditional sensors are generally the best suited for measuring and recording these physiological reactions.

Validation of a Systolic Time Interval (STI): RWCPI. Systolic time intervals measure how long it takes for various phases of the heart beat to occur. Previous research has found that they may be useful for detecting deception. It is a tedious and error-prone task to analyze the computerized data by hand. The Institute contracted with Delta Biometrics to develop software for quantifying the STI known as RWCPI. The contractor also built a Vagal Tone Monitor and conducted a study to determine the influence of sympathetic and parasympathetic activity on the heart. The Institute learned that STIs reflect a complex interplay of sympathetic and parasympathetic influences. They are a good indicator of changes in the level of parasympathetic activity. It has always been known that the sympathetic nervous system is heavily involved in reacting to lies. It now appears that the parasympathetic nervous system is much more involved than previously known.

Evoked potentials for identifying training. The Institute collaborated with the FBI in a study of how brain waves can be used to identify people who have been trained in espionage. The goal was to develop a security screening test to identify persons who have been trained in espionage by foreign countries. The initial study showed promising results, but the project is now on hold because of higher priorities in other areas.

New methods and techniques:

Subliminal Conditioning in the Detection of Deception. There are times when we would like to find out if an agent employed by a foreign intelligence service knows certain people; yet we don't want that service to learn what names we know. Will people react to names they know, even if the names are flashed on a screen subliminally, for such a short time that they can't consciously read and remember them? This study explored this question. The Institute learned that it is very difficult to design effective ways to present the stimuli; people could recognize the stimuli even when flashed for only a few milliseconds. This technique does not seem to be practical.

Validity and Miscellaneous studies:

The Relative Utility of the Forensic Disciplines. In a joint study with the US Army Criminal Investigation Division Command, the Institute examined the correlation between the results of polygraph tests and other forensic lab tests. In total, 1,069 forensic examinations were reviewed. Polygraph exams accounted for 45 percent of them, and all other types of forensic examinations comprised the rest. In all categories, a higher solve rate was achieved when multiple forensic disciplines were utilized. In no case did the

findings of one discipline contradict the results another. The polygraph was both the most utilized discipline and the single most effective.

Subcultural factors. Is the polygraph biased against Afro-American or Hispanic subjects? Does the race of the examiner affect the accuracy of his decisions? This study assessed outcome accuracies of examinations conducted on Caucasian, Afro-American and Hispanic subjects by examiners of the same or different cultural backgrounds. Neither the subject's race nor the examiner's race had any reliable effect on the accuracy of the test.

Designed a Field Validation Study. How accurate is the polygraph in criminal investigations? Previous studies have not fully answered this question. The Institute contracted with Personnel Decisions Research Institute (PDRI) to design a field validation study which would provide a definitive estimate of the polygraph's validity in criminal investigations. PDRI has submitted two designs, which will be reviewed by the Armed Services for their feasibility and by various researchers for scientific rigor. If the reviews are favorable, the next step will be a pilot study.

Comparison of Control Question Test (CQT) Effectiveness in Mock Crimes and Real Events. Is the polygraph as accurate in a "make believe" mock crime scenario as it is when a person is lying about something that actually happened in "real life?" This is an important question, because much of the Institute's research involves mock crime scenarios. The University of New Brunswick in Canada compared the effectiveness of the CQT in a mock crime versus real life. They found that the polygraph was equally accurate in both paradigms (mock crime and real events). This bolsters the confidence that can be put in research results involving mock crimes.

Demographic variables. Much of the Institute's research has been conducted on military recruits. But recruits differ from other people in many ways. They are young, in better shape than most people, but are often verging on exhaustion from their rigorous training. To assess the effect of differences between recruits and the general civilian population recruited from communities near the Army base, the Institute compared polygraph outcomes from those populations on such variables as 1) gender, 2) age, 3) urban or rural residence, 4) income, and 5) educational level. In general these variables had little impact on test outcome.

Situational variables. What happens to the accuracy of the polygraph if the subject is unusually tired, or is suffering from a cold or blistered feet? The Institute looked at several situational variables on the accuracy of polygraph outcomes. The variables included 1) number of hours the subject had slept prior to the test; 2) the subject's alertness during the test; 3) the subject's general health; 4) the subject's level of physical discomfort; 5) the

subject's use of alcohol, nicotine, and coffee prior to the test. In general, the situational variables had little impact on test outcome.

<p style="text-align: center;">DEPARTMENT OF DEFENSE POLYGRAPH INSTITUTE STUDIES IN PROGRESS</p>

New physiological measures and equipment:

Accuracy of (APL's) Polygraph Automated Scoring System (PASS) with mock crimes. PASS was developed from a combination of verified and unverified field cases. Because ground truth is often hard to determine, unverified cases were included if three examiners agreed on the interpretation of the polygraph charts. The Institute is comparing the accuracy of PASS to that of human examiners in an analog crime study in which ground truth was known for all examinations.

Evaluation of the Stoelting Computerized Polygraph System (CPS). The Institute conducted a user evaluation of the CPS. The manufacturer was briefed on the results. The final report will be submitted in 1994.

Event-Related Potentials (ERPs) in Prisoners). Event-related potentials are a type of brain wave activity that occurs when a subject recognizes the significance of certain stimuli, such as items of information one is attempting to conceal. Many studies have shown that this technique can be quite accurate. Most of the studies have used college students. We need to know if this technique is accurate when testing criminals. The Institute is planning a study of these brain waves using prisoners in the local jail. The study is awaiting coordination of legal aspects.

Event-Related Potentials and Long-Term Memory. The Institute is studying the effects of stimulus meaningfulness on the P300 brain wave. This experiment assesses the effect of long term memory on the elicitation of the P300 wave. Does the active process of withholding information affect the P300 in some way, such as amplitude, latency, or duration?

Voice Spectrum Analysis. Voice analysis for detecting deception offers many advantages over conventional measures. With no attached sensors, the examinee would experience less stress. A person could be examined remotely by radio or telephone. The Institute is exploring differences in the spectral content of voice as a possible index of deception. The voice recordings of 46 subjects who were administered a numbers test are being digitized and analyzed.

Comparison of Cardio and Finapres Measures. The cardio cuff used to record heart rate and changes in blood pressure can be uncomfortable. The purpose of this study is to see if it can be replaced by more comfortable sensors. The Institute collected cardiovascular data from 110 subjects, half of whom were guilty of committing a mock crime. The cardio cuff and a Finapres were used to record cardiovascular changes. The data is being analyzed.

New methods and techniques:

Event-related Control Stimuli. This study seeks to develop a polygraph test which does not depend on conventional, privacy-invading control questions. All questions on the test refer to the matter under investigation. Decisions would be based on a rank order scoring of the pattern of reactions among the relevant questions. The Institute has collected the data and the preliminary analyses are promising.

Test of Espionage and Sabotage (TES). TES was developed to improve the accuracy of security screening. The Institute conducted an analog study comparing the effectiveness of the standard Counterintelligence-scope Polygraph (CSP) examination with conventional control questions, CSP with directed lie control questions, and TES with directed lie controls. The tests were equally accurate at clearing the innocent subjects, but TES was more accurate than either CSP at identifying the guilty subjects.

TES Replication. The findings of any individual study mean little because many factors influence what results are obtained. Before policies or procedures are changed to reflect research findings, the findings should be verified. The Institute replicated the previous study by comparing the TES with directed lie controls against the CSP. Again, the TES was significantly more accurate than the CSP, with fewer inconclusives.

TES Expansion. Some 27 examiners from 8 federal agencies participated in a study at the Institute to determine whether the size of the physiological responses to TES questions reflects the specific questions the programmed guilty examinees were lying about. The computerized data collected is being analyzed by APL to develop a scoring algorithm for TES.

TES Field Study. The Institute developed a preliminary design for a field study to provide a comparison of the TES results with CSP results from the previous year. The design may be modified as dictated by field experience.

Countermeasures:

Countermeasure Data Collection (CM-1). The control question test (CQT) is the most widely used type of polygraph test. The

Institute has contracted with APL to develop a countermeasure detection algorithm. The Institute had 30 subjects deny which of five cards he had selected. The subjects engaged in countermeasures to create reactions to one of the unselected cards on the test in an effort to mislead the examiner. The physiological data has been provided to APL.

Countermeasure Data Collection (CM-2). To gather more data for APL, the Institute conducted another study under somewhat different circumstances. Each of 30 subjects denied which of ten cards he had selected, and tried to mislead the examiner by creating reactions to an unselected card. The additional data has been provided to APL.

Validity and Miscellaneous studies:

Accuracy of repeated testing. The Institute had half of 46 subjects memorize a number included in a numbers test; the other half memorized a number not covered by the test. All subjects were administered a numbers test immediately after memorizing the selected number. They were again tested at least six days later. Data collection is in progress.

USPO Field Validity. Critics of the polygraph claim that the polygraph cannot clear the innocent criminal suspect in real-life examinations. Analog studies cannot answer this question, because mock-innocent subjects are not very worried about failing the test; nothing bad will happen to them if they are falsely accused. It is hard to answer this question in most field studies, because relatively few innocent criminal suspects undergo polygraph examinations. What is needed are situations in which many innocent suspects are tested, the case is solved by the confession of the guilty person, and it can be established that the guilty person acted alone. The U.S. Post Office has a number of cases that meet these requirements. In a joint study with the Post Office, the Institute has collected data from 189 polygraph field examinations. Thirty-two variables from these cases have been entered into a data base for analysis. Additional data is being collected.

Electrodermal Reactivity. This study investigates the relationship between individual differences in electrodermal reactivity and anxiety and their relationship to performance on a control question test. The following issues are being examined: a) habituation of the electrodermal response, b) magnitude of responses to control and relevant questions, c) response magnitude and individual difference variable scores, and d) numerical scores.

<p style="text-align: center;">NATIONAL SECURITY AGENCY STUDIES COMPLETED IN FISCAL YEAR 1993</p>
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Algorithm to Analyze Polygraph Results: In 1993, NSA completed development and field testing of an analytic algorithm to classify computerized polygraph examination results. The final algorithm was delivered to NSA by the Applied Physics Laboratory of the Johns Hopkins University (APL/JHU) on 14 October 1993. The algorithm is designed to analyze the results of single issue, control question types of polygraph examinations. Field studies and cross-validation of the APL/JHU work indicate that the use of this algorithm will significantly reduce inconclusive test diagnoses while increasing overall validity. The algorithm was developed from real criminal cases conducted by city, county, state, and federal law enforcement agencies. The completed algorithm has been distributed to all federal agencies that have polygraph programs. The algorithm has also been provided to the DoD Polygraph Institute for use in its basic and specialized training courses.

Effectiveness of the Symptomatic Question: A study has been completed on the use of the symptomatic question in terms of its influence on polygraph results. Several well regarded polygraph experts have theorized that a bothersome outside issue to the person taking a polygraph examination may be the cause of inconclusive polygraph diagnosis. This study investigated whether or not the insertion of a question into the format to identify bothersome outside issues reduces the inconclusive rate. The results indicate that the inclusion of a symptomatic question significantly reduces inconclusive diagnoses in single issue control question type examinations

<p style="text-align: center;">NATIONAL SECURITY AGENCY STUDIES IN PROGRESS</p>
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Polygraph Computerization: APL/JHU continues to work on a multiple issue algorithm as well as work on an analytic algorithm for screening examinations. Real screening examinations are being supplied by two federal agencies and by four law enforcement agencies using the format directed by the federal agencies to collect data for the screening algorithm. A prototype algorithm is scheduled for delivery to NSA on 30 April 1994. This will be distributed to

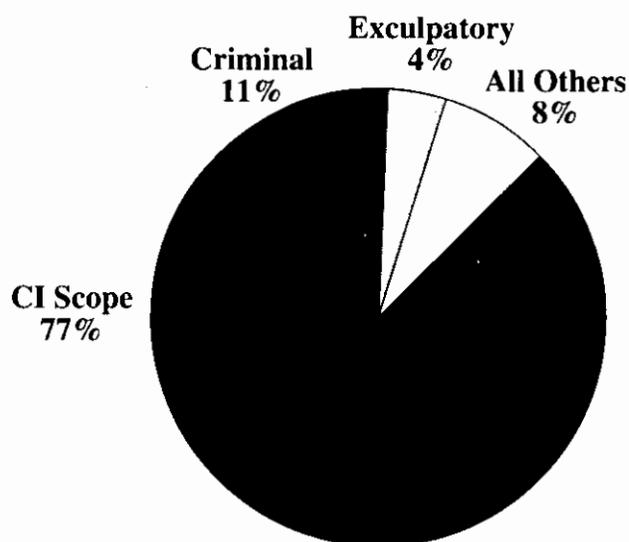
agencies for field testing and further data collection in anticipation of a final algorithm on 30 September 1994.

Study of Cognitive Arousal Levels: The psychological literature indicates that differences may exist between cognitive arousals and emotional arousals. With pervasive changes occurring in the conduct of polygraph examinations, including the introduction of questions designed to produce cognitive arousals, this study is investigating the difference in these arousal levels and windows of occurrence. This research is being conducted to give better insight into the evaluation process where cognitive (directed lie) questions are involved in the comparison measure.

APPENDIX A

DEPARTMENT OF DEFENSE POLYGRAPH PROGRAM STATISTICS FY 1993

Criminal	2,678
Exculpatory	970
CI Scope	17,970
All Others*	<u>1,820</u>
Total**	23,438



* Includes examinations conducted in support of personnel security, counterintelligence and intelligence operations, and all other examinations that are not reported under the *Criminal*, *Exculpatory*, or *Counterintelligence-scope* categories.

** Does not include polygraph examinations conducted by the National Security Agency (NSA). A breakout of polygraph examinations conducted by NSA is contained in a classified annex to this report.

igation. During the examination he advised that while performing work on a contract for another government, he was asked questions by representatives of that government about U.S. classified information, which he avoided answering. These questions continued during future meetings, and included open and aggressive requests to provide sensitive classified Department of Defense information. Prior to the polygraph examination, he had failed to report these foreign attempts to solicit classified information from him.

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A personnel security investigation disclosed that the individual being investigated was arrested in 1984 for the murder of her boyfriend. However, she was not prosecuted even though allegedly she initially confessed to the murder. During her personnel security investigation interview, she claimed that she was innocent and blamed the killing on a cousin. She agreed to take a polygraph examination to support her denial. The results of the polygraph examination indicated deception. Subsequently, she confessed that she had committed the murder by shooting her husband six times. She disposed of the murder weapon by tossing it into a passing train as she was crossing a nearby railroad track after leaving the murder scene. This information was referred to the local authorities for investigation. This individual was arrested and is currently awaiting trial.

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A cleared government contractor admitted during a counterintelligence-scope polygraph examination, administered as part of his reinvestigation, to intentionally sabotaging U.S. computer software. He explained that he was angry because he had been denied permission to accompany his work team during a trip to test software which he helped develop. Vindictively, he deliberately modified the software causing it not to perform properly during the test. He then prepared computer commands to correct the malfunction, so he would be ready to help the test team correct the problem. As anticipated the software malfunctioned. The test team requested help, which he was immediately able to provide. The second test was successful. Subsequently, he was able to modify computer records thereby eliminating any evidence of his sabotage of the software.

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An Army member was afforded the opportunity to take a polygraph examination to verify her denials of past and present usage of illegal drugs, which was developed during a routine personnel security investigation. During the polygraph examination she admitted usage and involvement with illegal drugs.

APPENDIX B
EXAMPLES OF HOW THE POLYGRAPH WAS USED IN
FISCAL YEAR 1993

Polygraph Utility in Counterintelligence and Security
Matters

A U.S. Army member was a suspect in an espionage investigation. The investigation failed to confirm the member's involvement in espionage activities. The member agreed to take a polygraph examination. The results of the polygraph examination indicated deception. When confronted with the results of the examination, the member admitted to engaging in espionage activities against the U.S. The member was arrested by the Federal Bureau of Investigation and is awaiting trial.

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A source advised of planned terrorist attacks against U.S. personnel and facilities in an overseas location. A polygraph examination was conducted to confirm the source's information. Based on this confirmation, U.S. and host nation security personnel were able to take appropriate action to secure the facilities. Host nation police subsequently arrested several individuals at one of the facilities, thus thwarting any terrorist attacks.

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A Marine member assigned to an overseas post was suspected of having a sexual relationship with a female foreign national from the host country. The host country is considered a "designated country," and there exists a non-fraternization policy regarding socializing with the local population. A polygraph examination was conducted on the Marine member, the results of which indicated deception. The Marine member admitted having the relationship with the local female and advised that she had queried him regarding the consulate facility and his duties. He further admitted that he may have orally provided her classified information regarding his previous assignment.

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A cleared government contractor was administered a counter-intelligence-scope polygraph examination as part of his reinvest-

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An applicant for civilian employment with a government agency was administered a polygraph examination as part of his initial security processing. The applicant listed no criminal activity on his security forms. During the polygraph examination, he admitted stealing computer software and hardware valued at \$4000 from his current employer. He further admitted that from his early teens through his mid 20's, he sexually abused many children, ages two through eight. At age 27, he contemplated touching his brother's three daughters, but, finally decided it was crazy to do so. Although this contemplation occurred many years ago and was his last involvement, he still considers himself a pedophile who finds children sexually appealing.

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A contractor seeking a government security clearance was administered a polygraph examination as part of his security processing. On his security forms he stated that he used marijuana 10 times from 1981 to 1991. During the polygraph examination, he admitted using marijuana two to three times a week and purchasing it once a week from May 1988 to the present. He also admitted using hashish five times from 1988 to 1992 and cocaine 20 times from 1988 to 1993.

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During a personnel security investigation of an Air Force member, information was developed that in 1991 the member took his three year old daughter to the base hospital for treatment. A medical examination disclosed that the child had a yeast infection. It was the opinion of the medical personnel, due to various physical signs, that the child had been sexually abused. An investigation was conducted following which the case was dropped. When this came up during the personnel security investigation interview of the member, he again denied that he had abused the child and agreed to a polygraph examination. The results of the polygraph examination indicated deception. Subsequently, the member was interrogated and confessed to sexually abusing his daughter.

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During the personnel security investigation of a Navy member, it was learned that in 1986 the father of the member was murdered in his home. The weapon used was a .22 caliber rifle owned by the member. Subsequently, the member's mother was tried for the murder. The member testified against his mother, but she was acquitted. It was also learned that the member was a suspect in the case and that he had inherited \$200,000 as a result of his dead father's insurance. When interviewed during the personnel security investigation, he

denied any complicity in the murder and agreed to take a polygraph examination to support his denial. The results of the polygraph examination indicated deception. The member was interrogated and confessed to killing his father.

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An Army member agreed to undergo a polygraph examination to verify his denials of past and present usage of illegal drugs, which was developed through a routine personnel security investigation. During polygraph testing, he admitted to selling and using illegal drugs. He also admitted to involvement in the larceny of a motorcycle at the age of 18.

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During a personnel security investigation of an Army Reserve member, it was learned that in 1991 the member attempted to join the South African Permanent Force through the South African Consulate. Further, she admitted that while on active duty, she had cohabitated with a Jordanian air defense officer with whom she had fallen in love and still corresponds with. It was also determined that as a result of her contacts with the South African Consulate, she had been questioned by another federal agency. The member agreed to take a polygraph examination during which she admitted to the unauthorized disclosure of U.S. air defense information to her foreign contacts. Following referral, the other federal agency reassumed jurisdiction and opened an espionage investigation on the member.

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During a personnel security investigation of a military member, it was learned that the member had been investigated two years earlier for the alleged rape of a 13 year old girl in his barracks room on the military installation. However, the investigation failed to prove the allegation. When questioned during the personnel security investigation, he again denied the rape and agreed to take a polygraph examination to support his denial. During the polygraph examination, he admitted to having sexual intercourse with the girl but contended it was consensual. He was then tested regarding the use of force against the girl. The results of the polygraph examination indicated deception and the member confessed that he had forced the girl to have sex.

Polygraph Utility in Criminal Matters

An investigation was initiated as a result of information received that an Army member had unlawfully received over \$8,000 in

payments over a three year period for quarters allowance to which he was not entitled. The investigation determined that the member did in fact reside in government quarters, yet continued to receive quarters allowances for which he was not entitled. When interviewed, the member stated that he initially did not realize he was receiving unauthorized money; however, when he did, he placed an inquiry through the local finance office to stop the payments. The member denied that he was knowledgeable about receiving the unauthorized money and consented to take a polygraph examination. The examination results indicated deception. The member subsequently confessed that he had not notified the local finance office to stop the payments and knew that he should not have received the money.

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A Navy member was suspected of sexually molesting his five year old step-daughter. He agreed to take a polygraph examination which was evaluated as deceptive. The member was confronted with the results of the examination and confessed to sexually molesting his step-daughter.

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An investigation was conducted on a civilian government employee following allegations that he had accepted cash bribes from a majority partner of a freight forwarding contractor. Investigators found records of the government employee receiving three \$1,000 cash transactions through Western Union. The employee acknowledged that he received the \$3,000, but claimed that the money represented winnings from wagers placed with an unknown "bookie" in New Jersey. The employee was administered a polygraph examination and subsequently confessed that the contractor had offered him the money for future consideration. He said that it was the contractor's idea to have an unknown associate wire the money from a Western Union office in order to cover up the true source of the money.

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The 14 year old daughter of an Army member initiated a complaint that, during a six month period, she had been raped by her step-father. When interviewed, the step-father denied the allegations and stated that his step-daughter had made a false complaint because she had recently been in trouble. The step-father agreed to undergo a polygraph examination regarding the allegations. The examination results indicated deception. The step-father subsequently confessed that he had indecently assaulted his step-daughter.

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The snack bar at a Base Exchange on an Air Force Base was robbed of approximately \$3,000 just prior to closing. The supervisor advis-

ed that based on the physical description, the perpetrator was possibly the husband of a store employee. The employee was working the night of the alleged robbery. The employee was administered a polygraph examination and was found deceptive when she denied knowing who robbed the snack bar. Subsequent to the examination, she stated that it was her husband. The husband was arrested as a result of the employee's statement.

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An Army female member reported that she had been raped by an Army male member in his barracks room. She stated she went to the male member's room to visit him and while there, was forced to have sexual intercourse with him against her will. The female stated she attempted to stop the advances of the male, but, failed to deter his advances. The male denied forcing the female to have sexual intercourse, stating that the sex act was consensual, and the female had initiated the sex act. The male took a polygraph examination which indicated deception when he denied forcing the female to have sex with him. The male subsequently confessed that he had forced himself on the female, and knew that she was attempting to resist his advances.

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A Department of Defense contractor was identified as having paid gratuities and bribes to U.S. government inspectors in return for their cooperation in allowing the contractor to substitute non-conforming, foreign made, parts on U.S. and foreign military sales contracts. The contractor was already on federal probation for an earlier violation and was cooperating with another federal investigative agency when the above violation took place. In conjunction with a plea agreement, the contractor agreed to take a polygraph examination. During the examination, he admitted additional instances of substituting foreign made parts and named other contractors with whom he had jointly participated in these schemes. He also told of deliberately substituting unordered parts for items which he did not have in stock and collecting from the government as if the order had been correctly filled. The contractor also admitted to bribing foreign officials (whom he named) with cash, and in one instance an automobile, through his foreign sales agents. He also admitted to telling one potential target of an investigation of his cooperation with the government.

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A Marine Corps member was suspected of engaging in sexual intercourse with a 13 year old female at her residence. The Marine Corps member denied any sexual contact with the girl. The member consented to a polygraph examination, the results of which indicated deception regarding the denial. Subsequent to the examination, the

member admitted to engaging in sexual intercourse and oral sex with the girl on several occasions.

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An investigation regarding the alleged sabotage of a C-141 aircraft was initiated. After several hundred interviews, three Air Force members remained under suspicion, including the Air Force member who had discovered the alleged sabotage. All three individuals were given polygraph examinations. Subsequent to these examinations, two of the individuals were exonerated. The third individual, who discovered the alleged sabotage, was evaluated as deceptive during his examination and subsequently confessed that he had set the aircraft controls so that the landing gear would collapse. He reported it in order to gain recognition.

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An investigation was initiated regarding a contract administered by the Army Corps of Engineers for gate attendants at a camp ground. The investigation determined that during a two year period, \$3,000 had been diverted from user fees. In particular, it was determined that registration fees were being accepted without receipts being provided. The gate attendants were interviewed and denied stealing any money or having any complicity in this matter. One attendant agreed to undergo a polygraph examination to verify her denial. The polygraph results indicated deception. The attendant then admitted to stealing registration fees, visitor fees and altering documents to reflect lesser amounts collected than were actually being received.

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A Navy member was suspected of sexually molesting a three year old boy while acting as the boy's baby-sitter. The member was administered a polygraph examination which was evaluated as deceptive to the relevant issues. When confronted with the deceptive results, the member confessed fondling the young boy as alleged.

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An investigation revealed that the plant superintendent of a Department of Defense contractor had instructed employees to use an unauthorized silicone sealant to make torpedo and missile containers pass required air pressure tests. At a plea negotiating meeting, the defendant denied committing the offense, claiming that he had the approval of the government inspector at the plant. The defendant agreed to undergo a polygraph examination. During the polygraph examination, the defendant confessed that he was responsible for the use of the sealant and that he is doubtful that he ever told the government inspector of this practice.

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An investigation was initiated as a result of a wife of an Army member being found dead in their on-post quarters. The investigation had determined that the woman had been strangled with an electric cord from a television set which was located in the children's bedroom. The husband had reported that he had found his wife hanging from the shower rod with the shower running. The crime scene examination refuted this, as there was no sign that the shower had been on. Additionally, the crime scene examination revealed the presence of a blood soaked shirt which was located in an upstairs hallway. No other traces of blood were found at the crime scene, and there was no explanation for this shirt. An autopsy of the victim could not rule out foul play. The husband denied any wrongdoing in the death of his wife and consented to a polygraph examination. The examination results indicated deception. The husband then confessed to having hung his wife with the cord after she had used the cord to spank their four year old son.

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A Navy member was suspected of stealing two government owned .45 caliber pistols from a shipment of 11 pistols sent to Indiana. The shipment was prepared by the Navy member from aboard his assigned ship, however, only nine pistols were received in Indiana. The member denied any knowledge or complicity regarding the theft. The member agreed to undergo a polygraph examination which was evaluated as deceptive. Subsequently, the member confessed to the theft of the two missing pistols and identified another member to whom one of the pistols was provided.

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A Marine Corps member was suspected of causing injuries to his 11 month old daughter. The injuries consisted of bruises around the eyes, the neck, and below the right side of her temple. The member claimed that his daughter had fallen down the stairs at their residence. The member agreed to undergo a polygraph examination which was evaluated as deceptive to the relevant issues regarding the injuries to his daughter. Subsequently, the member confessed to causing his daughter's injuries by striking her in the nose with an open hand and squeezing her head and face with his hands to stop her from crying.

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An Army member reported that during a five month period person(s) unknown had negotiated 22 of his checks at the finance office for a total value of in excess of \$10,000. The Army member stated that he had inadvertently left his checkbook in a barracks room, which he had since vacated. He also stated that his ID card

was lost during the period these checks were negotiated. The investigation determined that the negotiated checks appeared to have been written by the member. The investigation failed to identify any suspects. The member was then afforded the opportunity to undergo a polygraph examination to prove the veracity of his complaint. The polygraph examination results indicated deception. The member then confessed that he had falsely reported his checks and ID card as being stolen to cover up for the fact that he had insufficient funds to cover the checks he had written.

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A male Air Force member allegedly raped a female Air Force member in her on-base dormitory. The female advised that she awoke and found herself nude, and the male was having non-consensual sexual intercourse with her. When interviewed, the male stated that he had consensual sex with the female. The male agreed to take a polygraph examination regarding this matter. The examination indicated deception to the relevant issues. Subsequently, the male confessed that the female told him that she did not want to have sex and that he was not sure the female was awake during sexual intercourse.

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An investigation was initiated based on a complaint made by an Army member that his 1989 Chevrolet Beretta, valued at \$5,500, had been stolen from his address on Fort Hood, Texas. The vehicle was subsequently found near Waco, Texas, burning in a field. The member had both sets of keys to the vehicle in his possession, and there was no debris at the site from which the vehicle was stolen. The member was re-interviewed and denied fabricating his complaint of larceny. The member consented to undergo a polygraph examination. The examination indicated deception. Subsequently, the member confessed to having entered into a conspiratorial agreement with another Army member to fake a larceny and destroy the vehicle. The member also confessed to submitting a false claim to his insurance company and receiving \$6,002.43 for the automobile.

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A male Navy member was suspected of the rape of a female acquaintance while she was asleep in her residence. The Navy member was considered a friend of the female and was spending the evening at her residence agreeing to sleep on the couch. The female advised that she was awakened in her bed with the Navy member engaged in sexual intercourse with her without her consent. The Navy member agreed to undergo a polygraph examination. The examination results indicated deception to the relevant questions. The Navy member subsequently confessed to having sexual intercourse with the female while she was asleep and without her consent.

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An investigation was initiated regarding the theft of a credit card from the U.S. mail system. The investigation determined that a female Army member, who worked in the mail room, had stolen the card which was in the name of a male U.S. civilian worker in Seoul, Korea. The female member enlisted the aid of a male member, forging the signature of the civilian worker, and charging in excess of \$3,000 in goods purchased in Seoul, Korea. The two Army members were interviewed and implicated a third Army member as being a conspirator to the larcenies after the credit card was stolen from the mail system. The third member was interviewed and denied all allegations implicating her with the forgeries and larcenies. The third member agreed to undergo a polygraph examination. The examination results indicated deception to the relevant questions. Subsequently, the third member confessed to her involvement in the illegal purchases and surrendered approximately \$1,400 worth of stolen merchandise which she had in her possession.

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Polygraph Utility in Exculpation

An audit of the Chaplain's funds at Fort Leonard Wood, Missouri, indicated a loss of \$10,000. An investigation identified an Army member, the fund manager, as the only person who had access to all the funds that were missing. The member was interviewed and denied all allegations against him and requested a polygraph examination to clear his name. The results of the examination indicated deception to the relevant questions. The member subsequently confessed to stealing the missing funds.

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An Army civilian employee requested a polygraph examination to verify his version of information developed during a personnel security investigation. The civilian employee had been notified that his security clearance was going to be revoked. The polygraph examination indicated no deception and the civilian employee retained his security clearance.

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A Navy male member was suspected of engaging in sexual intercourse with a Navy female member while she was allegedly asleep. The female claimed that she neither desired sex from the

male nor provided her consent. The male requested an exculpatory polygraph examination claiming the female was awake and willingly participated in the sex act. The results of the examination indicated that the male was non-deceptive to the relevant questions. Upon re-interview, the female admitted that she was awake during the sex act and her consumption of alcohol prompted her willing participation. She admitted that no crime had been committed as originally alleged.



**OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE
(COMMAND, CONTROL, COMMUNICATIONS, AND INTELLIGENCE)**

Department of Defense

POLYGRAPH PROGRAM



ANNUAL REPORT TO CONGRESS

Fiscal Year 1994

**OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE
(COMMAND, CONTROL, COMMUNICATIONS, AND INTELLIGENCE)**

**FISCAL YEAR 1994 REPORT TO CONGRESS
ON THE
DEPARTMENT OF DEFENSE POLYGRAPH PROGRAM**

TABLE OF CONTENTS

	page
	Executive Summary
I	DoD Use of Polygraph Examinations 1
II	Fiscal Year 1994 Counterintelligence-scope Polygraph (CSP) Examinations 2
	CSP Refusals 4
	Specific CSP Examination Results 4
	Significant Information Developed 5
III	Utility of the Investigative Polygraph 8
IV	Qualification Standards for Department of Defense Forensic Psychophysicologist (Polygraph Examiners) 18
V	Polygraph Research 20

EXECUTIVE SUMMARY

The Department of Defense (DoD) uses the polygraph in criminal investigations, counterintelligence cases, foreign intelligence and counterintelligence operations, and exculpation requests. This report contains numerous examples of polygraph utility in resolving counterintelligence and security issues as well as criminal investigations. The polygraph is clearly one of our most effective investigative tools.

In addition, about 62 percent of our polygraph examinations are conducted as a condition for access to certain positions or information under the DoD Counterintelligence-scope Polygraph (CSP) program. The purpose of the CSP Program is to deter and detect activity involving espionage and sabotage. In fiscal year 1994, the Department revised the relevant topics covered in the CSP examination to achieve reciprocity with the Intelligence Community.

The Department conducts CSP examinations on military personnel, DoD civilian employees, and DoD contractor personnel. Of the 10,742 individuals examined under the CSP Program in fiscal year 1994, 265 yielded deceptive, inconclusive or non-deceptive results with relevant admissions. Of the 265 individuals, 227 received a favorable adjudication, 19 are still pending adjudication, 7 are pending investigation, and 12 individuals received adverse action denying or withholding access.

The report contains numerous examples of polygraph utility in resolving counterintelligence and security issues as well as criminal investigations. The polygraph is clearly one of our most effective investigative tools.

The Department of Defense Polygraph Institute trains all federal polygraph examiners except those individuals employed by the CIA. The basic polygraph courses are taught at the Masters Degree level. The Institute also offers specialized courses in forensic psychophysiology through their continuing education program. In addition, the Institute conducts on-going evaluations of the validity of polygraph techniques used by the Department as well as research on new polygraph techniques, instrumentation, analytic methods, and polygraph countermeasures. The DoD research program is authorized by Public Law 100-180.

The Department of Defense continues to be the focal point for polygraph training and research in the federal government.

I**DOD USE OF POLYGRAPH EXAMINATIONS**

The Department of Defense has used the polygraph for almost half a century. It is used in criminal investigations, counterintelligence cases, foreign intelligence and counterintelligence operations, exculpation requests, and as a condition for access to certain positions or information. The polygraph is a tool that enhances the interview and interrogation process. Often it is the only investigative technique capable of providing essential information to resolve national security issues and criminal investigations. The use of the polygraph as a condition for access is limited by a statutory quota for Counterintelligence-scope Polygraph (CSP) examinations.

The following table reflects Department of Defense Polygraph Program statistics for fiscal year 1994.

Criminal	2,928	17.0%
Exculpatory	805	4.7%
CI Scope	10,742	62.5%
All Others*	<u>2,707</u>	<u>15.8%</u>
Total**	17,182	100%

* Includes examinations conducted in support of personnel security investigations, counterintelligence and intelligence operations, and polygraph assistance to non-DoD federal agencies.

** Does not include polygraph examinations conducted by the National Security Agency (NSA). A breakout of polygraph examinations conducted by NSA is contained in a classified table submitted with this report. Nor does it include polygraph examinations conducted by the National Reconnaissance Office, which are conducted under the authority of the Director of Central Intelligence (DCI).

II**Fiscal Year 1994 Counterintelligence-scope
Polygraph Examinations**

Section 1121 of the National Defense Authorization Act for Fiscal Years 1988 and 1989 (Public Law 100-180, December 4, 1987; 101 Stat. at 1147) authorizes the Department of Defense to conduct Counterintelligence-scope Polygraph (CSP) examinations as a condition for access to certain information.

The purpose of the CSP Program is to deter and detect espionage and sabotage. Prior to fiscal year 1994, the CSP examination questions focused on whether the examinee had ever engaged in espionage or sabotage; had ever given or sold classified material to unauthorized persons or had been approached to do so; had ever had any unauthorized contact with a representative of a foreign government; or has ever had knowledge of anyone who had been involved in any of the above.

In fiscal year 1994, the Department revised the scope of CSP examinations in order to achieve reciprocity with the Intelligence Community. The following topics are covered during the CSP examination: (1) Involvement with a foreign intelligence/security service, involvement in espionage; (2) Involvement in foreign/domestic terrorism; (3) Unauthorized foreign contacts; (4) Deliberate failure to protect classified information; and (5) Damaging/sabotaging government information systems, clandestine collection, or defense systems. The standardization of the CSP ensures that all CSP examinations meet the needs of both DoD and the Intelligence Community so as to facilitate transfer of clearances.

Public Law 100-180 authorizes the Department of Defense to administer CSP examinations to persons whose duties involve access to information that has been classified at the level of top secret or designated as being within a special access program under section 4.2(a) of Executive Order 12356. This includes military and civilian personnel of the Department and personnel of defense contractors. The number of CSP examinations has been limited to 5,000 per fiscal year since fiscal year 1991. During fiscal years 1988 through 1990 the ceiling was 10,000. The quota reduction took place two years after new exemptions for cryptographic and reconnaissance programs were adopted. Public Law 100-180 exempts certain intelligence agencies and functions from the 5,000 quota: (1) individuals assigned, detailed or

under contract with the Central Intelligence Agency, (2) persons employed, assigned, detailed, under contract or applying for a position in the National Security Agency, (3) persons assigned to a space where sensitive cryptographic information is processed, or stored, or (4) persons employed by, assigned or detailed to, an office within the Department of Defense for the collection of specialized national foreign intelligence through reconnaissance programs or a contractor of such an office.

The following table reflects CSP examinations conducted by the Department of Defense in accordance with Public Law 100-180.

(1) Special Access Programs	2,711
(2) DIA Critical Intelligence Positions	1,198
(3) TOP SECRET	75
(4) Examinations for Interim Access to Sensitive Compartmented Information	2
Total Examinations Conducted Under the Congressional Ceiling	3,986
Exempted Examinations*	6,756
DoD Counterintelligence-scope Polygraph Program	
TOTAL**	10,742

*NOTE: Includes detailees to CIA and NSA; assignees to cryptographic information processing spaces; non-NRO reconnaissance programs.

**NOTE: Does not include polygraph examinations conducted by the National Security Agency (NSA). A table of polygraph examinations conducted by NSA is contained in a classified annex to this report. Nor does it include examinations conducted by the National Reconnaissance Office (NRO), which are conducted under the authority of the DCI. In previous years, examinations conducted by the NRO in support of DoD were included in the "Exempted Examinations" category.

CSP Refusals

In fiscal year 1994, only two persons declined CSP testing required as a condition of access to certain information. Department of Defense policy states those persons who decline to take the examination are denied access to the classified material in question, but are retained in their position or transferred to other positions in the organization of equal pay and responsibility, commensurate with the clearance level held before the declination.

Specific CSP Examination Results

The polygraph examination results for the 10,742 individuals tested under the Department of Defense Counterintelligence-scope Polygraph Program are as follows:

Six hundred ninety seven individuals required more than two series (a series is defined as the collection of at least two polygraph charts on an examinee). A total of 488 examinations required more than one day to complete.

There were 10,471 individuals whose polygraph examination results were evaluated as non-deceptive.

An additional 220 individuals made admissions relevant to the issues being tested, and through further testing, the examiner was able to resolve all relevant issues favorably to the subject.

Six individuals were, because of medical or psychological considerations, unable to complete the polygraph examination, resulting in insufficient data with which to form an opinion.

For 6 individuals the polygraph examination results were evaluated as inconclusive, i.e., after a review of the physiological data, it was not possible to determine whether the results indicated deception or non-deception.

There were 10 individuals whose polygraph examination results were evaluated as deceptive and who made no admissions to the relevant issues.

Twenty nine individuals made admissions relevant to the issues being tested but continued to be evaluated as deceptive during further testing.

Of the 45 individuals whose examination results were evaluated as inconclusive or deceptive, seven received a favorable adjudication, 19 are pending adjudication, seven are pending investigation and 12 individuals received adverse action denying or withdrawing access.

Significant Information Developed

The following cases indicate the most significant information developed during DoD counterintelligence-scope polygraph examinations covered by this report. It should be noted that all these individuals had been interviewed previously by security professionals and investigated by other means without any discovery of the information obtained by the polygraph examination procedure. In most cases the information was elicited from the subject in discussion with the examiner.

An individual exhibited significant physiological responses to questions regarding the mishandling of classified information during his initial polygraph test series. During the posttest interview, the individual stated that he had classified material at his residence and subsequently returned 156 pages of classified information, including SECRET/NOFORN. He continued to verbally indicate indecision as to whether additional classified material was located at his residence. During a subsequent search of his residence, additional classified materials, to include computer disks, were retrieved and returned to government control for review. The individual admitted during later polygraph examinations that he disagreed with an article published in a Washington, DC newspaper. He thought a classified message he saw more accurately portrayed the situation. He copied that document, after removing the classification markings, and mailed it to the newspaper. The individual subsequently successfully completed the polygraph examination. He was released from his pending overseas assignment and was given a formal letter of reprimand, and his name was temporarily removed from the Lt. Colonel promotion list.

An individual, during CSP testing, admitted to inadvertently providing classified information to a foreign attaché assigned to Washington, DC. The individual also admitted that, during an overseas military assignment, he had official contact with military attaches and exceeded his authority in providing classified information or confirming same for some foreign attaches.

An individual, during the pretest interview, stated that in January 1994, while socializing with friends, he was asked for information which he knew to be classified by an individual who identified himself as being a member of a Foreign Intelligence Service.

An individual admitted during CSP testing that he provided classified information to Foreign Allies beyond what was authorized. He also admitted providing SECRET information regarding satellite imagery resolution rates to an uncleared high school friend. In addition, he stated that he had repeatedly taken classified information home and on temporary duty trips and failed to properly secure the material.

An individual admitted, during CSP testing, that he had provided a classified document to a foreign national embassy officer after being authorized to verbally apprise the individual of certain unclassified portions of the document. The individual took it upon himself to remove the classification markings from the document and provide it to the foreign national. Further polygraph testing resulted in additional admissions concerning wrongful removals of classified material.

An individual admitted, during CSP testing, to disclosing classified information to a family member concerning a classified project at the National Security Agency. He also admitted to cutting classified markings off of documents at the direction of his superiors in order for the documents to be disseminated to persons with lower clearances or placed in personal files.

An individual, during CSP testing, admitted to numerous security violations during the course of his career to include wrongfully removing classified documents from secure spaces; leaving classified documents unattended in hotel and conference rooms; disclosing classified information to friends and relatives; cutting classification markings off of documents and sending them via unsecured fax; and currently having classified documents at his home. The documents were subsequently seized during a search of his home.

NOTE: These cases do not include NRO examinations.

III

Utility Of The Investigative Polygraph

During fiscal year 1994, DoD investigations obtained unique and significant information from interviews conducted with the aid of the polygraph. In all illustrated instances, the polygraph examination process produced significant security or criminal information which would not otherwise have been secured for the specific investigation. The polygraph examination process was also valuable in helping to establish the innocence of persons charged with serious infractions.

A civilian member of an intelligence agency showed deception on a polygraph examination regarding the unauthorized disclosure of operational/classified information and the theft of operational funds. During the examination, he admitted to stealing in excess of \$60,000.00 over a nine year period. He also admitted taking kickbacks from a car dealership to ensure that the dealer received the government business when his unit needed to purchase new vehicles. His government employment was terminated and his retirement account was seized to ensure the \$60,000.00 was repaid.

An Air Force member was accused by his 12 year old stepdaughter of sexually abusing her. The member was interviewed and denied the allegation and agreed to undergo a polygraph examination. During the pretest interview, the member confessed to sexually abusing his stepdaughter. The member was convicted by a General Court Martial and sentenced to 18 months confinement.

A contractor employee being processed for a sensitive position was administered a counterintelligence and suitability scope polygraph examination. During the first examination, he

reacted to several counterintelligence questions and a question regarding the falsification of his security forms. He was questioned about his reactions, but did not provide any information at that time. Subsequently he was reexamined and disclosed that he intentionally withheld information regarding his immediate family who were still residing overseas and contacts that he had with a known foreign intelligence officer. As a result of this information, the individual was not granted access to the program.

An investigation was initiated when a male civilian employee, at a facility in Bamberg, Germany, stated an unidentified masked male entered the facility and demanded money out of an open safe. The employee stated, when he started to lock the safe, he was knocked on the head unconscious. It was determined that \$1,400.00 in U.S. government funds were stolen. The employee was treated for a neck injury and was admitted to a medical facility for 48 hours. An examination of the wounds revealed that they were not consistent with the assault as described by the employee. The employee maintained his statement concerning the circumstances of the robbery and consented to a polygraph examination. The examination results indicated deception. The employee subsequently confessed he stole the deposits from the facility and fabricated the story that he was robbed. Final disposition is pending.

During a personnel security investigation of a DoD contractor, information was developed that the individual, a president of a major manufacturer of security products for the Department of Defense, had sexually harassed two female employees, and raped another employee. The individual was interviewed and admitted to numerous extra-marital affairs but denied involvement in the allegations of sexual harassment and rape. During the pretest of the polygraph examination, he admitted to the rape and sexual harassment as alleged. He also admitted to raping another employee. This information was referred to local law enforcement authorities who are conducting an investigation regarding these matters.

A civilian dependent wife of a Navy member was suspected of causing the death of a 14 month old child for whom she was providing child care. An autopsy showed the cause of death as being undetermined, however, listed manual strangulation as a possible cause. The dependent wife was administered a polygraph examination. The results of which indicated deception. During subsequent interrogation, she admitted holding the child's face down in a pillow for three to five minutes in an attempt to get the child to go to sleep. A Federal District Court found the dependent wife guilty of manslaughter.

An individual involved in a clandestine intelligence operation admitted, following polygraph testing, that he had provided intelligence, economic, and political information to a foreign intelligence officer. He further admitted that he was involved in the smuggling of gold into the United States and weapons into a foreign country. He also admitted that he was involved in an illegal conspiracy to steal money from drug traffickers which had been deposited in a foreign bank. Further investigation of this matter is pending.

Information was developed during the personnel security investigation of a DoD contractor that the individual had been investigated by civilian law enforcement authorities for reportedly sexually assaulting his seven year old daughter, who suffers from Downs Syndrome. The individual denied the allegations and agreed to undergo a polygraph examination. During the polygraph examination, he admitted that he had sexually assaulted his daughter. Action by the local child protective service agency is pending.

A cleared civilian employee, with access to Sensitive Compartmented Information, admitted that in the early 1980s he

had inadvertently met with two East German intelligence agents. The information was obtained while he was undergoing his routine reinvestigation polygraph. The employee indicated that he met the intelligence officers in a West German bar on several occasions, but did not know that they worked for the East German government until he was informed of this fact by a U. S. military officer. He stated that he did not reveal any classified material to the agents, but acknowledged that he failed to disclose the contacts to his government employer.

Several pay clerks with the Defense Finance and Accounting Service were suspected of creating false payments to retirees and then diverting those funds. A total of 62 suspected payments were identified with a total loss of \$275,000.00. A particular clerk's computer was used to create 10 of the fraudulent checks. She claimed that person(s) unknown must have used her computer, without her knowledge, after she logged in. During the pretest phase of the polygraph examination, she admitted to preparing three of the fraudulent payments. Testing could not be continued due to the examinee's mental state. The individual pled guilty in Federal District Court and was sentenced to four months incarceration, four months community service, three years supervised release and to pay \$5,762.50 in restitution.

During a personnel security investigation of a military member, information was developed that the military member had been investigated regarding the alleged trafficking in illegal drugs. The member did not list any involvement with illegal drugs on his personal history questionnaire. He was interviewed and admitted smoking marijuana one time in high school and denied any other involvement with illegal drugs. The member agreed to undergo a polygraph examination. The results of the polygraph examination indicated deception. Following the polygraph examination, he admitted to extensive use and trafficking of marijuana and cocaine over a five year period. He further admitted to participation in gang criminal activities such as assaults, thefts and illegal drug trafficking. Adjudication of the members security clearance is pending.

An investigation was initiated when a pair of U.S. government owned night vision goggles, valued at \$6,000.00, was stolen from a storage room at Fort Davis, Panama. Investigation revealed the only keys to the storage room were located in a key control box. Examination of the key control box revealed it could be opened without a key. It was determined that only one of the eight occupants of the building in which the storage room was located was in the area during the time of the theft. The occupant, an Army member, consented to a search of his quarters. During the search, the stolen goggles were not located, however, other stolen Army property was located. The Army member stated that he intended to return the stolen property. He denied any involvement or knowledge in the theft of the goggles and consented to a polygraph examination. The polygraph examination results indicated deception. The Army member subsequently confessed to stealing the goggles, placing them in a container and having the container packed by his movers. Final disposition is pending.

An applicant for employment with a government agency was administered a full screening counterintelligence and suitability scope polygraph examination. While reviewing the security forms with the polygraph examiner, the applicant acknowledged that he misrepresented the facts of an arrest. He acknowledged that he had been arrested and convicted of rape and a weapons violation and was sentenced to spend three years to life in a state penitentiary.

Suspected foreign object damage was discovered in the engine intake of a multi-million dollar research aircraft involved with a special access program. A contractor employee was identified as a possible suspect and denied any involvement or knowledge of the suspected damage. He agreed to undergo a polygraph examination. During the polygraph examination, he confessed to placing the foreign object in the aircraft engine. Final disposition is pending.

A civilian merchant marine assigned to a U.S. Naval ship was suspected of raping a female merchant marine aboard the ship. The victim stated that the suspect entered her unlocked room without her permission and raped her. The suspect claimed that he knocked on the victim's door, was invited in by her, and after several minutes of conversation they engaged in consensual sexual intercourse. The suspect agreed to undergo a polygraph examination. The results of which indicated deception and the suspect admitted raping the victim. The case is currently pending in Federal District Court.

A civilian contractor was suspected of wrongful removal and possible compromise of classified material. He admitted to several violations and agreed to undergo a polygraph examination to verify his admissions. During the polygraph examination, he admitted to additional violations of wrongful removals of classified material and having classified material at his home. A subsequent search of his home resulted in the seizure of numerous TOP SECRET and CODEWORD material. The investigation is continuing.

During a personnel security investigation of a military reservist, information was developed that he had been charged with 10 counts of indecent liberties with a child, aggravated sodomy and related offenses. The military reservist, who was also a former school teacher, denied any involvement in acts of sexual misconduct with children. He agreed to undergo a polygraph examination. During the pretest, he admitted that he engaged in various sexual acts with between 10 and 20 juvenile females on numerous occasions over a three year period. Adjudication of the military reservist's security clearance is pending.

An investigation was initiated into the activities of a psychiatric hospital and its parent company. A psychiatrist, who was the clinical director of the hospital, had previously admitted to providing false statements and the theft of government funds. The psychiatrist was administered a polygraph examination and during the examination admitted exaggerating diagnoses, and keeping patients in the hospital over weekends as a means of maximizing profits for the hospital. He also admitted sending forged documents to the State Medical Board in order to obtain his medical license and stealing checks from the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS) and cashing them. As a result of the investigation, the Government recovered \$372 million dollars from a national medical corporation. The psychiatrist was sentenced to five months incarceration, five months supervised release, 300 hours community service, court-ordered restitution of \$175,787.89 to CHAMPUS and a \$150.00 special assessment for having committed a fraud against the government.

Three individuals were administered polygraph examinations regarding injuries to a 10 month old infant caused by the "Shaken Baby Syndrome". All individuals showed no deception to the relevant questions. A baby-sitter was identified as a possible suspect but was unable to be administered a polygraph examination because she was nine months pregnant. When interviewed, the baby-sitter confessed to causing the injuries to the child. The baby-sitter has been indicted and is awaiting trial.

An investigation was initiated when an Army member was shot to death in his barracks room at Fort Riley, Kansas. The investigation identified the killer as another Army member at Fort Riley. This Army member identified another Army member as being with him when he committed the murder. This member was interviewed and stated that he tried to talk the other member out of shooting the victim and consented to a polygraph examination. The polygraph examination results indicated deception. The member admitted being a co-conspirator with the other member in the murder. Final disposition is pending.

Two Navy members were suspected of causing damage to equipment used to divert torpedoes away from the U.S. Navy vessel to which they were assigned. The damage was estimated in excess of \$40,000.00. Both members denied culpability and agreed to undergo a polygraph examinations. The examinations resulted in clearing one of the suspects of any wrongdoing and the other suspect admitting having caused the damage to the equipment. The Navy member was found guilty at a Special Court Martial of wrongful destruction of government property. He was sentenced to 60 days confinement, reduced in grade, and fined \$1,000.00.

Approximately \$2,000.00 was reported stolen from an Air Force Commissary cash office. Numerous behavioral analysis interviews were conducted which identified six individuals with possible motives. These individuals agreed to undergo polygraph examinations. One of the individuals indicated deception during his examination. During the posttest interview, this individual admitted to stealing the money from the commissary. His U.S. Government civilian employment has been terminated.

A Navy member was identified as a suspect in providing weapons to known foreign organized crime personnel in the overseas location where she was assigned. She admitted illegally bringing a weapon into the country, however, claimed the weapon had been stolen during a burglary of her home. She agreed to undergo a polygraph examination and subsequently admitted giving the weapon to an individual she knew was involved in organized crime. Because of her TOP SECRET clearance and access to cryptograph information, she was administered a polygraph examination to determine if she had ever provided classified information to this person or anyone else. During the polygraph examination, she admitted bringing classified material home and showing these documents to this same individual. Final disposition is pending.

An investigation was initiated when the dead body of an Army member was discovered on Fort Riley, Kansas. The autopsy disclosed that the members death was caused by sharp and blunt force trauma, and the manner of death was murder. It was also determined that the body was moved after death causing scratches to the body. The investigation revealed witnesses who identified another Army member stationed at Fort Riley, Kansas being with the victim during the approximate time of murder. The Army member stated that he was on restriction in his barracks room and not with the victim as alleged. The Army member stated that he knew the victim had scratches on his chest because he was shown crime scene photographs of the victim. The Army member denied any involvement in or knowledge of the murder and consented to a polygraph examination. The polygraph examination results indicated deception. The Army member confessed to being a participant and implicated three other Army members in the murder. One Army member received a life sentence, one got an acquittal, and one is pending trial.

A Navy member reported his 18 month old daughter had apparently been kidnapped from his on base residence. He stated he last saw her in her bed the night of December 2, 1993 and in the morning on December 3, 1993 he discovered her missing. Initial investigation raised some suspicion that the Navy member was withholding information. He was administered a polygraph to determine if he had harmed or caused the disappearance of his daughter. The results of the polygraph indicated deception. He continued to deny culpability, however, he agreed to additional interviews. During the additional interviews, the Navy member admitted to causing the child's death. The Navy member was found guilty at a General Court Martial of involuntary manslaughter, making a false official statement; and obstructing justice. He was sentenced to nine years incarceration, a dishonorable discharge, forfeiture of all pay and allowances, and reduction in grade.

An investigation was initiated when information was received from the Bureau of Alcohol, Tobacco and Firearms, that an Army member stationed in the Military District of Washington,

purchased 19 handguns from several different gun stores in the state of Georgia. Some of the handguns purchased by the member were recovered in the possession of other individuals by local police during traffic stops and the investigation of drug offenses. During the Army member's interview, he stated 12 or 13 of his handguns had been stolen from the trunk of his car. The member stated that he did not report the theft of his handguns because the perpetrator left a note on his car threatening his life if he reported the theft. The member denied that he sold any of his handguns and consented to undergo a polygraph examination. During the pretest, the member admitted to selling 16 of his handguns to nine different Jamaican civilians. The member also admitted that he lied about his handguns being stolen from the trunk of his car. Final disposition is pending.

IV
Training and Qualification Standards for
Department of Defense Forensic
Psychophysicologist (Polygraph Examiners)

The Department of Defense maintains very stringent standards for polygraph examiners. The Department of Defense Polygraph Institute's basic polygraph program is the only program known to base its curriculum on forensic psychophysiology, and conceptual, abstract, and applied knowledge that meet the requirements of a master's degree-level of study. Candidates selected for the Department of Defense polygraph positions must meet the following minimum requirements:

1. Be a United States citizen.
2. Be at least 25 years of age.
3. Be a graduate of an accredited four-year college or have equivalent experience that demonstrates the ability to master graduate-level academic courses.
4. Have two years of experience as an investigator with a Federal or other law enforcement agency. Two years of comparable experience may be substituted for the requirement of investigative experience with a Federal or other law enforcement agency.
5. Be of high moral character and sound emotional temperament, as confirmed by a background investigation.
6. Complete a Department of Defense-approved course of polygraph instruction.
7. Be adjudged suitable for the position after being administered a polygraph examination designed to ensure that the candidate realizes, and is sensitive to, the personal impact of such examinations.

Employees of all federal agencies, except the CIA, receive their basic polygraph training at the Department of Defense Polygraph Institute. After completing the basic polygraph training, DoD personnel must serve an internship consisting of a minimum of six months on-the-job-training and conduct at least 25 polygraph examinations under the supervision of a certified

polygraph examiner before being certified as a Department of Defense polygraph examiner. In addition, the Institute offers 16 different specialized courses in forensic psychophysiology. Between 350 to 400 students attend the specialized courses each year.

Department of Defense Forensic Psychophysicologists (Polygraph Examiners)		
<i>Fiscal Year</i>	<i>Average Number Of Examiners</i>	<i>Attrition Rate</i>
1988	235	14.5%
1989	261	10.0%
1990	270	6.3%
1991	269	14.9%
1992	269	17.8%
1993	254	17.3%
1994*	192	19.3%

*Does not include National Reconnaissance Office (NRO) polygraph examiners. NRO polygraph examiners are included in the totals for fiscal years 1988 - 1993.

V

Polygraph (Forensic Psychophysiology) Research

Department of Defense Polygraph Institute

The Department of Defense Polygraph Institute DoDPI has three Congressionally mandated research areas: 1) evaluate the validity of polygraph techniques; 2) conduct research on polygraph countermeasures; and 3) conduct developmental research to improve polygraph technology.

SMALL GRANTS

The grant program continues to provide an excellent mechanism for funding grants relating to DoDPI research priorities.

Of 11 proposals received in fiscal year 1994, DoDPI funded only three, as compared to 13 grants made in FY 1993. DoDPI rejected six proposals and held the remaining two for possible funding in fiscal year 1995. The number of grants awarded was restricted more by a lack of funds than by the quality of the proposals.

INSTITUTE STUDIES COMPLETED IN FY 1994

Polygraph Computerization:

Accuracy of the Applied Physics Laboratory of John Hopkins University (APL/JHU) Polygraph Automated Scoring System (PASS) algorithm with mock crimes. APL/JHU used a combination of verified and unverified field cases to develop their PASS algorithm. Using a mock crime study in which all test results were known, the Institute compared the accuracy of computer scoring against the accuracy of human evaluators. Both were equally accurate overall, but humans were better at detecting guilt and the computer was better at detecting innocence.

Artificial neural networks. Most computers operate serially, processing information one byte at a time, one after the other. The neurons in the brain operate in parallel, processing information in many locations simultaneously, then

combining the results. Artificial neural networks are computer circuits that operate in parallel, emulating the brain.

The Institute developed an algorithm using artificial neural networks to analyze physiological data. This worked extremely well on the small number of cases available last year. This approach will be extended next fiscal year using more cases and a different test format.

Fuzzy logic. The Institute developed an algorithm using a new statistical approach known as fuzzy logic, to analyze polygraph results. In an experiment, the average accuracy was 86 percent. The sample size was small, so the work is being expanded in fiscal year 1995 to include the Zone Comparison Technique and a new format, Event Related Controls.

New Measures:

Brain waves: Twenty subjects read true and false statements about themselves while their brain waves were recorded. All autobiographical statements elicited a characteristic brain wave known as the P300. Although the wave was slightly larger on the truthful statements, the difference was not enough for diagnostic purposes. Possibly the autobiographical significance of the information overpowered the veracity of the statements.

Vagal Tone Monitor. Vagal tone refers to a number of impulses traveling outward from the brain along the vagus nerve to the heart. The polygraph records reactions in the heart, blood vessels, sweat glands, and muscles used for breathing. The reactions are a product of messages from the brain. DoDPI is developing a new type of polygraph which would monitor both incoming and outgoing messages between the brain and other portions of the body. A computer would pull out complex interactions, revealing detailed information about brain activity underlying the conventional reactions. Most of the new measures being explored relate to the brain's control of the cardiovascular and respiratory systems.

In the first phase, completed in 1994, DoDPI developed equipment and programs that reveal some of the brain's control of the heart rate. DoDPI is now evaluating the equipment before proceeding to the next phase in 1995.

Cardiovascular measures. The pressure in the polygraph's blood pressure cuff is uncomfortable. This limits the number of questions that can be asked on the test. One of our research

goals is to replace the cuff with a more comfortable sensor which will be at least as accurate as the cuff.

Cardiovascular indices of guilty knowledge. DoDPI ran 10 subjects through a series of peak of tension tests, and analyzed a variety of cardiovascular measures. Based on these analyses, DoDPI developed a theory of how the cardiovascular system reacts when a person lies. This understanding will help us create more effective cardiovascular channels on new polygraphs.

Comparison of arm cuffs and thumb cuffs. DoDPI examined the thumb cuff tracing to see how similar it is to the blood pressure cuff. If it measures the same physiological information, it could be considered for replacing the blood pressure cuff. Twenty subjects were administered a numbers test. Correlations between the two types of cuffs were high on some subjects, but not on others. DoDPI concluded the particular thumb cuff used in this study should not replace the arm cuff at this time because of design problems; it leaks excessively.

Voice. Forty-four persons were administered a numbers test. We digitized and analyzed various aspects of their voice responses. DoDPI found that no single measure could accurately detect deception, but multiple voice measures extracted from pitch information was useful. The polygraph was much more accurate (79%) than voice measures (37%).

New Testing Formats:

Test of Espionage and Sabotage (TES). TES was developed to improve the accuracy of security screening. Four validation studies were started in fiscal year 1993 and three were completed in fiscal year 1994. The Institute found that the TES was significantly more accurate than the previously used Counterintelligence Screening Polygraph (CSP) examination, particularly in identifying deception. All DoD agencies have switched from the CSP to TES for security screening. Preliminary results from the fourth study, the TES field study, indicate that the amount of useful information being obtained from TES examinations is significantly greater than with the CSP examination.

Event related controls. In order to avoid some of the problems inherent in conventional control questions, DoDPI is developing a type of test in which the control questions relate to the matter under investigation. This provides two advantages. They don't invade a person's privacy, and they are more resistant to countermeasures because they are harder to identify as control questions. In fiscal year 1994, DoDPI conducted three studies

using event related controls. The purpose was to collect physiological data for computer analysis. The first study demonstrated that computers can distinguish between guilty and innocent subjects. The two additional studies are providing more data for the computer programmers to work with.

Foreign polygraph use and Countermeasures:

Foreign polygraph use. How many countries use the polygraph? How sophisticated are they with it? Where do they get their equipment and training? These questions arise when we assess the level and types of countermeasures we might encounter in our psychophysiological detection of deception (PDD) procedures.

The Institute publishes quarterly reports summarizing open-source information about foreign polygraph usage. Each report typically contains information about 15 to 20 countries. The Institute also continually updates a listing of over 50 countries having a polygraph capability. The current list includes foreign polygraph organizations, training centers, and manufacturers.

During 1994, the chief of the Institute's external research program, met with examiners from Russia, Estonia, Poland, Hungary, and Romania to discuss their use of the polygraph. The Institute also purchased a Russian-made computerized polygraph, and obtained a number of foreign books and articles on the polygraph.

Translations. During fiscal year 1994, the Library of Congress translated a Japanese textbook on the polygraph for DoDPI. They also translated selected portions of a Polish textbook on the polygraph. The FBI translated a Hungarian polygraph article and selected portions of a Yugoslav textbook used in a Croatian polygraph school.

Countermeasure detection algorithm. Can the computer tell when a person is using countermeasures? A spurious response deliberately manufacture by a guilty person on a control question may somehow be different than a genuine "lie" response on a relevant question. Using data DoDPI collected in two countermeasure studies, APL developed an algorithm which successfully identified the genuine and spurious responses. This line of work is continuing.

Miscellaneous:

Expectancy effect. If a person expects something bad to happen when he lies, does that make his lies easier to detect? The Institute conducted a study in which half the subjects expected to hear a loud noise when they lied. As predicted, they had bigger reactions when they lied than did people who didn't expect anything unusual to happen.

Abnormal breathing patterns. Some polygraph examiners have observed what appears to be a controlled breathing pattern on directed lie control questions in field screening tests. DoDPI conducted a preliminary investigation of this observation using 204 sets of charts from a mock espionage study. The charts included both directed lie controls and conventional probable lie controls. The results indicated that the breathing pattern occurred only rarely, and when it did occur, it did so with both types of control questions and with both innocent and guilty subjects. Additional research needs to be done on this subject.

Comparison of two scoring techniques. Criminal PDD examinations using control questions normally compare relevant questions against the greater of two adjacent control questions. Would accuracy be improved by comparing all relevant questions against the single greatest control question reaction on that chart? The FBI conducted such a study at the Institute, using a mock crime scenario. All data sets were scored both ways. The study found that when all relevant question reactions were compared against the control question with the largest reaction the innocent persons were easily cleared. Unfortunately, many of the guilty persons were also cleared. DoDPI concluded that it is better to use the adjacent controls because there were fewer false negative errors.

Anxiety's effect on accuracy. If a person is chronically anxious, does that affect the accuracy of his polygraph test? DoDPI examined both state (short-term) and trait (chronic) anxiety in a mock crime study. Guilty subjects who were highly anxious had larger reactions than low anxiety guilty subjects, but this had no effect on the accuracy of the polygraph examiner's decisions.

Electrodermal reactivity and accuracy. A persons degree of Galvanic Skin Response (GSR) reactivity can affect the test outcome. In a mock crime study DoDPI conducted, people with unusually flat GSR tracings were more likely to produce inconclusive results. This is probably because the GSR is normally the most productive channel, so when the GSR is largely flat the polygraph examiner has less biological information to evaluate.

Inquiry vs. accusatory questions. Normally, a polygraph examiner asks inquiring questions: "Did you commit that crime?" Would a guilty person react more if he were asked an accusatory question: "You committed that crime, didn't you?" How would such a question affect an innocent person? These questions were studied in a mock crime experiment. DoDPI found the type of question asked had little affect on the overall accuracy rate.

Ethics curriculum. Ethics is a cornerstone for scientific and research endeavors. The Institute developed a graduate-level course on ethics for forensic psychophysicologists. This course is available for practitioners who have completed the basic PDD course.

Research data base. Data bases are vital for research. The Institute created a computerized data base of all 150 known English language validity studies. A total of 77 variables were extracted from the studies. These included such factors as whether it was a laboratory or field study, the type of polygraph examiners, type of subjects, what physiological measures were recorded, the specific test that was administered, how the physiological data was scored, and whether they were reviewed by another polygraph examiner. The factors were put into the data base, giving us instant access to all validity studies involving any of those 77 variables. This sets the stage for a meta-analysis of the research, which would provide definitive answers to a number of questions about the effect of these variables on polygraph accuracy.

INSTITUTE STUDIES IN PROGRESS

Computerization:

Identifi. A commercially available consulting firm developed a means of inputting conventional, non-computerized physiological data into a computer for analysis. DoDPI sent the firm a number of data sets from previous experiments, in which DoDPI knew who was lying. DoDPI is awaiting the results of this analysis.

Axciton field study. The Institute is helping the FBI conduct a field study of the Axciton computerized polygraph. The purpose of the study is to evaluate the Axciton's performance under field conditions, and to compare the Axciton and PASS scoring algorithms against the decisions of the field polygraph examiners. DoDPI lent the FBI several Axcitons and wrote the protocol describing what data DoDPI needs for the study. The FBI

is examining criminal suspects and sending DoDPI the physiological data, score sheets, and other information on each case.

New measures:

Brain waves. The University of Ottawa is completing a study on brain wave changes during deception. They looked at changes that occur the moment a person recognizes each question.

Cardiovascular. The State University of New York at Stony Brook is comparing several ways of measuring blood pressure. They are comparing the plethysmograph and blood pressure cuff (which only record changes in relative blood pressure) to state-of-the-art devices which measure changes in absolute blood pressure. Knowing exactly how high a person's blood pressure is should increase diagnostic accuracy by giving us a standard against which to judge the significance of blood pressure changes during the tests.

Voice changes. In response to many queries about the commercially available Computerized Voice Stress Analyzer (CVSA), DoDPI bought one of those units, attended the CVSA school, and conducted the first of two studies comparing it to the polygraph. DoDPI conducted two numbers tests on each of 42 subjects. One test was conducted with the polygraph, the other with the CVSA, using the test format recommended for each. The results are being analyzed.

Eye movements. DoDPI is exploring the use of oculometric measures of deception, using equipment on loan from the manufacturer. It monitors changes in pupillary diameter, eye movements, and blinking. The device is being used by some California law enforcement officers to identify via eye movements driving impairment due to alcohol and drug use.

New Tests:

Control questions. Control questions often cause people to feel that PDD examination procedures invade their privacy. One of DoDPI's research goals is to develop tests that don't use that type of control question.

Guilty Knowledge Tests (GKT) feasibility. The GKT has long been advocated by scientists as a potential replacement for the control, question test. This has not occurred, as many polygraph examiners believe the GKT could rarely be used. This study, being conducted by the inventor of the GKT, reviews the polygraph files of the Ocala, Florida Sheriff's Office to see how often the

GKT could realistically have been used. In selected cases during the next year, the GKT will be conducted on a trial basis.

Single Test Interview (STI). This test is related to the Test for Espionage and Sabotage (TES). DoDPI developed a hybrid screening paradigm for testing real-life issues of cocaine use and felony convictions. The subjects were recruited from the general population and from a group of convicted felons. Ground truth was established by taking hair samples (for cocaine use) and records checks (for felony convictions). Based on admissions from the subjects, the new test format seems to be very accurate. DoDPI is awaiting the reports of the laboratory tests and record checks before publishing the final results.

Foreign use and countermeasures:

Foreign use. DoDPI is continuing to establish contacts with polygraph examiners in other countries, with emphasis on the former East Bloc. As a result, DoDPI is starting to receive a number of foreign polygraph publications and have identified many foreign articles they wish to acquire.

Translations. DoDPI is translating a Russian-language doctoral dissertation on the polygraph published two years ago in Estonia.

Drug database. DoDPI is reviewing the pharmacological literature to identify drugs which could present a countermeasure threat.

Miscellaneous:

Statement verification testing. The conventional practice with criminal suspects is to ask them, point blank on the polygraph test, "Did you commit that crime?" What would happen if, instead, suspects made a written statement denying they had committed the crime, and then were asked on during the PDD test, "Did you lie in your statement?" A pilot study examined this question, and found that statement verification testing is effective. A larger study is needed before policy decisions could be made about using this type of testing in the field.

Repeated testing. Little research has been done on what happens when a subject is tested several times on the same issue. DoDPI conducted a study in which subjects were administered a numbers test six times in a row, then return a week later for an additional six repetitions. Preliminary results indicate that

the pattern of reactions was remarkably consistent during these tests. Additional studies are necessary to assess the effects of repeated testing.

NATIONAL SECURITY AGENCY STUDIES COMPLETED IN FY 94

Polygraph Computerization:

APL/JHU completed work on an algorithm for scoring the Reid Modified General Question Test and has delivered it to NSA who has distributed it to various Federal agencies, including the DoD Polygraph Institute, for evaluation. It includes a rank order algorithm which ranks each question in order of responsiveness. The most responsive question ranks 100%; all others are ranked as a percentage of that.

Study of Cognitive Arousal Levels

The psychological literature indicates that differences may exist between cognitive arousals and emotional arousals. Some variants of the Relevant-Irrelevant test use a reverse norm question involving cognitive arousal, such as, "Do you remember my (the polygraph examiner's) name?" to determine a subject's capability of responding. This study examined the effectiveness of the reverse norm question to serve as a control against which the relevant question reactions could be compared. DoDPI concluded that the reverse norm question is not effective as a control question and should not be used for scoring purposes.

NSA STUDIES IN PROGRESS

Algorithm to Analyze Polygraph Results:

Development of an algorithm for the Relevant-Irrelevant (RI) test continues. NSA is contracting with a private firm to provide the physiological data, and the CIA is funding the algorithm development by APL/JHU. The RI formats in this study are those currently being used by NSA and CIA for screening applicants and employees. The project will take 18 months to complete.



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