Polygraph

Volume 10 December 1981 Number 4

Contents

PUBLISHED QUARTERLY

P.O. Box 74, Linthicum Heights, Maryland 21090

A SURVEY: RELIABILITY OF POLYGRAPH EXAMINATIONS CONDUCTED BY VIRGINIA POLYGRAPH EXAMINERS

By

Robert H. Edwards

Introduction

Throughout history, man has utilized many different techniques to detect when other humans are lying. These techniques have evolved from the use of meer superstitions to the current practice of using highly technique techiques and sophisticated scientific instrumentation.

In 1923, the first court opinion was rendered concerning the use of "lie detection" (polygraph) examination results as evidence in court. The court rejected the results and since this case, much controversy has surrounded the use of the various lie detection techniques.

Some research studies have clouded the issue by utilizing non-scientific means to determine reliability of the technique. Commercial firms have added controversy by marketing instruments designed to be used for "party games" which establishes the polygraph as a gimmick and the media has on some occasions added to the confusion by improperly reporting polygraph findings. Finally, the polygraph profession has in some instances contributed to the controversy by not supporting a high degree of examiner qualifications, training, and strict licensing laws; and in some instances, by over using the technique in the commercial field.

The objective of this study is to resolve some of the controversy and misunderstanding about the reliability of polygraph results.

The Problem and Its Setting

The Problem and Sub-Problems

The purpose of this study is to explore the hypothesis that polygraph examinations conducted by Virginia polygraph examiners are reliable and

---

The author is an APA Member who has been employed by the Commonwealth of Virginia for the past twenty-two years, as a State Trooper, State Police Criminal Investigator, Police Systems Coordinator for the Division of Justice and Crime Prevention; and is currently the Assistant Director for the Virginia Bureau of Forensic Sciences (State Crime Laboratory). He is a graduate of the Backster School with fourteen years of experience as a polygraph examiner. He has a B.S. and M.S. in Administration of Justice from Virginia Commonwealth University. This study was prepared for the Commonwealth of Virginia, and has been distributed by the Commonwealth to all Congressmen. For copies of reprints write to the author at Edwards-Edwards and Associates, 405 Fairmont Drive, Colonial Heights, Virginia 23834.

the examination results should be accepted by the courts as evidence. The study will address the reliability of "specific" examinations of a criminal nature.

History

In view of the many years of experience humans have had in lying and detecting lies in others, it was inevitable that eventually someone would conceive the idea that might make it possible to make a scientific determination of deception or truthfulness by obtaining indications or recordings of nonobservable physiological phenomena. Certainly there was a basis for this idea, and there was a practical need particularly in the field of criminal investigation.

Deception began with Adam and Eve, and since that time man has utilized many means to determine the truth of the matter. For example, in the First Book of Kings, Chapter 4, Verses 16 through 28, King Solomon is confronted with the problem of two females both claiming to be the mother of a particular child. King Solomon's attempt to detect deception was successfully consumated when he drew his sword and announced he would cut the child in half and award half to each woman. The first claimant readily agreed to this proposal, whereas the second woman cried out and begged that the King give the child unharmed to the other claimant. This convinced King Solomon that the woman willing to give up the child to protect it was the true mother and awarded her the child.[1]

Ancient Hindu investigators played upon the supernatural qualities attributed to the sacred ass in their attempt to detect deception. They would conceal the ass in the darkened half of a tent, and then would instruct their suspects to enter the tent, one at a time, and pull the tail of the sacred ass. They instructed the suspects that the ass would bray loudly when the guilty party pulled its tail. Without the knowledge of the suspects, the investigators had dusted lamp soot on the tail of the ass. Their theory was that the guilty subject, knowing he was the only person in the tent, would not pull the animal's tail. The investigators would then apprehend the suspect having clean hands.[2]

There are other examples of lie detection methods in ancient history, such as, the Chinese who determined deception by the inability of suspects to swallow mouthfuls of rice because guilty subjects were believed to suffer from dryness of the mouth; Zoroaster, the Persian, who founded the magical system of religion about 600 B.C. by proving to unbelievers the truth of his religious revelations by carrying red-hot irons in his hands without being burned; and by Erasistratus, the celebrated Greek physician and anatomist (300-250 B.C.) who at the request of Nicator, a former general in the army of Alexander the Great, determined that Antiochus, Nicator's son had fallen in love with his father's wife. Erasistratus determined this by feeling the changes in Antiochus' pulse when he was questioned about Nicator's wife.[3]

Since Erasistratus' use of the pulse, there have been other accounts of its use to determine deception from the middle ages to present. During the middle ages, in the book Gesta Romanorum, it is related that a nobleman obtained a confession from his wife about her infidelity after noting a change in her pulse rhythm when she was questioned about her suspected lover.[4]

Throughout the 18th and the 19th Centuries, man learned how to more accurately and scientifically gauge emotions and then began to apply these methods to detection of deception. The first attempt to utilize a scientific instrument in an effort to detect deception occurred about 1895. In that year, Cesare Lombroso published an account of several experiments he had conducted on actual criminal suspects whose truthfulness or deception he sought to determine on the basis of the presence or absence of blood pressure-pulse changes when the suspects were questioned about the offense under investigation. Lombroso used the "hydrosphygmograph" which had been developed by other scientists for medical purposes. The instrument consisted essentially of a small water filled tank into which one of the suspect's hands was placed. The immersed hand was then sealed across the top of the tank by a rubber membrane. Changes in the pulse pattern and blood pressure changed the water level in the tank which in turn caused a recording to be made by a connecting recording needle.[5] Lombroso reported successful results with his experiments; however, his work was not followed up until 1915 when William Marston began similar research using a more modern sphymomanometer. Marston's research also was reported to have had a high degree of success in detecting deception.[6]

In 1914, Vittorio Benussi published an account of his successes in detecting deception by monitoring changes in the respiratory system. He measured respiratory changes by utilizing a pneumograph which was a corrugated vacuum tube placed around the chest that expanded and contracted with each inhalation and exhalation of breath. This pressure change was transmitted to a recording pin which recorded the changes.[7]

In 1926, Leonarde Keeler constructed an instrument capable of recording simultaneously all three phenomena, blood pressure, pulse, respiration, and then he added one additional component, the galvanometer (GSR). The galvanometer is named after Galvani, an Italian who, in 1791, published the results of his study and experiments with this phenomenon. This device was further studied by Marston who reported successful experimentation in detecting deception with it in 1917. The device measures the galvanic skin response or electrodermal response through attachments generally placed on the fingers of the subject being examined. The instrument emits an undetectable amount of electrical current through these attachments. Changes in conductivity through moisture on the skin is then measured.[8]

In popular belief, the polygraph instrument is often considered as a device which is supposed to ring a bell, flash lights, or produce some other rapid and positive indication of a lie when one is told by a person being examined. Unfortunately, there is no known instrument in existence at this time that will detect deception so simply and effectively. There are, however, instruments available which are capable of producing recordings of physiological phenomena that may be used as the basis for the application of a reliable technique for diagnosing truth or deception.

Theories and Applied Aspects

Three basic testing theories have evolved in the field of lie detection: (1) the Backster Tri-Zone Comparison Theory, (2) the Reid Control/Guilt Complex Theory, and (3) the Relevant/Irrelevant Theory. Recent research by Raskin, Barland, and Podlesny, Professors in the Department of

Psychology, University of Utah, working with a grant from the National Institute of Law Enforcement and Criminal Justice, has determined that the Backster Theory is the most reliable with the Reid method being about equally reliable; however, the Relevant/Irrelevant technique was found to be very unreliable.[9]

Each of these theories follows the assumption that one will respond to the stimuli which threatens his well being the most at a specific time; that these responses can be detected through specific changes in the blood pressure/pulse rate, respiration, and electrodermal (GSR) responses; and that the response change can be interpreted as representing truthfulness or deception to questions asked through a very specifically structured testing technique.

The control question, introduced by Reid, is an integral part of both the Backster and Reid theories. The use of the control question is based on the stated assumption that one will respond to that stimuli which threatens his well being the most at a specific time. The theory behind control questions, then, is that when a person who has been lying about the matter under investigation is examined, he is concerned almost solely with the questions relevant to that issue; all else, such as the control questions, are inconsequential. On the other hand, a subject who has been telling the truth about the matter under investigation will be less concerned about the relevant questions than the control questions to which he will be lying or to which his answers may be of dubious validity. As a consequence, each type of subject will reflect his own particular concern by deceptive responses on the polygraph tracings to either the relevant questions or to the control questions. The design of the control question then is for the examiner to develop a question not relevant to the issue in question but of the same nature and having importance, but less importance than the offense in question. This is based on the assumption that everyone will "probably" lie about an issue in their lives not relevant to the offense. A typical relevant question in a theft case may be: "Last week, did you steal that bank deposit missing from the Apex Cleaners?" A typical control question to be used in relation with this case may be: "During the first 20 years of your life, do you remember stealing any money?" The time frame of the control question would not overlap the offense in question. A baseline change in the polygraph tracings is indicative of a physiological change in the subject being examined. Physiological changes occurring during the answer of a test question is indicative of a response. A lack of response to relevant questions and a response to control questions is indicative of truthfulness. Deception is indicative if there is a response to the relevant question and a lack of response to the control questions.

The Reid technique incorporates a question into the examination which is designed to discover if the subject being examined is a guilt complex responder. He suggests that the subject be informed by the examiner that the police have requested that everyone being examined be questioned about an unsolved case. The subject is not informed that this is a fictitious case. The examiner formulates a question about a fictitious case and if the subjects shows a lying response when answering, it may indicate a false response could be shown on the relevant and control questions. Backster does not utilize the guilt complex question. His theory teaches that his control questions will produce guilt complex responses if the subject is prone to such responses; therefore, a response to the control

questions and the relevant questions may reflect a guilt complex response.

The Backster theory also incorporates symptomatic questions into the test structure. The theory behind these questions is that there may be an issue in the life of the subject which if discovered, would in the mind of the subject, be more detrimental to him than the offense in question. Backster theorizes that if this happens, the subject's responses to the relevant and control questions could be subdued since the main stimuli to the subject would be the threat of this detrimental background problem being discovered.

To discover such a problem, Backster suggests that all questions be reviewed with the subject prior to the actual examination and that the subject be informed that no other questions will be asked during the examination. To ensure he has the confidence of the subject, and with the subject's knowledge, Backster incorporates two symptomatic questions, such as, "Are you afraid I will ask you questions during this examination which have not been reviewed?", and "Is there something else you are afraid I will ask you a question about, even though I told you I would not?" According to Backster, responses to these questions and a lack of response to the control questions and the relevant questions would not mean truthfulness or deception but would indicate a stronger outside issue and a distrust in the examiner by the subject being examined.

The Relevant/Irrelevant technique is not being widely taught at this time, although, many examiners who were taught the method are still utilizing it. The theory behind this method is that a person will simply respond when telling a lie to a relevant question, and will not respond to a non-threatening irrelevant question. An irrelevant question is designed to ascertain the subject's "norm" such as, "Is your name Joe Doe?", or "Were you born in the United States?" The theory also projects the idea that the element of surprise is essential to produce a response; therefore, the subject being examined is only informed of the issue to be resolved and all relevant questions asked about the offense are intermingled with irrelevant questions and are asked in a surprised fashion during the examination.

Backster, Reid, and many other researchers have found the element of surprise may create false responses. Virginia law prohibits the asking of questions without prior review.[10]

It should be noted that the Backster and the Reid techniques utilize irrelevant questions; however, they are used primarily to introduce the subject to the beginning of the test.

In order for a successful examination to be conducted, the subject being examined must be cooperative. Any attempts to control responses, through controlled breathing, muscular movements and pressures will distort the recordings to an extent the examination may end with inconclusive results.

One of the most frequently asked questions about the polygraph techniques is the effect of extreme nervousness. First of all, the pretest interview reduces the apprehensions of a truthful, tense or nervous subject. The pretest interview is that portion of the examination in which the examiner obtains case information from the subject, and explains to

the subject the workings of the instrument and the examination procedures. During this time, the examiner is attempting to convince the subject that the instrument "really works." This portion of the examination is aimed at calming the anxiety of the innocent and providing a stimulus for the guilty. The importance of this portion of the examination cannot be overlooked. Secondly, if a subject's nervousness persists, it will be detected through the uniformly irregular nature of the polygraph tracings; in other words, physiological changes or disturbances induced only by nervousness usually appear on the polygraph tracings without relationship to any other particular question or questions.[11]

Another important area of concern of those in the field is the concern that a subject without a "conscience" or those subjects considered as psychopaths may be able to "beat the test." Research in this area does not support this concern. Reid and Inbau point out that, "Concern over possible detection appears to be the principle factor accounting for the physiological changes that are recorded and interpreted as symptoms of deception."[12] Maurice Floch, in his study on the limitations of the lie detector, expressed the view that, "conscience should be put in the same class as fear of detection," and he further states:

> ... after all, psychologically conscience is also fear of detection. Only the fear is of the superego or moral principles which, in the final analysis, represents the father or authority in general. In brief, conscience is fear of detection and retribution and not an abstract concept.[13]

The study Raskin, et al., conducted covered the accuracy of examining psychopaths (sociopathic). They state:

> ... [Among] subjects who had been diagnosed as psychopaths, decisions were 96 percent correct. The single error was a false positive, and not a single guilty psychopath was able to produce a truthful polygraph outcome.[14]

One could argue that if the fear of detection is the primary basis for the functioning of the polygraph, then the lack of concern over the possibility of detection would enable a subject to "beat the test." Reid and Inbau,[15] and Richard Arther,[16] point out that the lack of concern about detection is a factor in conducting a successful examination; however, they point out this should not cause an inaccurate examination if control questions are used because the lack of concern would result in a lack of response to the relevant and control questions. The lack of response to both the relevant and control questions would render the examination inconclusive. They also point out the rarity of examinations conducted in which the subject was so "down and out" that he would not be concerned about being detected of committing a crime.

There are other factors that must be considered in conducting a successful examination such as, environment, subject's physical condition, adequate question phraseology, excessive interrogation prior to the examination, and mental deficiency; however, perhaps none are as important as examiner qualifications. Because the polygraph technique involves a diagnostic procedure rather than a mere mechanical operation, a prime requisite to its effectiveness and reliability is examiner competence. An examiner must be a person of intelligence and one with a good educational

background. Because he will be dealing with persons in delicate situations, the examiner must also possess suitable personality characteristics, which might be categorized as the ability "to get along" well with others and to be persuasive in his dealings with them. Professor Andre Moenssens states:

> ... an examiner's training must have been received on an internship basis under guidance of a competent, experienced examiner, and that the trainee should have read and received instruction in the pertinent phases of psychology and physiology. The trainee must have been given to the detailed study and analysis of a considerable number of polygraph test records in actual cases in which the true facts of truthfulness or deception were later established by independent evidence.[17]

The American Polygraph Association (APA), the association of western world polygraph examiners, requires applicants for membership to have completed a course of formal instruction on polygraph instrumentation and techniques which has been accredited by the APA; that the applicant must have administered at least 200 examinations within three years of completion of training; and the applicant must possess, as a minimum, a degree at the baccalaureate level.[18]

The Commonwealth of Virginia regulates the polygraph field. Virginia law requires the State Department of Commerce to establish and administer the regulations. These regulations require examiners to be licensed.[19] Before a license is issued, an examiner must show proof of having a Bachelor's degree; or an associate degree in a police-related field and three years experience as an investigator or detective; or has a high school diploma and five years experience as an investigator or detective. He must show proof of having completed a course of formal training accredited by the APA and that at least six months has been served in an intern status working under the direct supervision of a licensed examiner approved by the Department.

Frank S. Horvath conducted research into examiner reliability in 1971.[20] In this study, ten examiners agreed to analyze polygraph records independently and without the benefit of case information. Forty examinations conducted by Horvath were selected. Twenty had been analyzed by Horvath as having deceptive responses and twenty as having truthful responses. A total of 247 questions were analyzed. Horvath's determination in each case had been confirmed as correct through independent evidence. Seven of the examiners had been engaged in polygraph training for over one year and three had between four and six months experience. The experienced examiners were successful in 91.4 percent of their diagnoses; the inexperienced in only 79.1 percent. Fred L. Hunter and Philip Ash[21] and Raskin, et al.,[22] conducted similar research since 1971 and reached similar conclusions.

During recent years, Reid and Backster have introduced a numerical chart evaluation procedure which has reduced the inconclusive examination results and which has increased examiner accuracy. Unfortunately, this numerical procedure cannot be utilized with the Relevant/Irrelevant technique. The numerical evaluation requires the examiner to examine each of the tracings, respiration, GSR, and blood pressure/pulse (cardio), and

compare the responses between the relevant and control questions, placing a numerical value on each tracing for each question. The numerical value is determined by the magnitude of the responses when compared with the adjacent control or relevant question and a certain value is needed before a determination can be made. The Raskin et al., study revealed that examiners who explicitly employed numerical evaluation achieved significantly higher accuracy of decision (95%) than those examiners who did not use numerical scoring (88%).

Even though the research reported since Lombroso in 1895 has been extensive and mostly favorable for the polygraph, the courts have, for the most part, not accepted the test results as evidence in trial proceedings. The first appellant court decision concerning admissibility of polygraph test results was rendered in 1923 by a federal court in Frye v. United States.[23] The court in rejecting its admissibility stated:

> ... [the] deception test has not yet gained such standing and scientific recognition among physiological and psychological authorities as would justify the court in admitting expert testimony.

Ironically, the defendant was convicted of murder even though the examination revealed his innocence. Three years after Frye's conviction, the true murderer confessed. Since 1923, the courts have steadfastly rejected examination results based primarily on this decision.

Sub-Problems

Some sub-problems needing additional study are problems relating to other types of examinations such as, "pre-employment" and "periodic" examinations given primarily by private polygraph examiners. Both of these examinations cover many specific areas; they are sometimes given without regard to environment, adequate case information, or to the subject's physical condition.

Another sub-problem which will not be addressed in this study is the emerging use of the Psychological Stress Evaluator (PSE). This device monitors and records changes in voice wave lengths which in turn are evaluated to determine truthfulness or deception. Much controversy surrounds the use of this device and many states, including Virginia, prohibit its use. A 1981 study conducted by the Virginia Department of Commerce determined the device unreliable.[24]

Another sub-problem not considered in this study, is the question concerning the weight the court or jury would place on the polygraph results if submitted as evidence. Since the examination results serve to get at the very "heart of the issue--guilt or innocence" one could argue that a jury may tend to overemphasize the importance of the polygraph results and overlook other relevant evidence. Recent studies in this area by Forosch,[25] Barnett,[26] Kifler,[27] Carlson,[28] and Markwart,[29] have been generally inconclusive.

The Hypothesis

The purpose of this study is to explore the following two hypotheses:

1. Has sufficient scientific research been conducted since the 1923 Frye decision to establish that polygraph examination results in specific criminal cases are reliable?

2. To what extent are Virginia polygraph examiners rendering reliable polygraph examinations in specific criminal cases?

The Delimitations

The study does not take into account every possible aspect of polygraph examinations. The study includes only fully licensed Virginia examiners residing within the state even though examiners residing in other states may often give examinations in Virginia. Examiners in a training status and holding intern licenses are not included due to their limited experience; however, they often conduct examinations. The study will not encompass pre-employment or periodic screening examinations, even though a majority of the examinations conducted by private examiners fall into this category.

Since the thrust of this study is to determine the reliability of examinations involving criminal offenses occurring in Virginia, the study is limited to its target population.

The Definition of Terms

1. Polygraph Examiner. An individual licensed by the Virginia Department of Commerce to conduct polygraph (lie detection) examinations.

2. State Police Examiner. An examiner employed by the Virginia Department of State Police.

3. Local Law Enforcement Examiner. An examiner employed by either a sheriff's department, county police department, or a town or municipal police department.

4. Private Examiner. An examiner employed by private, industrial or commercial firms or by federal agencies, such as, the Central Intelligence Agency.

5. Specific Examination. A polygraph examination involving a criminal violation and designed to resolve a single issue.

6. Pre-employment Examination. A polygraph examination which is designed to determine weakness in a job applicant's employment history.

7. Periodic Examination. A polygraph examination designed to confirm employee honesty when no specific problem has arisen.

8. Determination. An opinion rendered by the polygraph examiner.

9. Truthful Determination. The subject being examined responded truthfully to the questions asked by the examiner.

10. Deceptive Determination. The subject being examined lied to the question being asked.

11. Inconclusive Determination. The subject being examined did not show sufficient responses for an examiner determination, or the subject was rendered unfit for a complete examination.

12. Verified Examination. An examination in which the subject's truthfulness or deception is established through evidence independent of the polygraph results.

Assumptions

Sufficient scientific data has been established which meets the criteria necessary for admitting polygraph results into evidence in court proceedings. Professor Moenssens, a professor of law with a special interest in the forensic sciences has reported that he could find no legal reason for a blanket denial of admissibility of polygraph results. He states:

> When dealing with legal standards for admissibility of testimony derived from scientific tests and offered by expert witnesses, the three most important criteria for admissibility are: (1) that we have a scientific test which has a sufficient degree of reliability or replicability; (2) it has been properly applied according to accepted procedures; and (3) it has been administered by a competent technician or examiner.[30]

He further explains that although items 2 and 3 are important factors, the main reason for denial of admission is item 1, the lack of proven reliability. The reason the federal reviewing court gives for rejecting the polygraph testimony in the Frye case is:

> Just when a scientific principle or discovery crosses the line between the experimental and demonstrable stages is difficult to define ... the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs.[31]

Professor Moenssens explains that this was the birth of the so-called "general acceptance test" which set the precedent upon which the polygraph evidence is excluded today. He further points out that the California court in People v. Williams, in 1958, recognized the weakness of this overly broad approach to general acceptance, when it was asked to admit into evidence testimony of the Nalline test for drug addiction. The Nalline test, which had been developed by one doctor, and was accepted by other doctors, nevertheless was largely unknown to the medical profession as a whole. Professor Moenssens explains that the California court in fashioning a test for admissibility stated that it would not be necessary to prove general acceptance in the medical field, but only among those people in the field who might be expected to be familiar with it.

A further refinement of Frye was undertaken in 1968 in the case of Coppolino v. Florida. Here, a medical examiner testified to his findings that the victim had died of an overdose of a drug known as succinylcholine chloride which had never before been detected in the human body. The medical examiner's findings were dependent on a toxicological report that identified the drug. The defense argued that the test for presence of succinylcholine chloride was new and the absence of corroborative

experimental data by other scientists meant it had not gained general acceptance in the toxicology profession. The court, in rejecting this argument recognized the necessity that exists for devising new scientific tests; however, that these new tests would be admissible only if they are based on scientifically valid principles and techniques.[32]

Professor Moenssens also suggests that:

> ... general acceptance is not necessarily a proper test since it does not invariably equate with reliability. A better test for admissibility of novel scientific test results should require proof of reliability. General acceptance in a scientific community may, to some extent, be circumstantial evidence of reliability, but it should by no means be considered sufficient in itself. ... general acceptance, then, is not the proper standard. Proof of scientific reliability is--and the proof of scientific reliability has been demonstrated by experiments, studies and publications--a reliability which can no longer be authoritatively challenged.
>
> ... [if] we look at the problem as the California court in Williams did, and consider the opinions of those who might be expected to be familiar with its results, we would reach the inescapable conclusion that the general acceptance test is amply met.[33]

No one in the polygraph field professes that the polygraph technique is infallible. Reliability, however, does not require infallibility. There are, in fact, examiners in other forensic disciplines whose test results are routinely accepted as evidence which are less than 100 percent conclusive such as, handwriting analysis, paint analysis, glass analysis, and hair and fiber analysis. Professor Moenssens goes further and states:

> In fact, there is no scientific test today, save possibly the blood grouping test, to exclude the possibility of paternity, that is deemed to be totally infallible.[34]

A crime laboratory proficiency testing study conducted by the Forensic Sciences Foundation and published in 1978 revealed a wide range of proficiency levels among the forensic disciplines of the participating laboratories (See Table I).[35]

It may be true that sufficient scientific research had not been done in the lie detection field in 1923 to allow testimony about it in the Frye case; however, to compare scientific research on lie detection up to the Frye case and the simple instrumentation used to conduct the examinations with the scientific research now available and the sophisticated instrumentation that has been developed since the Frye case, would be like comparing the horse and buggy to the modern automobile.

Why then have the courts routinely accepted as evidence results of other scientific tests which are less than 100 percent conclusive and having a degree of fallibility and yet continue to discriminate against the polygraph? One could conclude that the courts will not accept the polygraph results because they are still not convinced of the scientific

TABLE I

PERCENTAGES OF LABORATORIES REPORTING RESULTS OF "UNACCEPTABLE PROFICIENCY"

$$\frac{\text{Number "unacceptable" responses}}{\text{Number of laboratories responding with data}} \times 100 = \text{Percent "Unacceptable"}$$

Sample Number	Sample Type	Number of Labs Responding With Data	Number of "Unacceptable" Responses	% of Laboratories Submitting "Unacceptable" Responses
1	Drugs	205	16	7.8%
2	Firearms	124	35	28.2%
3	Blood	158	6	3.8%
4	Glass	129	6	4.8%
5	Paint	121	24	20.5%
6	Drugs	181	3	1.7%
7	Firearms	132	7	5.3%
8	Blood	132	94	71.2%
9	Glass	112	35	31.3%
10	Paint	111	57	51.4%
11	Soil	93	33	35.5%
12	Fibers	120	2	1.7%
13	Physiological Fluids (A & B)	129	(A) 3 (B) 2	(A) 2.3% (B) 1.6%
14	Arson	118	34	28.8%
15	Drugs	143	26	18.2%
16	Paint	103	35	34.0%
17	Metal	68	15	22.1%
18	Hair (A, B, C, D, & E)	90	45 25 49 61 32	(A) 50.0% (B) 27.8% (C) 54.4% (D) 67.8% (E) 35.6%
19	Wood	65	14	21.5%
20	Q.D. (A & B)	74	4 14	(A) 5.4% (B) 18.9%
21	Firearms	88	12	13.6%

reliability of its results. The courts may question, as previously mentioned, that the juries may place too much weight on the examination results. This position does not seem appropriate since a jury could place an equally heavy weight on evidence in a forgery case in which a handwriting examiner testifies that a forged document did in fact bear the writings of the accused. Another concern may be that the court may consider the test unconstitutional or a form of self incrimination. Can an argument for this be seriously maintained since a successful examination depends upon the willing cooperation of the subject being examined? Even the Supreme Court recognizes that a person may waive his constitutional rights, including the privilege against self-incrimination, provided he does so knowingly, intelligently, and voluntarily. And would it not rule out the constitutional issue if the accused wanted the examination results introduced on his behalf which is now also prohibited?

Need for the Study

The Virginia Supreme Court in the 1971 case of Skinner v. Commonwealth rejected the admission of polygraph results based on the Frye decision; however, in rejecting the evidence, the court inferred it would be agreeable to hearing a future case in which scientific evidence was presented concerning polygraph reliability.[36] This is very important since many law enforcement and other criminal jsutice agencies are using the instrument in the course of criminal investigations and more and more courts are being asked to introduce examination results as evidence; however, Virginia courts have heard very little testimony about the instrument's reliability.

Many individual scientific studies have shown the polygraph to be very reliable; however, this study is important because it will report the results of existing scientific studies and compile data concerning actual field examinations conducted by Virginia polygraph examiners in an effort to reach an overall conclusion for the reliability of polygraph examinations given by Virginia polygraph examiners.

The Review of Related Literature

Investigations into the reliability of the polygraph have been carried out in two separate and distinct realms: in the laboratory and in actual life situations. In the former, the approach has been highly varied. Volunteer subjects, often college students, have attempted deception to such varied activities as denying that they had chosen specifically numbered cards, to examining individuals who lied about having taken part in a mock trial. Most experimentalists have readily admitted that a great difference exists in the emotional response of a college student voluntarily participating in an experiment and an actual criminal suspect whose penalty for being detected in a lie may result in personal embarrassment, a financial loss, or even imprisonment. The obvious difference in the fear of detection is great enough in these two procedures to classify them separately. In fact, in Trovillo's view[37] "Simulated emotion in psychology class, on the lecture platform, in drama, and in experimental laboraties has done more to clutter up and confuse honest polygraphic reporting than all the quackery of 50 years!" Berrin,[38] Kugelmassand Lieblich,[39] Wolfe,[40] and Gustafson and Orne[41] all have reached similar conclusions through their research as did Trovillo.

In addition to the lesser fear and guilt in the laboratory situation, there are a number of factors that diminish the polygraph's effectiveness in the experimental setting. For example, due to a time factor, most researchers have had to limit the number of charts administered to each of their subjects. In the law enforcement setting the examination can often continue until a firm determination can be made.

In addition, the majority of laboratory studies do not employ trained and experienced examiners, which is undoubtedly the major determinant in attaining an accurate diagnosis. Some laboratory studies also have been weakened considerably by the fact that they have used instruments with less than three sensors, some using only a single measure, such as the galvanic (GSR) stimulus.

The differences that exist between laboratory and field studies must inevitably result in lesser reliability for the former. This, therefore, must be considered when one evaluates the findings of these two research procedures.

The history of some early experimentation with the polygraph is described in detail by Trovillo.[42] His research of early experimentation discovered an accuracy range of 57 percent by Landes and Wiley in 1926,[43] using only the respiratory component to 96 percent accuracy by Marston in 1971,[44] using only the blood pressure. Marston evaluated 107 records and only had four errors. In 1921, Langfeld,[45] compared a word association technique with blood pressure as a means of differentiating truth from deception. He reported the blood pressure technique easily and more accurately picked out the guilty suspects. Burtt,[46] in that same year, compared blood pressure with respiration in three separate procedures. The first related to lying or truth telling in response to letters and digits; the second to deception or truth in relating stories; and the last used the mock crime paradigm. In addition, observers were present who attempted to determine truth or deception by the subject's responses and behavior. The observation technique was found to be far less effective than the systolic blood pressure approach which was 91 percent accurate and the respiration was 73 percent accurate. W.G. Summers,[47] in 1936, reported that in over 6,000 laboratory experiments and 50 actual cases he had obtained results in the range of 98 to 100 percent accuracy.

In 1942, MacNitt,[48] studied the blood pressure and concluded it was very reliable, but his main emphasis was on the GSR. He compared the GSR results with word association results in 194 cases and he attained 99 percent accuracy with the GSR and 75 percent accuracy with the word association test. From this he concluded the GSR was a valid and reliable measure of deception.

In 1959, using the mock crime paradigm Lykken,[49] examined 49 subjects with the GSR and obtained 93.9 percent correct classification. He employed electric shocks with each lie that was detected in an attempt to create some degree of fear of detection.

Van Buskirk and Marcuse,[50] determined which of four cards were chosen by each of 50 subjects. They reached a significance at the <0.01 level of confidence. They reported that had these charts that were felt to be inconclusive been eliminated they would have reached an accuracy of 92 percent.

In 1963, Kubis[51] carried out a series of three studies, with mixed results. Using a mock crime situation an attempt was made to differentiate between a thief, a lookout, and an innocent suspect. He employed five examiners with three months training but without experience and he obtained an average accuracy of 78 percent. The examiner with the least success was correct 73 percent of the time and those with an apparent aptitude for the technique reached 92 percent accuracy.

In studying larger samples, Reid and Inbau,[52] were able to verify only three errors in 4,093 individuals who were tested. Of those found to be deceptive, 97 percent were verified to be accurate determinations.

In 1963, a subcommittee of the House Government Operations Committee, under the chairmanship of John E. Moss of California was directed to investigate Federal use of the polygraph.[53] Of all the research that had been carried out before the Moss report only Kubis' investigation would cast real doubt upon the polygraph, even though he used a laboratory setting with examiners having only three months training and without any actual experience. Even Kubis was not influenced by his study or by the negative Moss report for he stated "Accuracy on a complicated lie detector experiment can reach a figure close to or beyond 90 percent."

Dr. Abrams,[54] in an attempt to clarify the validity level of the laboratory studies reported prior to the Moss hearing, studied and averaged the laboratory findings, including those mentioned thus far in this report. He found the mean accuracy level to be 81 percent. This is impressively high when one considers that much of the research was done with one sensor, and often with inexperienced and untrained examiners. Dr. Abrams also averaged the findings of some nineteen known studies conducted with actual criminal cases in which the findings were verified by evidence independent of the polygraph. These studies were conducted by some police agencies, U.S. Army Military Police, Northwestern University, Emergency Committee in Psychology of the National Research Council for World War II, etc. He reported that up to the 1963 Moss hearing actual field research corroborates statements that the polygraph examinations are around 95 percent accurate when competent examiners are used. Of all those verified, guilty and innocent alike, no error was greater than three percent, with the majority being two percent or less. There were only five studies in which complete verification was possible, and in each, 100 percent correct diagnoses were made. In all of the other investigations an average of only 65 percent verification could be attained, but of these, 98 percent accuracy was reported. It can be assumed that in the unverified 35 percent, the accuracy would be just as great. As this shows and as expected, the field research has a much higher level of accuracy.

Since the Moss investigation, further research has been carried out; however, investigation into this technique was minimal until 1972. Two studies that were conducted during this time were ones conducted by Kugelmass, et al.,[55] who studied the effectiveness of the GSR, and Barland and Raskin,[56] who studied examiner reliability by having them evaluate polygraph charts without the benefit of giving the entire test, each of which obtained a statistically significant score at the <0.001 level.

In 1972, Raskin, et al.,[57] published a report of the overall reliability of the polygraph technique. They conducted eight experiments

using all three polygraph components and divided into two basic categories: (1) Laboratory Experiments and (2) Field Studies.

In the laboratory research two experiments were conducted. The first involving a mock crime of theft, utilized 48 male volunteers from prison who were convicted felons, half of which were clinically diagnosed as psychopathic (sociopathic), and the second involved the same mock crime but used 60 male subjects recruited from the community by newspaper advertisements.

Several different field studies were completed using 102 criminal suspects referred by the police, prosecuting attorneys, and defense attorneys. The Minnesota Multiphasic Personality Inventory (MMPI) was used to obtain background information to determine relationship between various personality, behavioral, socioeconomic and crime categories and the results obtained with the polygraph.

One study concerned the reliability and validity with criminal suspects, another study was to determine the effectiveness of physiological measures, and a third and fourth experiment evaluated the current practices by law enforcement and private polygraph examiners.

In each study in which a significant evaluation was made only the examination in which the tests were confirmed by evidence independent of the polygraph results were used. The overall accuracy for the laboratory and field experiments was found to be approximately 90 percent. In the field test 13 percent of the tests were inconclusive. If these tests were omitted, the accuracy for field testing would have been 92 percent. Among the 24 suspects diagnosed as psychopaths, decisions were 96 percent correct. There was one error but not a single guilty psychopath was able to produce a truthful reaction nor were there any indications other variables relating to the MMPI scores, sex, age, etc., were shown to affect the test results. Likewise there was no discernible differences among polygraph scores based upon the type and nature of the crimes. There was no significant increase in accuracy using other nonstandard measures to detect deception; therefore, they made no recommendation to add any additional measuring devices to the standard polygraph instrument.

Since this study by Raskin, et al., in 1972, several other studies have been conducted, two of which are worthy of mentioning. Dr. Stanley Abrams in 1975 attempted to determine the reliability of examining children. He tested eight children from each grades four through eight. The students were chosen by their teachers and placed at random in experimental groups. The examiner was to determine which student had received a special gift. The overall accuracy was 77 percent; however, when the scores were measured for the sixth through eighth grade, the accuracy increased to 88 percent. This report does not preclude younger children from being successfully examined; however, greater accuracy can be expected at age 11.[58]

Another study by Drs. Widacki and Horvath in 1978, attempted to compare polygraph effectiveness with fingerprint, handwriting, and eye witness identification. By using an elaborate situation involving 80 students divided into 20 groups of four, the Criminalistics Department, Jaguellonian University, Kracow, Poland attempted to detect the one perpetrator in each group who had adequately handled a test object, who

left a signature, and who provided the opportunity to be seen by eyewitnesses. Forensic experts then attempted to identify the 20 perpetrators among the 80 participants. The polygraph identified 18 correctly, one incorrectly and one inconclusive; the handwriting identified 17 correctly, one incorrectly and two inconclusive; the eyewitness correctly identified seven, four were incorrect and nine inconclusive; and the fingerprint correctly identified four, zero were incorrect and 16 were inconclusive. The polygraph was shown to be the greatest identifier by correctly resolving 90 percent of the cases. The significant level for all disciplines after dropping the inconclusive tests was ($P<0.05$).[59]

Methodology

The Population

A complete review of scientific research studies concerning the polygraph reliability was conducted with a major emphasis being on the studies conducted since the 1923 Frye decision. In addition 147 fully licensed polygraph examiners who reside in Virginia were surveyed.

The Sample and Selection Procedures

A thorough research of literature of those scientific studies seeking to determine the validity and reliability of the polygraph was conducted. Minor references or articles in newspapers and magazines; minor discussions of the polygraph included in books where the discussions were not the central or general thesis; and judicial decisions relating to the admissibility of the polygraph were not included.

Those selected to receive the questionnaire survey were chosen from the roster for licensed polygraph examiners maintained by the Virginia Department of Commerce. Examiners listed on this roster who were shown as residing in Virginia were selected. Examiners licensed in Virginia but residing in other states were not selected since it was assumed a majority of their examinations probably would be conducted in their resident state. This selection process did not eliminate any law enforcement examiners. Examiners holding intern licenses were also eliminated because of inexperience and because their license requires a review of all examinations by a fully licensed instructor/examiner which would influence their final determinations.

The Research Design

The research design in this study is the descriptive survey method. A secondary search of literature to review scientific studies was conducted to determine the validity and reliability as established prior to this study. Primary emphasis was on the studies conducted since the 1923 Frye decision.

In addition a questionnaire was mailed to each licensed polygraph examiner residing in Virginia in which he was asked to provide data regarding specific examinations conducted during calendar year 1980; to categorize the examination results into the various determinations rendered and to provide data on the number and category of verified determinations.

Since it could be expected that only a portion of the population would respond, the Stratified Sampling Technique was utilized by dividing the examiners into three groups by employment: State Police, local police and private firms. This provides a means for examining the overall reliability of the examiners as well as examining individual group reliability.

Data Collection Procedures

Each examiner selected to participate in the survey was mailed a questionnaire (See Appendix B). This questionnaire was one page and had six (6) questions. There was also an area allowed for specific examiner comments.

The questionnaire had directions and definitions which made it easy to complete.

The first part of the questionnaire was limited to questions concerning experience and employment.

The second portion dealt with the examinations. Respondents were asked to provide the total number of examinations conducted during calendar year 1980; to categorize determinations; and to show the number and category of verified determinations. Respondents were also asked if they had been qualified by a court as an expert in the field and to show the number of times they had provided testimony concerning their polygraph results.

Before the questionnaires were mailed, the data to be requested was personally discussed with approximately 80 examiners in attendance at the Virginia Polygraph Association meeting held during May 1981. Examiners expressed cooperation and explained that the requested data could be obtained from their files. Prior to mailing the questionnaire, the study was also personally discussed with the Director of the Bureau of Investigation, Virginia Department of State Police. He subsequently issued a directive to all active State Police examiners requiring each to provide the requested data.

To allow sufficient time for examiner response, the questionnaires were mailed on June 1, 1981 with the requested return date being July 10, 1981. One follow-up request was made by telephone and the date was extended to July 24, 1981.

Data Analysis Procedures

The research studies regarding polygraph validity and reliability were reviewed to determine the reliability level determined by each study. A mean average of the findings was then determined.

A statistical tabulation using stratified sampling was done on the data obtained from the groups of responding examiners. This was done to develop an overall level of confidence for the estimated population mean of examiners as a whole and as individual groups.

Histograms are used to present data for visual review. The total number of examinations reported has been categorized by examiner

determinations as to the subject's truthfulness, deceptiveness, inconclusive examinations, and examiner errors. These tabulations have been compared with the number of cases in each category in which examiner determinations were verified.

The Findings

Validity and Reliability of the Sample

The population selected to receive the questionnarie was chosen from the current 1981 licensed examiner roster and this population was segregated into three groups. A total of 147 questionnaires were mailed to examiners located throughout the State. Seventy-one (71) examiners responded. This represented an overall response of 48.3%; however, when the data was segregated into groups, the response from law enforcement was very large.

A total of 80 questionnaires were mailed to law enforcement examiners and 62 or 77.5 percent responded.

1. Virginia State Police. Twenty-four (24) questionnaires were mailed and 24 examiners (100 percent) responded. Twelve of the examiners did not conduct examinations during 1980 for reasons such as retirement or reassignment of duties.

2. Local Law Enforcement. Fifty-six (56) questionnaires were mailed and 38 examiners (67.9 percent) responded. Eighteen (18) of the examiners responding did not conduct examinations during 1980 primarily for the same reasons given by the State Police examiners.

3. Private Firms. Sixty-seven (67) questionnaires were mailed and nine (9) examiners (1.4 percent) responded.

The validity and reliability of the questionnaire sample is limited to law enforcement examiners and may not be reflective to private examiners due to a limited sample response from this group. An additional survey may provide better data for this group.

Validity and Reliability of the Data

The survey instrument used in this study (See Appendix B) was mailed directly to each examiner with an emphasis made that all individual data would remain confidential. The exception being the State Police. Questionnaires mailed to this group were forwarded to the Director of the Bureau of Investigations who forwarded the questionnaire to each examiner. The instrument used was found to be satisfactory as to comprehending the questions on the instrument and the directions given. In addition, as stated above, the requested data was reviewed and found acceptable by examiners in attendance at a recent polygraph examiner association meeting and by the Director of the Bureau of Invstigations of the Department of State Police prior to mailing the instruments.

Findings in Relation to the Hypotheses

Hypothesis one which explored recent scientific research, determined

that extensive scientific research has been conducted since the 1923 Frye decision. An extensive review of this research did not show the polygraph technique to be infallible; however, the research reviewed shows the technique to have an accuracy rate in the mid-ninety percent range if the examiner was properly trained and utilized a proper technique. The research further revealed that researchers concluded that the accuracy range extends higher for actual criminal field examinations.

Dr. Abrams, in his study previously cited in this report, reported a mean accuracy level of approximately 95.0 percent for the scientific studies he reviewed. His study cites sixty-six references. Since his study includes current research as well as the research cited in this study, no further tabulation was done.

Hypothesis two explored the reliability of polygraph examinations conducted by Virginia polygraph examiners. Figures one, two and three show tabulations of questionnaire response, agencies responding and examiner experience. A tabulation of the data received (See Figure 4) shows that 2620 specific criminal examinations were conducted. The State Police conducted 1531 (58.4 percent) of the examinations; local police 902 (34.4 percent); and private examiners reported 187 (7.2 percent) of the examinations. Of the 2620 examinations reported 1055 (40.3 percent) determinations were verified. The verified correct determinations were 1037 (98.3 percent) versus 18 (1.7 percent) error verification. Total inconclusive results were 340 or 13.0 percent (see Figure 5). This gives a 95 percent level of confidence (see Appendix C).

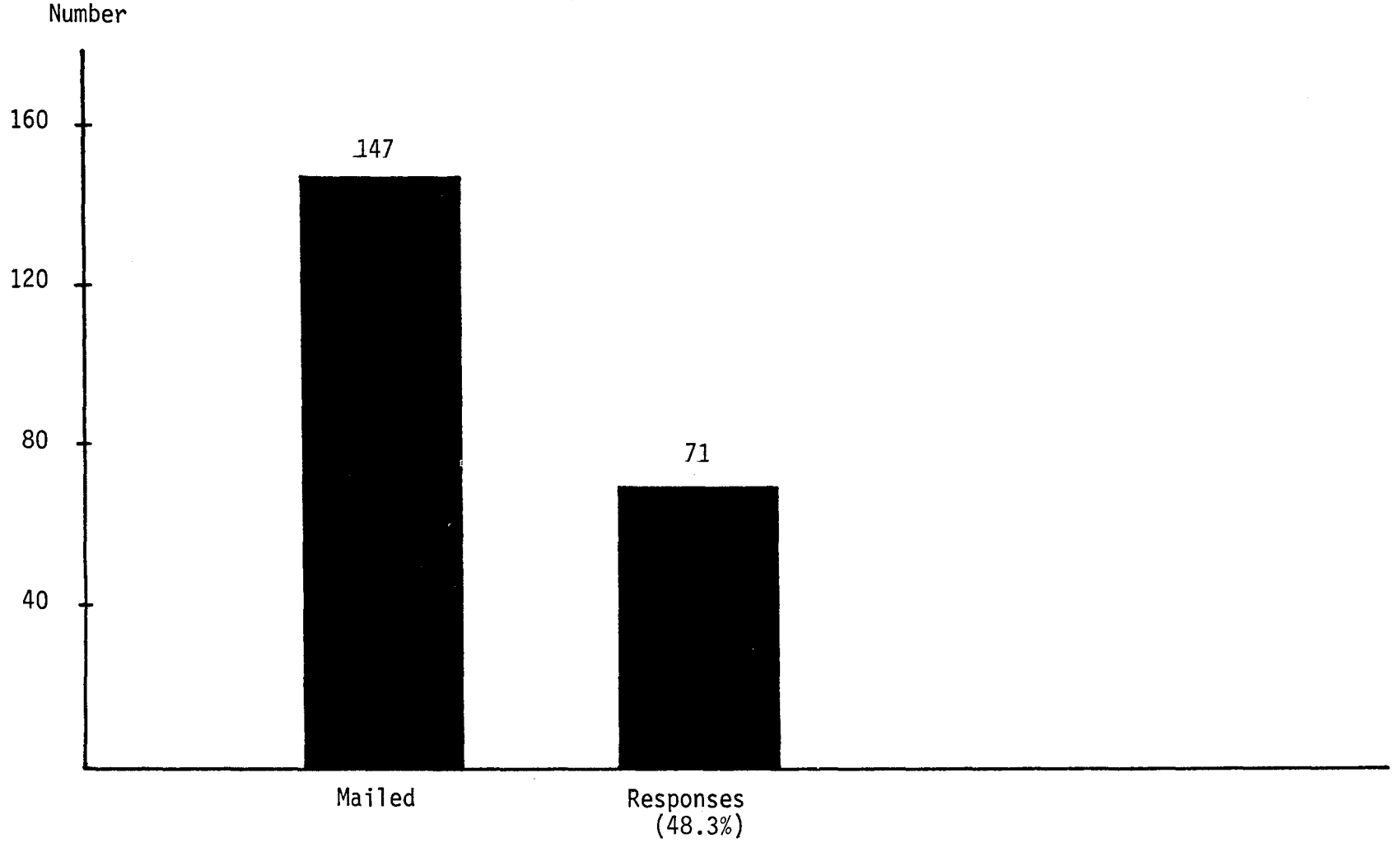
For a more complete review and comparison one must review the data of the three groups individually.

1. Virginia State Police. Examiners reported 1531 examinations with 649 (42.4 percent) of the determinations being truthful; 649 (42.4 percent) being deceptive; and 233 (15.2 percent) being inconclusive. A total of 636 (41.5 percent) verifications of determinations were made (see Figure 6). The determinations are also shown by truthful and deceptive categories (see Figure 7). Of those determined truthful, 224 (34.5 percent) were verified; 221 (98.7 percent) were verified as correct and 3 (1.3 percent) were verified as incorrect. Verified deceptive determinations were 412 (63.5 percent) and 409 (99.3 percent) of these were verified as correct, and 3 (00.7 percent) were verified as incorrect.

2. Local Law Enforcement. Examiners reported 902 examinations conducted with 464 (51.4 percent) determinations being truthful; 334 (37.0 percent) being deceptive; 104 (11.6 percent) were inconclusive; and 323 (35.8 percent) were verified (see Figure 8). Determinations are shown by truthful and deceptive categories (see Figure 9). Of those determined truthful 139 (30.0 percent) were verified; 135 (97.1 percent) were as correct and 4 (2.9 percent) were verified as incorrect. Verified deceptive determinations were 184 (55.1 percent) with 178 (96.7 percent) being verified as correct. Verified incorrect were 6 (3.3 percent).

3. Private Firms. Examiners reported 187 examinations with 132 (70.6 percent) of the determinations being truthful; 52 (27.8 percent) being deceptive; and 3 (1.6 percent) being inconclusive. A total of 98 (52.4 percent) verifications were made (see Figure 10). Determinations

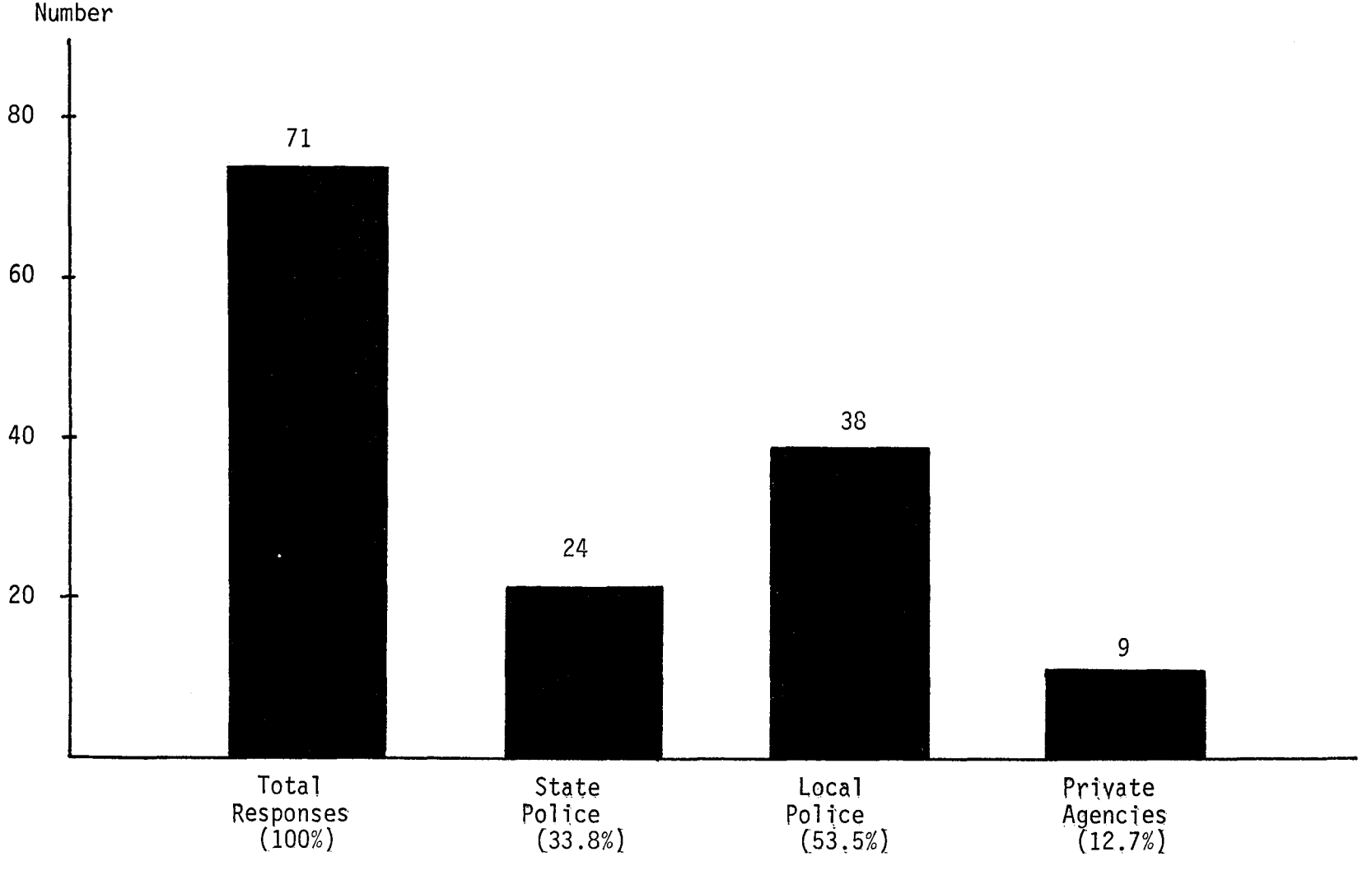
FIGURE 1: QUESTIONNAIRE RESPONSE



Total number of polygraph examiners fully licensed and residing in the State of Virginia = 147.

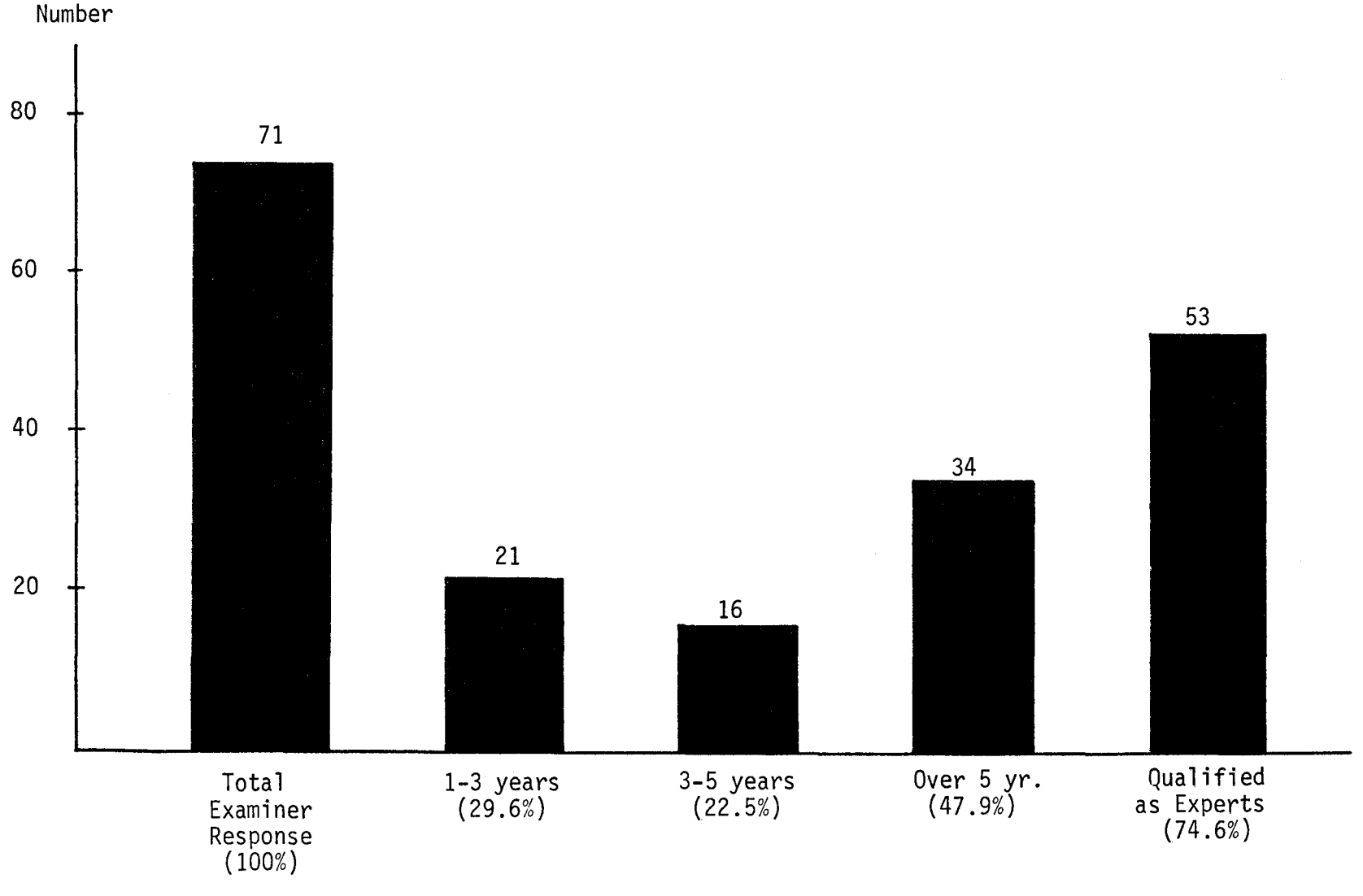
Sample size per this study = 71 or 48.3% of the total population.

FIGURE 2: TYPES OF AGENCIES RESPONDING



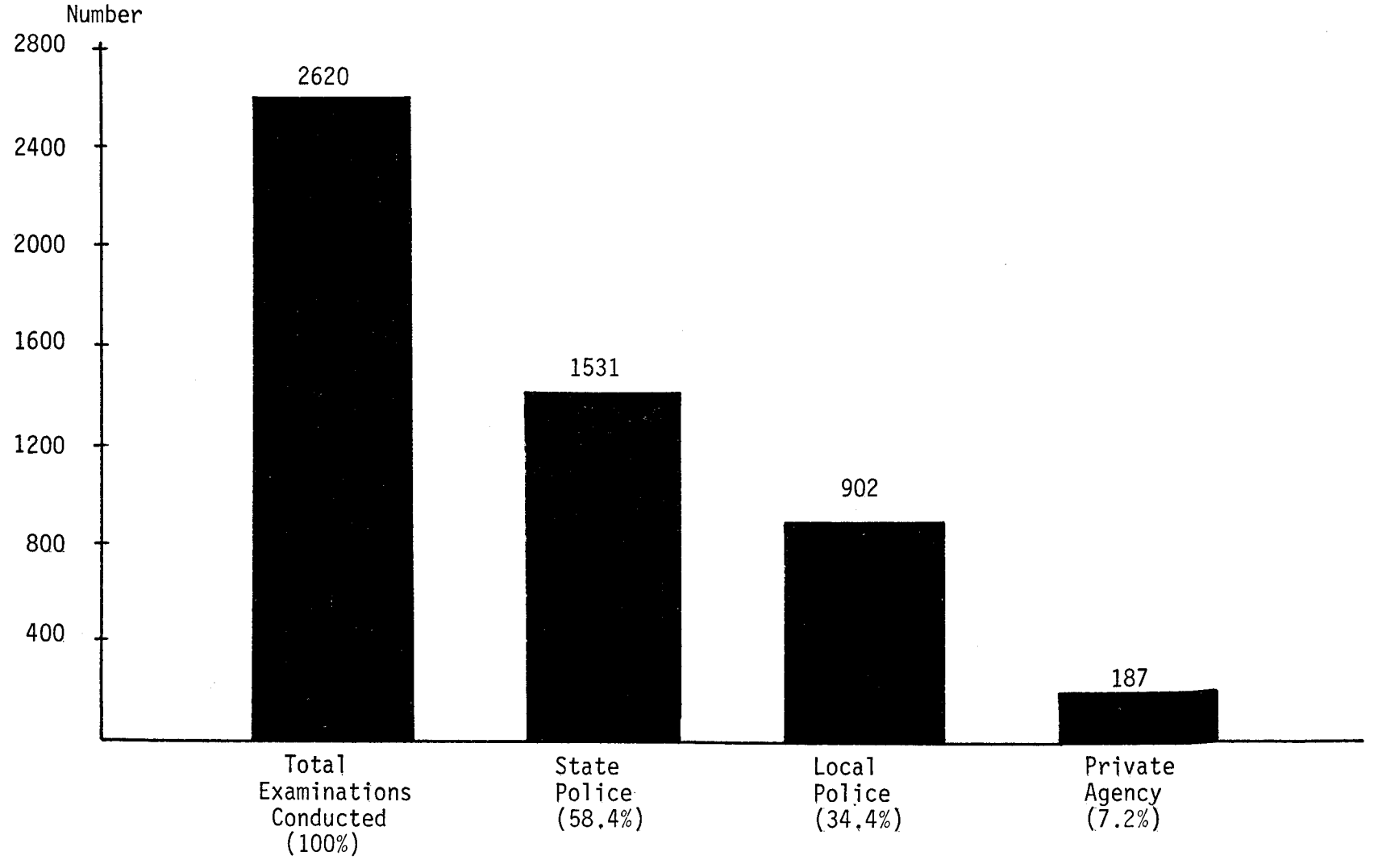
Total questionnaires returned = 71.

FIGURE 3: EXPERIENCE OF EXAMINERS



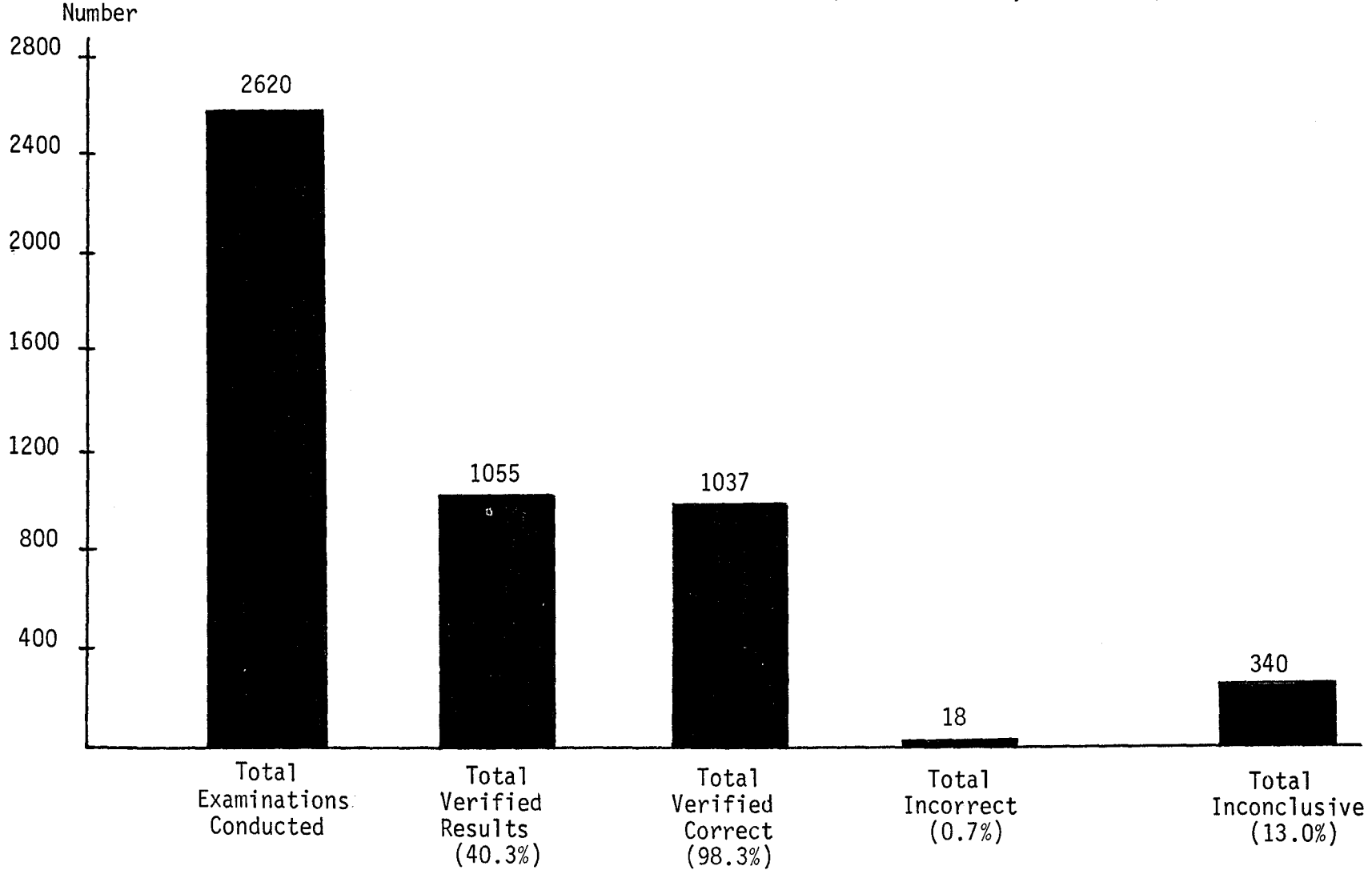
Total number of questionnaires returned = 71.

FIGURE 4: NUMBER OF EXAMINATIONS CONDUCTED BY AGENCY



Total number of examinations reported = 2620.

FIGURE 5: TOTAL NUMBER OF CASES FOUND VERIFIED, INCONCLUSIVE, OR IN ERROR



Total examinations conducted = 2620.
Total examinations verified = 1055.

are shown by truthful and deceptive categories (see Figure 11). Of those determined truthful 65 (49.2 percent) were verified, 65 (100 percent) as being correct. Verified deceptive determinations were 33 (63.5 percent), 31 (93.9 percent) were correct and 2 (6.1 percent) were verified as incorrect.

Because of the low response from the private group, a further tabulation was done using only data submitted by law enforcement examiners (see Figure 12). A total of 2433 examinations were reported with 959 (39.4 percent) being verified. Determinations verified as correct were 943 (98.3 percent) with 16 (1.7 percent) being verified as incorrect. A total of 337 (13.9 percent) of the examinations were inconclusive.

Discussion and Interpretation of the Findings

The findings of this study shows research into polygraph reliability conducted since the 1923 Frye decision to have an accuracy level in the mid-ninety percent range with the accuracy level for actual field examinations being even higher. In all the research involving actual verified field examinations, no error was found greater than three (3.0) percent.

The results of the prior research closely parallels the findings of this study. For example, the mean accuracy level for Virginia law enforcement examiners was found to be 98.3 percent. The error factor only exceeded three percent in one area which was in the category of deceptive in the law enforcement group. This error factor was 3.3 percent. There were 16 errors in the 959 verified law enforcement examinations with the mean error being 1.7 percent.

Virginia State Police examiners had six (6) errors in a total of 636 verified examinations giving this group an accuracy level of 99.0 percent. The level of errors in the truthful determinations was 1.3 percent; in the deceptive category, the level was 00.7 percent.

Local law enforcement examiners had 10 errors in a total of 323 verified cases giving this group an accuracy of 96.9 percent. Errors in the truthful category were 2.9 percent, in the deceptive category they were 3.3 percent of all verified examinations.

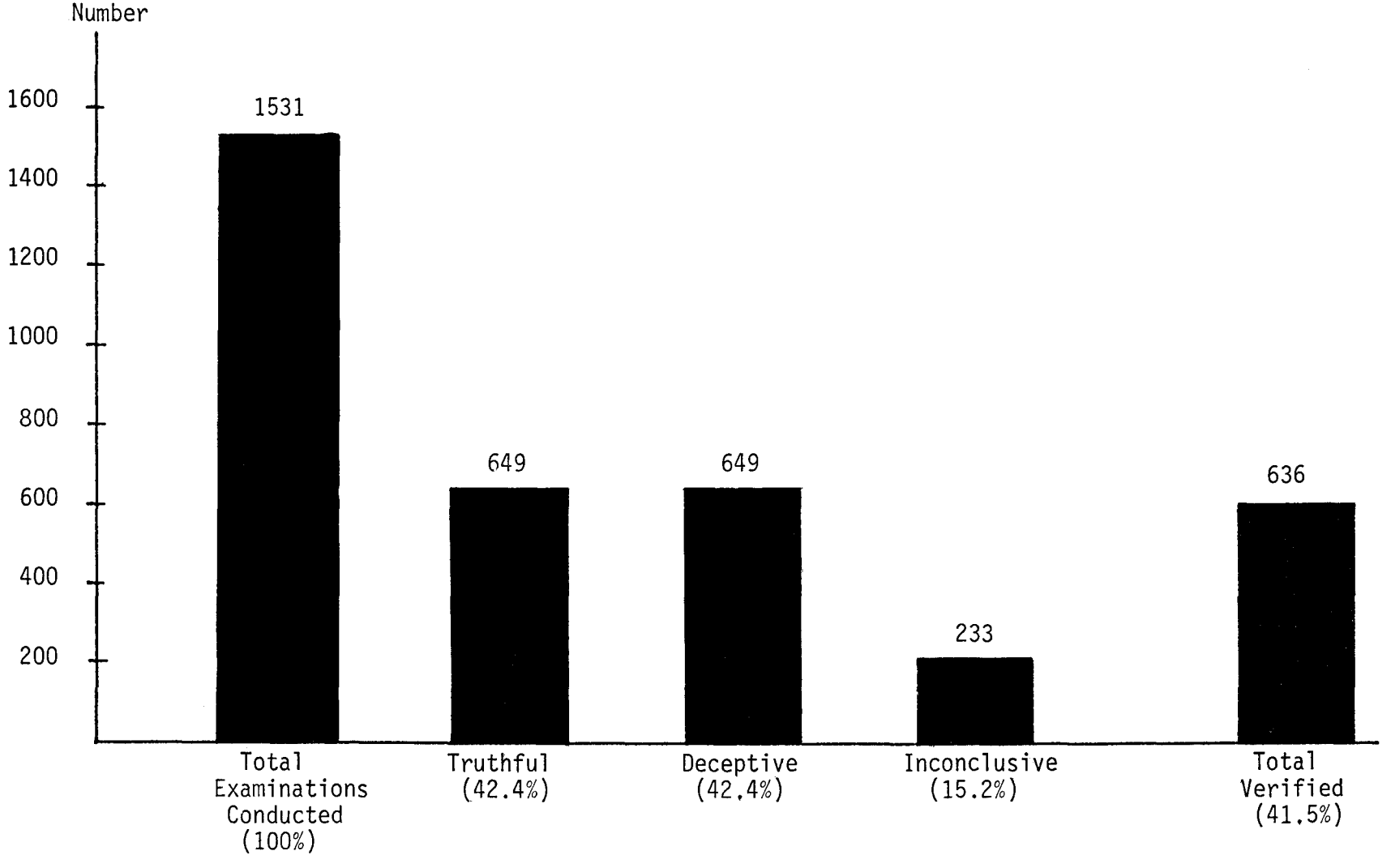
Private examiners had two (2) errors in a total of 98 verified cases giving this group an accuracy level of 98 percent. The two errors made were both in the deceptive category.

No correlation could be made between errors and examiner experience since the errors were randomly dispersed throughout the examiner experience range.

Summary and Conclusions

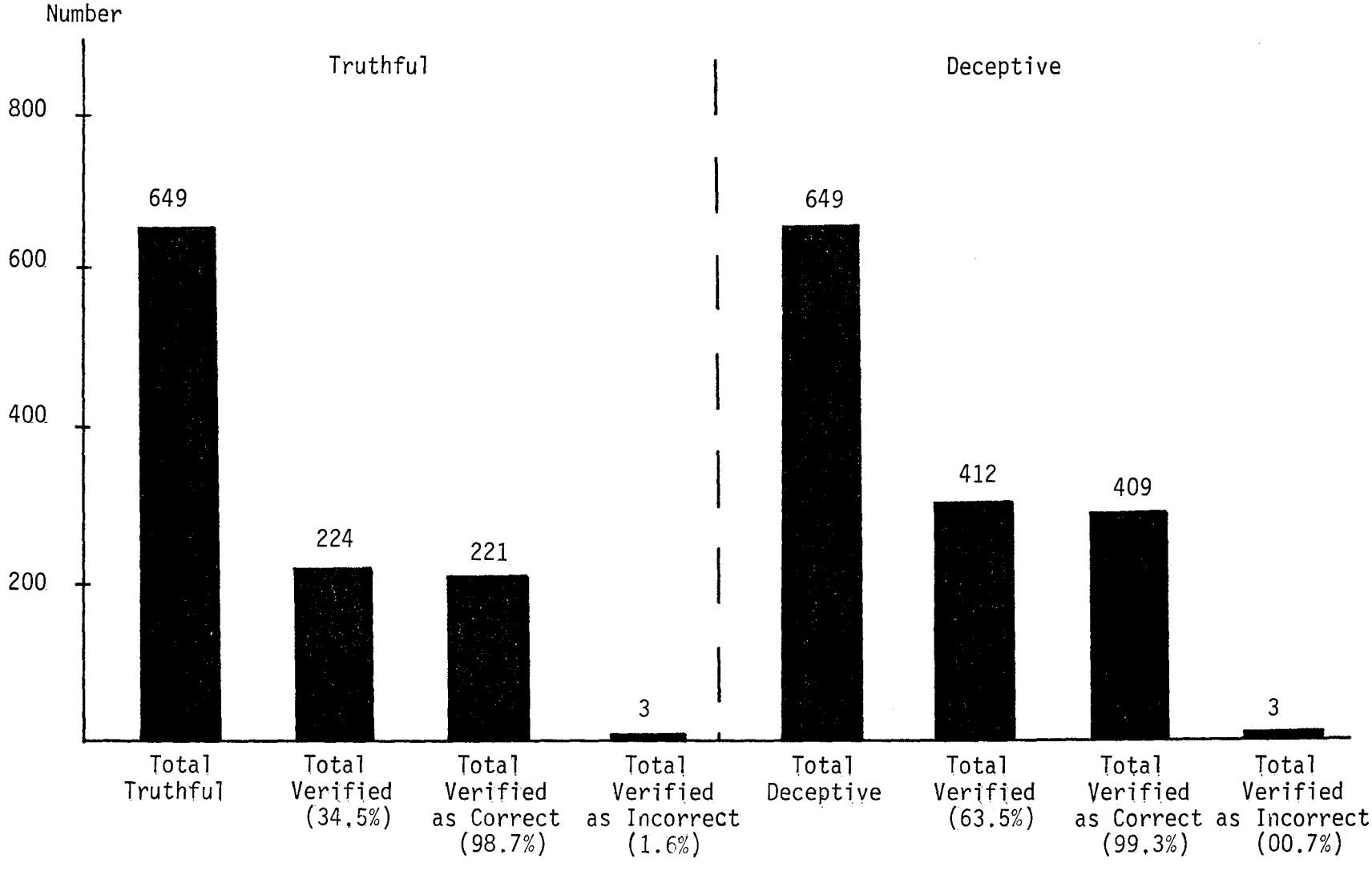
The objective of this general descriptive survey was to gather sufficient information to determine the reliability of Virginia polygraph examiners particularly those employed by law enforcement agencies. The objective in obtaining information gathered from research conducted by previous researchers in the field was to lend support to the findings of the survey of Virginia examiners.

FIGURE 6: CASE DATA OF STATE POLICE



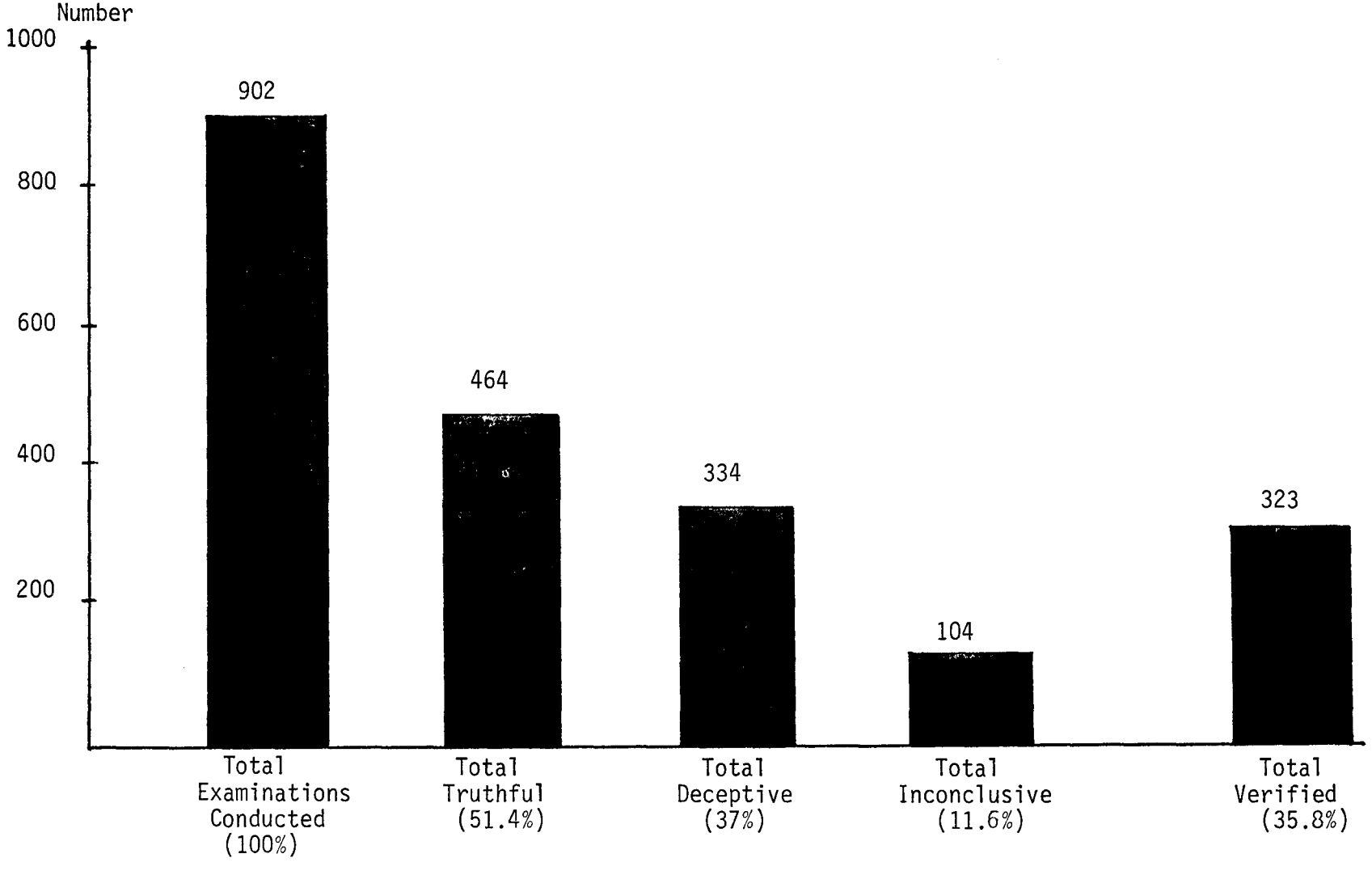
Total number of examinations reported = 1531.

FIGURE 7: VERIFIED CASE DATA OF STATE POLICE



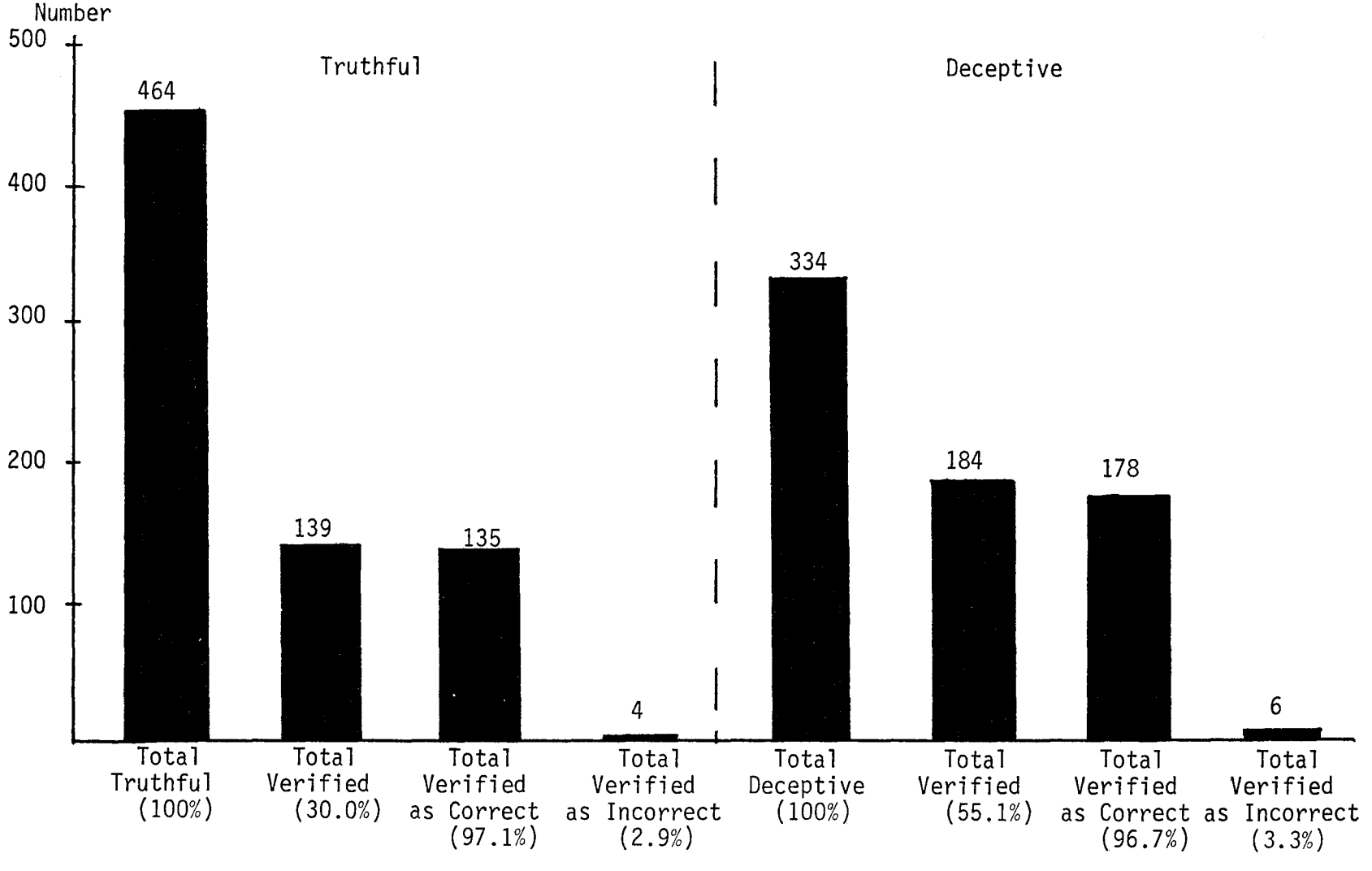
Total number of truthful determinations = 649.
Total number of deceptive determinations = 649.

FIGURE 8: CASE DATA OF LOCAL LAW ENFORCEMENT



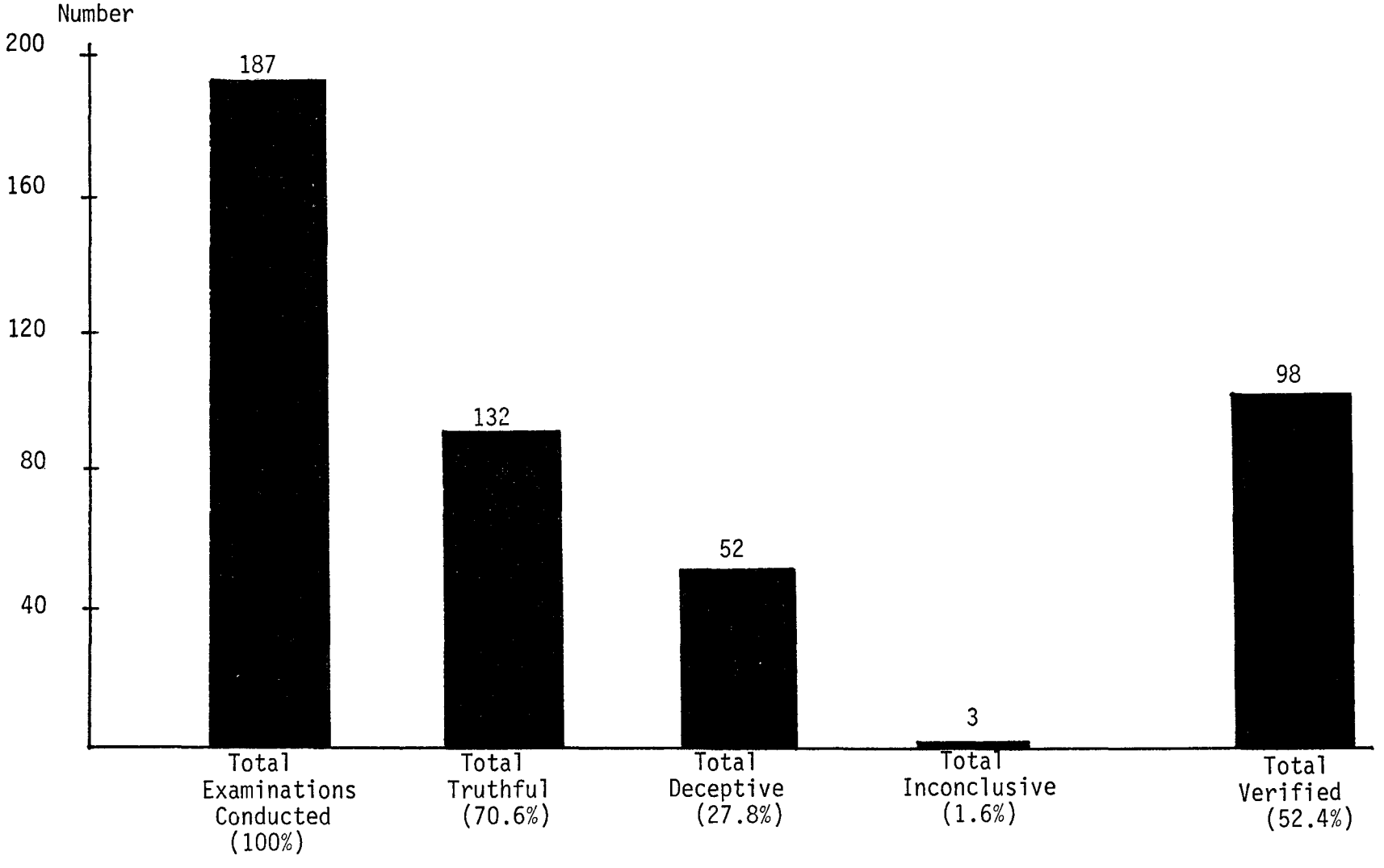
Total number of examinations conducted = 902.

FIGURE 9: VERIFIED CASE DATA OF LOCAL LAW ENFORCEMENT



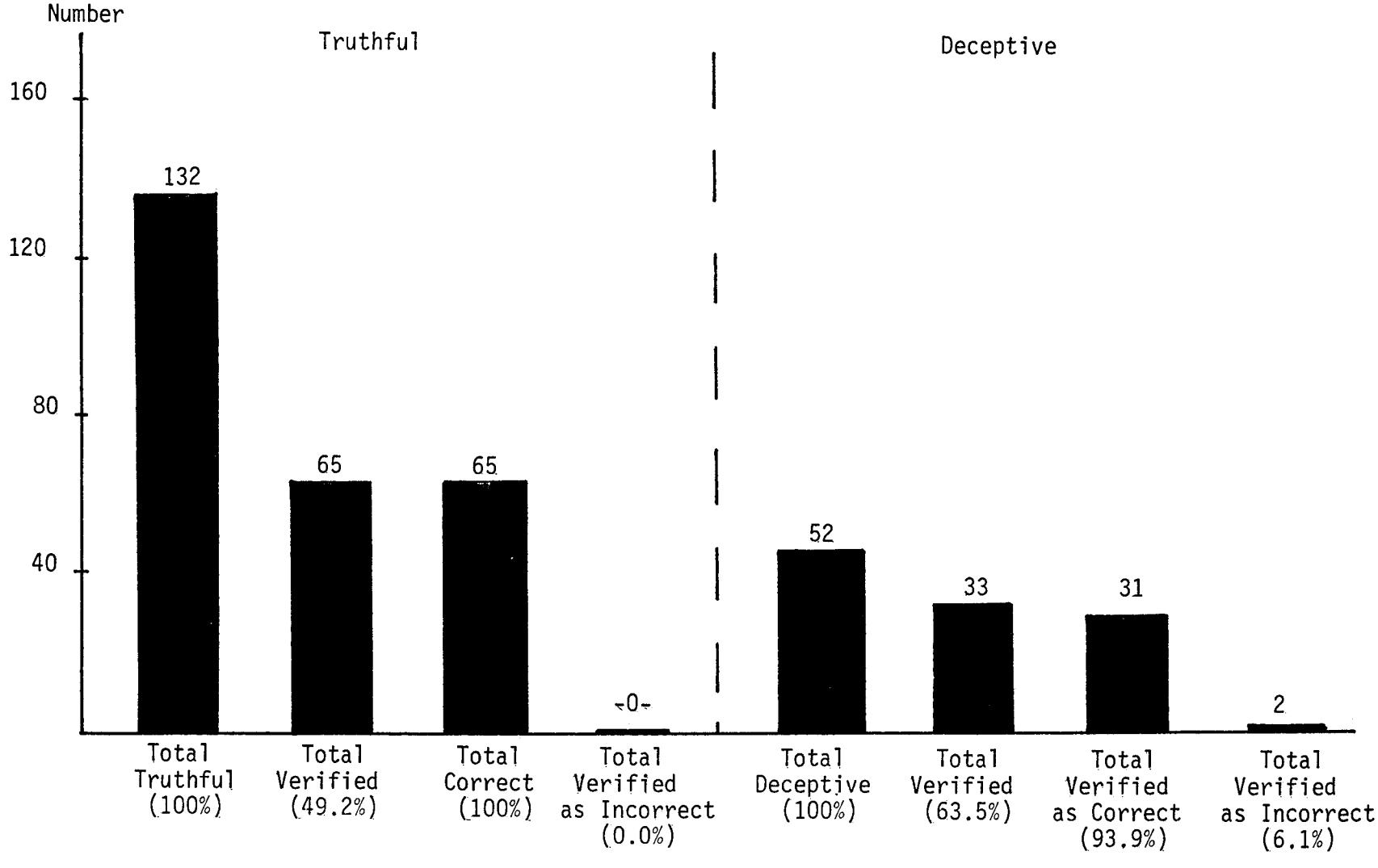
Total number of truthful determinations = 464.
Total number of deceptive determinations = 334.

FIGURE 10: CASE DATA OF PRIVATE AGENCIES



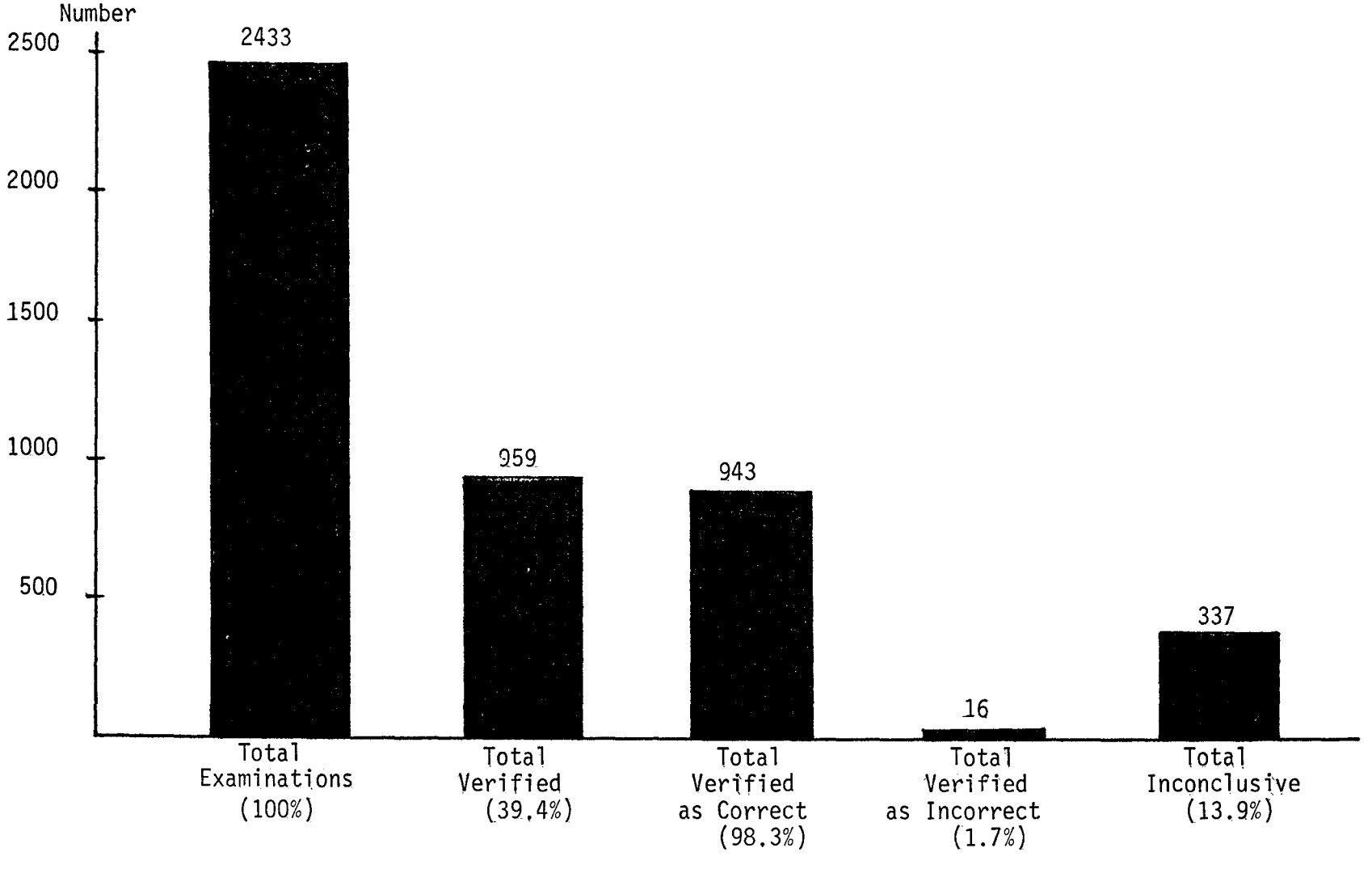
Total number of examinations conducted = 187.

FIGURE 11: VERIFIED CASE DATA OF PRIVATE AGENCIES



Total number of truthful determinations = 132.
Total number of deceptive determinations = 52.

FIGURE 12: TOTAL LAW ENFORCEMENT SUMMARY



Total law enforcement examinations = 2435.

Polygraph 1981, 10(4)

This researcher feels that the overwhelming response, cooperation, and interest received from law enforcement examiners and police managers will tend to improve the overall confidence the courts and legal profession have in this discipline. It may even lead to polygraph results being accepted by courts as evidence in the same fashion as some other forensic disciplines.

Many respondents expressed the need for such a study and many have indicated that as a result of this study, they have initiated programs designed to follow-up on examinations to increase the number of verified cases.

The population represents the majority of law enforcement examiners practicing in Virginia, and it represents small as well as large police agencies which are dispersed throughout the State.

With further research, experimentation, and follow-up studies to support these findings, an excellent polygraph program can be continued in Virginia.

The survey results of Virginia examiners involved in actual criminal field examinations concluded the mean accuracy level for these examiners is 97.7 percent.

It is the researcher's conclusion that sufficient research has been conducted since the 1923 Frye decision to establish the polygraph technique, when properly administered by a qualified examiner, to be valid and reliable. It also is the researcher's conclusion, based upon the findings of this study that Virginia examiners, particularly those employed by law enforcement agencies, are rendering reliable polygraph examinations.

Since most examiners in those states having polygraph licensing laws are required to meet similar qualifications and training standards as required by Virginia, it is concluded that examiners in these states are also rendering reliable polygraph examinations.

It is further concluded that the courts should accept polygraph results as evidence in criminal cases, and those examiners involved in conducting criminal polygraph examinations should be commended for the work they are performing.

Recommendations

Upon completing this study there are several recommendations which should be given consideration:

... Virginia should continue to maintain a licensing law requiring a high level of qualifications and training for examiners.

... Examiners should establish follow-up programs to verify their determinations.

... The courts should accept polygraph results as circumstantial evidence after closely determining examiner qualifications and the technique used.

Footnotes

1. I Kings, 4:16-28.

2. Leonard H. Harrelson, "Polygraph" (unpublished lecture outline, Leonarde Keeler, Inc.), 1.

3. Paul V. Trovillo, "A History of Lie detection", Journal of Criminal Law and Criminology 29 (6)(1939): 848-881; 30 (1)(1939): 104-119.

4. Ibid.

5. C. Lombroso, L'Homme Criminal, Ed. 2, Vol. I, (1895), 336-346, Citing John E. Reid and Fred E. Inbau, Truth and Deception, The Polygraph ("Lie-Detector") Technique (Baltimore, 1966), p. 2.

6. Ibid.

7. Ibid.

8. Ibid., p. 3.

9. David C. Raskin, Gordon H. Barland, John A. Podlesny, Validity and Reliability of Detection of Deception. (Contract 75-NI-99-0001, U.S. Department of Justice, June 1968), 20.

10. Commonwealth of Virginia, "Polygraph Examiners and Examinations in Virginia," License Law Regulations, Department of Commerce, POR. 22-6, (Commonwealth of Virginia, August 1, 1975), 7.

11. Reid and Inbau, p. 169.

12. Reid and Inbau, p. 50.

13. Maurice Floch, "Limitations of the Lie Detector", Journal of Criminal Law and Criminology, 40 (5)(January-February 1950): 652.

14. Raskin, Barland & Podlesny, p. 20.

15. Reid and Inbau, p. 168.

16. Richard O. Arther, "Non-Reactors", The Journal of Polygraph Science, Vol. XII, (2)(1977): 1.

17. Fred E. Inbau, Andre A. Moenssens, Louis R. Vitullo, Scientific Police Investigation (Philadelphia, 1972): 158.

18. American Polygraph Association, "Membership", (June 1980): 11.

19. Section 54-917, 1950 Code of Virginia as Amended.

20. Frank S. Horvath, "The Reliability of Polygraph Examiner Diagnosis of Truth and Deception," The Journal of Criminal Law, Criminology and Police Science, Vol. 62 (1)(1971): 1.

21. Fred L. Hunter and Philip Ash, "The Accuracy and Consistency of Polygraph Examiner's Diagnosis," Journal of Police Science and Administration, Vol. 1 (3)(1973): 370-375.

22. Raskin, Barland, and Podlesny, p. 11.

23. Frye v. United States, 293 Fed. 1013 (D.C. Cir. 1923).

24. Section 54-922, 1950 Code of Virginia as Amended.

25. M. D. Forosch, "The Lie Detector and the Courts," N.Y.U.L. Q. Rev., 117 (1939): 202-231.

26. F. J. Barnett, "How Does a Jury View Polygraph Examination Results?". Polygraph 2 (1973): 275-277.

27. J. Koffler, "The Lie Detector - A Critical Appraisal of the Technique as a Potential Undermining Factor in the Judicial Process," N.Y.L.F., 146 (1957): 3123-3129.

28. Stephen C. Carlson, "The Effect of Lie Detector Evidence on Jury Deliberations: Am Empirical Study." J. Police Science and Admin., 5 (1977): 148-154.

29. Alan Markwart, "The Effect of Polygraph Evidence on Mock Jury Decision Making," J. Police Science and Admin., 5 (1979): 324-332.

30. Andre A. Moenssens, "Polygraph Test Results Meets Standards for Admissibility as Evidence," Legal Admissibility of the Polygraph, Ed. by Norman Ansley, (Springfield, 1975): 14.

31. Ibid., p. 15.

32. Richard Saferstein, Criminalistics: An Introduction to Forensic Science, (Englewood Cliffs, 1977): 14.

33. Ibid., p. 18.

34. Ibid., p. 20.

35. Joseph L. Peterson, Ellen L. Fabricant, and Kenneth S. Field, Crime Laboratory Proficiency Testing Research Program, (Washington, D.C., 1978): 251.

36. Skinner v. Commonwealth, 212 VA 260 (1971).

37. P. V. Trovillo, "Scientific Proof of Credibility", Tennessee Law Review, Vol. 22 (1953): 743-766.

38. F. K. Berrien, "A Note on Laboratory Studies of Deception," Journal of Experimental Psychology, Vol. 24 (1939): 542-546.

39. S. Kugelmass and I. Lieblich, "Effects of Realistic Stress and Procedural Interference in Experimental Lie Detection," Journal of Applied Psychology, Vol. 50 (1966): 211-216.

40. D. Wolfle, "The Lie Detector: Methods for the Detection of Deception", Confidential Report to Emergency Committee, revised ed., (October 8, 1941).

41. L.W. Gustafson and M.R. Orne, "Effects of Heightened Motivation on the Detection of Deception", Journal of Applied Psychology, Vol. 47 (1963): 408-411.

42. P.V. Trovillo, "A History of Lie Detection", Part I, Journal of Criminal Law and Criminology, Vol. 29 (1939): 848-881 and Part II, Vol. 30 (1939): 104-119.

43. C. Landes and L.E. Wiley, "Changes of Blood Pressure and Respiration During Deception", Journal of Comparative Psychology. Vol. 6 (1926): 1-19.

44. W.M. Marston, "Psychological Possibilities in the Deception Tests," Journal of Criminal Law and Criminology, Vol. II (1921): 551-570.

45. H.S. Langfeld, "Psychophysical Symptoms of Deception," Journal of Abnormal and Social Psychology, Vol. 4 (1921): 1-23.

46. H.E. Burtt, "The Inspiration Expiration Ratio During Truth and Falsehood", Journal of Experimental Psychology, Vol. 4 (1921): 1-23.

47. W.C. Summers, "Guilt Distinguished From Complicity", Psychology Bulletin, Vol. 33 (1936): 787.

48. R.D. MacNitt, "In Defense of the Electrodermal Responses and Cardiac Amplitude as Measures of Deception", Journal of Criminal Law and Criminology, Vol. 33 (1942): 266-275.

49. D.T. Lykken, "The GSR in the Detection of Guilt", Journal of Applied Psychology, Vol. 43 (1959): 385-388.

50. D. Van Buskirk and F.L. Marcuse, "The Nature of Errors in Experimental Lie Detection", Journal of Experimental Psychology, Vol. 47 (1954): 187-190.

51. J.F. Kubis, "Studies in Lie Detection: Computer Feasibility Considerations", Fordham University RADC-TR 62-605, (June 1962): 205.

52. Reid and Inbau, pp. 243-248.

53. U.S. Congress, House Committee on Government Operations: "Use of Polygraphs as 'Lie Detectors' by the Federal Government", (89th Congress, 1st Session) House Report No. 198, (22 March 1965).

54. Stanley Abrams, "Polygraph Validity and Reliability: A Review", Journal of Forensic Science, Vol. 18, No. 4 (1973): 313-324.

55. Kugelmass and Lieblich, pp. 211-216.

56. G.H. Barland and D.C. Raskin, "An Experimental Study of Field Techniques in 'Lie Detection'," Polygraph, Vol. 1 (1972): 22-26.

57. Raskin, Barland and Podlesny, p. 11.

58. Stanley Abrams, "Polygraph Examinations With Children", Journal of Police Science and Administration, Vol. 1 (1975): 310-311.

59. J. Widacki and F. Horvath, "An Experimental Investigation of the Relative Validity and Utility of the Polgyraph Technique and Three Other Common Methods of Criminal Identification", Journal of Forensic Sciences, Vol. 23, No. 3 (1978): 596-601.

Bibliography

Abrams, Stanley, "Polygraph Examinations With Children," Journal of Police Science and Administration, Vol. 1 (1975).

Abrams, Stanley. "Polygraph Validity and Reliability: A Review." J. For. Sci. 18 (1973).

Barland, G.H. and D.C. Raskin, "An Experimental Study of Field Techniques in 'Lie Detection,'" Polygraph, Vol. 1 (1972).

Berrien, F.K., "A Note on Laboratory Studies of Deception", Journal of Experimental Psychology, Vol. 4 (1921).

Burtt, H.E., "The Inspiration Expiration Ratio During Truth and Falsehood" Journal of Experimental Psychology, Vol. 4 (1921).

Caputo, Rudolph R., and Arthur S. Aubry, Jr. Criminal Interrogation. Illinois: Charles C. Thomas, 1965.

Carlson, Stephen C., Michael S. Passano, and Jeffery A. Jannuzzo. "The Effect of Lie Detector Evidence on Jury Deliberations: An Empirical Study." J. Police Sci. & Adm. 5 (1977)

Forosch, M.D. "The Lie Detector and the Courts." N.Y.U.Q. Rev. (1939).

Gustafson, L.W. and M.R. Orne. "Effects of Heightened Motivation on the Detection of Deception", Journal of Applied Psychology, Vol. 47 (1963).

Koffler, J. "The Lie Detector - A Critical Appraisal to the Technique as a Potential Undermining Factor in the Judicial Process." N.Y.L.F. (1957).

Kubis, J.F. "Studies in Lie Detection Computer Feasibility Considerations", Fordham University RADC-TR 62-205, (June 1962).

Kugelmass, S. and I. Lieblich, "Effects of Realistic Stress and Procedural Interference in Experimental Lie Detection," Journal of Applied Psychology, Vol. 50 (1966).

Landis, C. and L.E. Wiley, "Changes of Blood Pressure and Respiration During Deception", Journal of Comparative Psychology, Vol. 6 (1926).

Langfeld, H.S., "Psychophysical Symptoms of Deception", Journal of Abnormal & Social Psychology, Vol. 4 (1921).

Lykken, David T. "The Validity of the Guilty Knowledge Technique: The Effects of Faking." Journal of Applied Psychology (August 1960).

Lykken, D.T., "The GSR in the Detection of Guilt," Journal of Applied Psychology, Vol. 43 (1959).

MacNitt, R.D. "In Defense of the Electrodermal Responses and Cardiac Amplitude as Measures of Deception," Journal of Criminal Law and Criminology, Vol. 33 (1942).

Markwart, Alan and Brian E. Lynch. "The Effect of Polygraph Evidence on Mock Jury Decision-Making," J. Police Science and Admin. 7 (1979).

Marston, W.M., "Psychological Possibilities in the Deception Tests," Journal of Criminal Law and Criminology, Vol. II (1921).

McCormick, C.T. Handbook of the Law of Evidence. St. Paul: West Publishing Co., 1954.

McInerney, Charles A. "A Review of 'Legal Admissibility of the Polygraph,'" Journal of Forensic Sciences (July 1976).

Moenssens, Andre A., Ray Edward Moses, and Fred E. Inbau. Scientific Evidence in Criminal Cases. New York: The Foundation Press, Inc., 1973.

Myatt, M.W. "Polygraph Examinations: Constants and Variables," In V.A. Leonard (Ed.) Academy Lectures on Lie Detection, Volume 2. Illinois: Charles C. Thomas, 1958.

O'Hara, Charles E. Fundamentals of Criminal Investigation. Illinois: Charles C. Thomas, 1967.

Peterson, Joseph L., Ellen L. Fabricant, and Kenneth S. Field. Crime Laboratory Proficiency Testing Research Program. Washington, D.C.: U.S. Government Printing Office, 1978.

Raskin, David C., Gordon H. Barland and John A. Podlesny. "Validity and Reliability of Detection of Deception," Polygraph 6 (1977).

Reid, John E. and Fred E. Inbau. Truth and Deception: The Polygraph ("Lie-Detector") Technique. Baltimore: Williams & Wilkins Co., 1966.

Rice, Berkeley. "The New Truth Machine," Psychology Today (June 1978).

Ruch, Floyd L. Psychology and Life. Illinois: Scott, Foresman and Co., 1967.

Saferstein, Richard. Criminalistics: An Introduction to Forensic Science. New Jersey: Prentice-Hall, Inc., 1977.

Steele, Robert and James Torrie. Principles and Procedures of Statistics. New York: McGraw-Hill Book Co., Inc., 1960.

Summer, W.G. "Guilt Distinguished from Complicity," Psychology Bulletin, Vol. 33 (1936).

Thirteenth Report by the Committee on Government Operations. "The Use of Polygraphs and Similar Devices by Federal Agencies." (1976).

Trovillo, P.V. "Scientific Proof of Credibility," Tennessee Law Review, Vol. 22 (1953).

Trovillo, P.V. "A History of Lie Detection," J. Crim. L. & Criminol. 29: (6)(1939); 30 (1)(1939).

U.S. Congress, House Committee on Government Operations, "Use of Polygraphs as 'Lie Detectors' by the Federal Government," (89th Congress, 1st. Session) House Report No. 198, (22 March 1965).

Van Buskirk, D. and Marcuse, F.L., "The Nature of Errors in Experimental Lie Detection," Journal of Experimental Psychology, Vol. 47 (1954).

Widacki, J. and F. Horvath, "An Experimental Investigation of the Relative Validity and Utility of the Polygraph Technique and Three Other Common Methods of Criminal Identification," Journal of Forensic Sciences, Vol. 23, No. 3 (1978).

Wolfle, D. "The Lie Detector: Methods for the Detection of Deception," Confidential Report to Emergency Committee, revised ed. (8 October 1941).

Appendix A

COMMONWEALTH of VIRGINIA

Department of General Services
Division of Consolidated Laboratory Services
Bureau of Forensic Science
P. O. Box 999
Richmond, Virginia 23208

June 1, 1981

Dear Fellow Polygraphist:

Attached is a questionnaire to assist me with a study to determine the reliability of polygraph examinations conducted by licensed Virginia polygraph examiners. The purpose of the study is to collect and compile data which could be presented as evidence in court; however, you can be assured that the individual information you provide will be kept strictly confidential.

As you know, normally, the results of our examinations are not admissable in court primarily because of the 1923 case of United States v. Frye. in the 1971 case of Skinner v. Commonwealth, the Virginia Supreme Court rejected the admission of polygraph examination results based upon the Frye decision and the 1958 Virginia case of Lee v. Commonwealth; however, in rendering its decision in this case, the court inferred it would be agreeable to hearing a future case in which scientific evidence would be presented concerning polygraph reliability.

Completing the questionnaire, I realize, will impact your busy schedule; however, I sincerely believe the only way our discipline/profession will ever be recognized by the courts is to continuously provide them with as much scientific data as possible.

I sincerely solicit your participation in the study by you completing the questionnaire as thoroughly and as accurately as possible and returning it to me by July 10, 1981. Should you need additional information, please call me at (804)786-2281.

Your assistance will be sincerely appreciated.

Professionally yours,

Robert H. Edwards
Assistant Director

RHE/bh

Attachment:

QUESTIONNAIRE

Appendix B

1. Examiner experience: No. Years_____ No. Months_____

2. Virginia Polygraph License: Full_____ Intern_____

3. Primary employment: A. Law Enforcement: State Police_____ Local Police_____

   B. Private: Commercial/Consultant_____ Industrial/Corporation

   C. Other (explain)_____

4. State total number of SPECIFIC[1] polygraph examinations you conducted from January 1, thru December 31, 1980 for the agency shown in item 3. Inactive examiners should report data from the last 12 months of active testing and list date of reporting peri

   Reporting period_____

   A. Total specific examinations for the 12 month period:_____

   B. Number/Category of determinations:

      1. Truthful_____ 2. Deceptive_____ 3. Inconclusive_____

   C. Number/Category of VERIFIED[2] determinations:

      1. Truthful_____ 2. Deceptive_____

   D. Number/Category of errors (false-negative/false-positive):_____

      1. Truthful later verified deceptive (false-negative)_____

      2. Deceptive later verified truthful (false-positive)_____

5. Qualified by a Virginia court as a polygraph expert:

   Yes_____ No_____

6. Number of times polygraph testimony given in court during 12 month reporting period:_____.

7. Definitions:

   [1]Specific examination: One in which a single issue (specific issue) was to be resolved, i.e. theft of a bank deposit. For the purpose of this study, report cases involving criminal offenses only.

   [2]Verified examination: One in which the truthfulness or deceptiveness of the subject was established through means independent of the polygraph examiner's opinion, such as, confession, conviction, etc.

8. Examiner comments to clarify any of the above items:

Appendix C

LEVEL OF SIGNIFICANCE

The Stratified Sampling Formula from the text, Principles and Procedures of Statistics by Robert Steele and James Torrie, McGraw-Hill Book Company, 1960, was used to determine a confidence interval about the estimated population proportion of incorrect determinates by polygraph examiners (IP).

The sample of question responses is divided into three stratified groups:

1. State Police $(N1)$
2. Local law enforcement $(N2)$
3. Private firms $(N3)$

The proportion (P_k) of sample responding from each group is:

$$P_1 = \frac{n_1}{N_1} = \frac{24}{24} = 1.000$$

$$P_2 = \frac{n_2}{N_2} = \frac{38}{56} = 0.679$$

$$P_3 = \frac{n_3}{N_3} = \frac{9}{67} = 0.134$$

{where n_k is number responding per group and $_k$ = 1, 2, 3 stratified groups}

The proportion (IP) of incorrect determinates per total verified within each stratified sample group:

$$IP_1 = \frac{6 \text{ incorrect}}{636 \text{ verified}} = .0094$$

$$IP_2 = \frac{10 \text{ incorrect}}{323 \text{ verified}} = .0310$$

$$IP_3 = \frac{2 \text{ incorrect}}{98 \text{ verified}} = .0204$$

Therefore:

$$IP \text{ (est. pop. proportion)} = \sum_k \left(\frac{n_k IP_k}{N}\right) = .0104$$

where $k = 1, 2, 3$ stratified groups and

s^2 (est. of pop. variance) =

$$\sum_k W_k^2 \left(\frac{P_k Q_k}{n_k} \cdot \frac{N_k - n_k}{N_k - 1}\right) = .000154,$$

where $Q_k = 1 - P_k$ and $W_k = \frac{n_k \text{ (group)}}{N_k \text{ (total)}}$

$$s = \sqrt{s^2} = .0124$$

then the 95% Confidence Interval:

$$IP \pm z\ .05\ (s) = .0104 \pm 1.96 \times .0124 = (-.0138, .0347)$$
$$= (0, .0347) \text{ since a negative}$$

proportion is not legitimate for this situation.

By using the above data, the author is 95 percent confident that the estimated population proportion of incorrect determinations lies between the proportion of {0 per 100 verified cases and {1.24 per 100 verified cases

or

{0 per 1000 verified cases and {12.4 per 1000 verified cases

POLYGRAPHY: MODERN RULES AND VIDEOTAPE TECHNOLOGY TO PROMOTE THE "SEARCH FOR TRUTH" IN CRIMINAL TRIALS

By

Jenneth L. Pemberton*

Introduction

Over the past decade the Supreme Court, under the rubric that criminal trials are a "search for truth", has expressed its preference in criminal cases for procedures which permit the parties to bring all relevant evidence before the jury and allow the jury to determine its weight. Thus the Court has condemned state procedures which barred defendants from offering reliable material evidence,[1] has favored expanded discovery rules[2] and has recommended considerably relaxed rules of evidence.[3] The Court's notion of a search for truth, however enigmatic in the context of the standard of "proof beyond a reasonable doubt," should be endorsed as an expression of confidence in the jury trial process. However, this writer is less certain that the Court has always coupled its zeal for procedure which seem to facilitate rational factual determination with a consideration of all available procedures and a careful balancing of advantages between the parties in a criminal trial so as to protect considerations of fundamental fairness.[4]

The thesis of this paper is that the federal courts, almost universally, are refusing to recognize one relevant element in the search for truth, namely, the evidentiary value of a qualified expert's testimony based on modern polygraph procedure. Such testimony, it will show, relates peculiarly to truth--and the credibility of the defendant will almost necessarily be at issue--because the expert's conclusion is whether or not the person tested was responding truthfully to questions about the particular crime at issue. It will urge that courts should not eliminate the outmoded precedent of per se exclusion and should instead follow the modern Federal Rules of Evidence in exercising discretion to admit qualified polygraph opinion evidence, guided by the rules and principles espoused by the Supreme Court, coupled with considerations of fairness established through appropriate procedural protections.[5] Accompanying arguments are that the standard for scrutiny of scientific evidence has been misapplied in the case of polygraphy, because it is only quasi-scientific,[6] or that the supposed standard is itself misinterpreted as one demanding infallibility rather than relevance.[7]

Alternatively, even if one views the modern polygraph as still scientifically unproven and hence too unreliable to be admissible,[8] one must acknowledge that a few federal courts and many state courts are admitting polygraph evidence, albeit in different degrees and for different reasons.

Reprinted with the permission of the National Journal of Criminal Defense, Volume 7 #1, Spring 1981, National College for Criminal Defense, Bates College of Law, University of Houston, Texas 77004.

*The American University Washington College of Law (J.D., 1982); Tufts University (M.A., 1970); University of Cape Town, South Africa (B.A., 1965; B.A. Hons., 1966).

Generally, however, it has been conditioned upon a prior stipulation on admissibility by the parties. The result is justice inequitably administered according to precedents established in different circuits or states, or perhaps, even the whim of the various courts under the guise of an exercise of discretion.[9] Thus at a minimum it would be beneficial to establish coherent federal standards of admissibility which will encourage rational findings on reliability and minimize waste of judicial resources or prejudice to either the defendant or the government.

While the end point of this paper will be a proposal for the use of polygraph procedure in federal court, it will also consider basic standards for polygraph procedure and the use of disclosure rules that will minimize its abuse in investigative procedures and maximize the potential for admissibility of the evidence at the later trial stage, should the adversary process be pursued. First, however, it will examine broadly the inconsistent state of the law and the principal areas of impact. Next it will outline the basic polygraph technique, suggesting inherent sources of inaccuracy and error which need to be scrutinized in a hearing or offer of proof on admissibility. It will also generally indicate the basis for acknowledging theoretical sufficiency. Finally it will suggest the rules and procedures that should be followed in producing the evidence and in pretrial discovery by the parties as well as the constitutional, practical and policy reasons for these, and for the conditions or limitations to be placed on admissibility.

I. The State of the Law and Its Impact on the Criminal Justice System

To date the Supreme Court has declined to consider a single case on the issue of the admissibility of polygraph evidence although some Justices have urged review, aware that the fractured state of the law has meant that defendants' rights are dependent upon the circuit in which they are tried.[10] A survey of federal appellate and district court decisions as well as state court opinions shows that, on the one hand, where polygraph evidence has been the subject of an evidentiary hearing, it has been rejected (1)under the per se historical rule of exclusion established in 1923 by Frye v. United States[11] on the ground that it is incompetent because it is invalid and unreliable according to the standards for scientific evidence;[12] and (2)under the modern standard for relevant evidence stated by the Federal Rules of Evidence because the reviewing court concludes that the trial court has not abused its discretion in rejecting such evidence.[13] The principal reasons given for finding the evidence prejudicial are the courts' fear of disrupting the traditional judicial system because indiscriminate use of the evidence will give rise to confusion and unwarranted consumption of time through the injection of collateral issues,[14] and, perhaps most important, the courts' fear that the evidence will unduly influence the jury by its aura of scientific accuracy.[15]

On the other hand, some courts, particularly the state courts, have been able to accept the evidence as relevant and their fears have been lessened, if not dispelled, once the parties have agreed prior to the test to stipulate to the admissibility of the results, whether favorable or unfavorable to the defendant.[16] One rationale is that stipulations only occur when the evidence is meager or doubtful and, because there is considerable probability of an incorrect and unjust decision, there is good reason to use the lie detector which would at least be more accurate than

the guess or hunch of the judge or jury. Other courts have refused to enforce such stipulations, sometimes even when prior decisions in the jurisdiction have done so, because they have recognized the requirement as a wholly artificial one that does not obviate the underlying lack of scientific reliability or assessment of weight of the polygraph report, nor does it lessen any prejudicial effect the evidence might have.[17]

Still another line of cases has demanded that the court appoint an expert where there is a stipulation.[18] This is an extension of another reationale for the stipulation requirement which is that the agreement of the parties on an expert will better assure he is properly qualified. It is also a clue that a distrust of the expertise of polygraph examiners underlies many courts' rejection of polygraph evidence. One reason perhaps is that while a number of the operators who testified as experts at the leading federal trials contesting admissibility in the early 1970's had training in medicine and psychology, most polygraph operators today, including some of the highly recognized experts, appear to have a background of law enforcement and investigation.[19] and are trained as technicians with minimal attention given to the psycho-physiological underpinnings.

Accompanying the above suspicion is the feeling that the courts are unwilling to make a decision that the scientific community should make, or that the courts should defer to the legislature to set the standards. However, the legislatures have either failed to provide adequate or uniform licensing statutes[20] or have limited their interest to those areas of polygraph use against which lobbying has been most active, such as the use of pre-employment or employee polygraph tests which have been strenuously challenged by organized labor.[21]

That this intellectually unsatisfactory solution to the rule of inadmissibility has developed is perhaps an indication of a growing recognition that there is a need for the evidence and that it is reasonably reliable if properly conducted by a qualified expert. This is supported by the fact that a few state courts have recently dispensed with the stipulation requirement.[22] In the face of federal legislative hesitancy to act, if not continued outright hostility,[23] the courts must rise to the task and set the standards. Contrary to the views of some,[24] the judicial system need this aid to protect both the innocent, particularly in what has been recognized as a perjury plagued system,[25] and the interests of society.

The need to protect the interests of society arises out of the increasing use of the polygraph by law enforcement officials in determining whether to prosecute criminal cases, particularly in conjunction with the firmly entrenched practice of plea bargaining.[26] Where the credibility of the defendant's story is likely to be a major issue at trial, the district attorney may enter into either a formal or informal agreement that the prosecution will dismiss the case if the defendant passes the test, but if he fails the test, he will plead guilty (generally to a lesser charge) or not object to the admission of the test at trial if it is admissible on stipulation in that jurisdiction. Because such pretrial agreements frequently end in either pleas or dismissals of indictments, it is almost impossible to know how frequently they take place. That the impact on law enforcement is likely to be signficant because of the time saved has not gone unnoticed by some courts.[27]

There is evidence that some law enforcement agencies regularly use the tests and some uniformly refuse to file complaints or information where no deception is shown in polygraph examinations.[28]

Where there is an agreement not to prosecute and the defendant passes the test, the polygraph completely replaces the judge and jury as the arbiter of the defendant's guilt or innocence. The test results are accepted without benefit of court scrutiny, and neither the expertise of the examiner nor the manner in which he conducted the particular test is subject to cross examination.[29] Judicial enforcement of a stipulation to require a guilty plea on unfavorable polygraph test results means, in essence, that the courts themselves have been willing to dispense with a trial of guilt on the basis of polygraph results alone. While it is not doubted that the prosecutor should have broad discretion in determining whether to prosecute[30] or plea bargain,[31] it is obviously in the interests of society that the tests be reliable as possible. Thus there is a need for the courts to set uniform standards for polygraph examinations which will have an impact on police agency practices.[32]

If admissibility is conditioned upon a prior stipulation, the defendant is placed in the disadvantaged position of being forced to gamble over the results of the test or to forego the opportunity to gain admission of what might be exculpatory evidence.[33] If, however, the prosecution refuses to enter into a stipulation, a situation which may occur when the prosecution had some incriminating evidence which is recognized by the court, albeit inherently unreliable identifications or perhaps prior convictions, and there are no apparent defenses or an alibi, the defendant has no opportunity to raise even a reasonable doubt of guilt in the fact of otherwise overwhelming evidence of guilt.[34]

Finally, law enforcement agencies use the polygraph not only as a tool for investigation, but concededly as a tool of interrogation, and one that appears extraordinarily successful in obtaining confessions.[35] Instruction manuals teach the operators that, absent specific limitations on their questioning, they should attempt to elicit a confession.[36] Although a polygraph operator may be barred from testifying to the results of a test, he is free to testify as a witness about a confession or incriminating statements made to him during its course. The courts have consistently held that the use of a polygraph in the process of interrogation is not per se coercive if the subject consented to the test.[37] This is true even where the examiner falsely advises the subject that the polygraph is infallible or where psychological tactics are used, such as falsely informing the subject that he is exhibiting gross deceptive tendencies, or where evidence shows physical and emotional exhaustion at the time the test was taken.[38]

An unresolved question is the constitutionality of any confessions obtained during or subsequent to a polygraph examination from a subject who volunteered to take the test and is not given Miranda warnings because apparently not in custody.[39] Another is whether the right to counsel's presence should attach and if so, whether only to prior consultation, or to presence during the test. If a confession is secured during a polygraph test preceded by Miranda warnings, and after which the subject has been told that the results of the test show deception, if has generally been held that the test procedure and what the examiner told the defendant during the polygraph test is admissible as one of the circumstances

relevant to the voluntariness of the confession.[40] This conflicts with the general rule barring polygraph testimony, although it does not necessarily make the actual results of the test admissible. The above demonstrates the need for clear standards for a valid waiver and procedural rules as to Miranda warnings and the right to counsel. Another issue is who may be the first party to present evidence at trial: Whether the prosecutor may as part of the burden of proof of voluntariness, or whether this must be conditioned on a prior challenge to voluntariness by the defendant.[41]

A related issue is the admissibility of statements indicating that the defendant had taken a polygraph test, or his willingness or unwillingness to do so. If polgyraph evidence is indeed testimonial, the state should not be able to extract a penalty from a defendant for exercising his Fifth Amendment right in declining a polygraph test.[42] However, the standard of some courts in reviewing whether or not it was error for the prosecution to mention that a defendant had taken a test in cases where the jury could conclude that the test results were unfavorable to him, has been whether it was so prejudicial as to warrant reversal.[43] Other courts have held that such apparently prejudicial error could be cured by an adequate jury instruction,[44] of that counsel had waived the right to such an instruction by failure to object.[45] These results place counsel in the dilemma of either objecting and drawing attention to the prejudicial evidence or facing the possibility that the failure to object may serve as a waiver for purposes of appeal.

The only exception to admissibility other than by stipulation, or as evidence of the voluntariness of a confession, has occurred when it has been viewed as a question of prosecutorial duty under the dictates of due process. The generally cited decision is United States v. Hart,[46] which relied on Brady v. Maryland.[47] The Supreme Court in Brady approved a new trial on the question of punishment after the prosecution had suppressed evidence favorable to the defendant. In Hart, the principal government witness, a narcotics dealer, had blurted out during cross-examination that he had taken a lie detector test. Defendants moved for admission of the results which indicated that he had been lying. The court ordered the results to be disclosed to the jury, without holding an evidentiary hearing, under an estoppel-like theory that the government had conceded the reliability of the test by using it to evaluate its witness, and that it should thus have the burden to prove that the test was of no significance.[48] The court emphasized, however, that its order did not otherwise change the rule against admissibility by a party, and rejected the defendants' requests for the introduction of their own polygraph tests.[49]

The courts' concerns that juries will be lured by the scientific basis of polygraphy into allocating disproportionate weight to the results is hard to measure. Where the jury impact has been analyzed it would appear that such concerns are greatly exaggerated.[50] They stem from a misunderstanding of the nature of the polygraph process which has been perpetuated by the application of the outmoded Frye precedent to it as scientific evidence rather than expert diagnostic opinion. Thus, courts have elaborated on the distinction between polygraph testimony as bearing on the sole issue reserved for the jury, namely guilt or innocence, in contrast to other scientific testimony which merely establishes one fact or circumstantial evidence about the defendant.[51]

However, the danger that juries will give evidence undue weight permeates virtually all use of expert testimony. The problem is thus not unique to polygraph evidence but inherent in the jury system. Courts have long given to juries the task of evaluating expert psychiatric testimony and, more recently, that of psychologists, which goes equally to a core issue in that it concerns the accused's mental capacity to commit the crime. The task is to find an effective way of introducing the expert evidence. As with all expert testimony, an essential safeguard is careful cross-examination to expose deficiencies in the diagnosis and to demystify the technique, accompanied by careful jury instructions.[52]

It is useful to consider by analogy what was required by a court in initially admitting the opinions of experts in the essentially new field of psychology,[53] over objection from the medical community that they were not qualified to express opinions on medical diagnosis[54] and that there were insufficient standards whereby courts could gauge their competence. The court found that its decision to admit expert testimony in one field need not be ratified by other allied disciplines, nor was it essential that all experts within a discipline accord in their opinions.[55] As for qualification, not everyone with the claim to the title of psychologist would be eligible, but rather the critical factor is the actual experience of the testifying witness and whether his testimony will aid the jury, absent contervailing considerations.[56] Although here were no statutory criteria for licensing psychologists in the jurisdiction (the District of Columbia), the court looked to the American Psychological Association to provide lists of approved graduate training programs, which could be used along with experience to gauge competence, as well as other indications such as certification by the American Board of Examiners in Professional Psychology.[57]

These criteria will be discussed infra in considering the qualifications for polygraph experts. Certainly, however, the polygraph profession is beyond the objection that there are too few qualified experts to provide a residue upon which courts can draw for expert guidance.[58]

II. The Polygraph Technique

The issues involved in admitting polygraph evidence into our courts will be clarified by at least a cursory survey of the psychophysiological theory of its functioning and the examination procedures used.

The fundamental premise underlying the theory of polygraphy is that conscious lying or less than full disclosure of the truth causes emotional conflicts or stress because of fear of detection of guilt. These in turn create involuntary physiological responses in the subject which are measurable by the polygraph. The modern polygraph machine, a multi-penned instrument, measures changes in the following physiological functions: (1) blood pressure at the tracheal artery with a sphygmamanometer, (2) respiration with a length-sensitive cuff reporting circumference of the abdomen above the diaphragm, (3) skin resistance to electrical current with an ammeter and a constant voltage source attached to the fingertips, and (4) gross muscular movements with a roller-bearing stand under the subject's seat.[59] The accuracy of the machine's measurements themselves are not questioned. Although the same basic physiological measurements have been used since the mid-1930's, the precision of the measurements has been increased through advanced instrumentation.[60] To the extent that

the polygraph examiner relies on this objective data, the technique can be considered scientific. However, while an adequate instrument is essential for proper testing, the role of the examiner in interviewing the subject, designing test questions and evaluating and interpreting the polygram is generally regarded as much more critical to an accurate diagnosis than is the mechanical function of the polygraph itself.[61] Since the human judgment of the examiner is intrinsic to the method, the proper standard for admissibility should be that for expert testimony, rather than the absolute standards of scientific evidence, because the polygram itself is meaningless absent the expert's interpretation.

Under the modern Federal Rules of Evidence, an expert's testimony, like all other evidence, must be relevant and its probative value must be weighed against its potential prejudicial effect, a decision which rests within the discretion of the trial court.[62] The evidence is relevant to the extent that it tends to make the existence of a fact more or less probable than it would be without the evidence.[63] In the rule on expert testimony, the expression of the standard of relevancy is even a little broader, in that the expert must have some specialized knowledge that will assist the trier of fact to determine or understand the fact in issue.[64] In comparison with the Frye standard of "general acceptance", it is true that the modern view requires "that expert testimony be evaluated on the basis of its acceptability to those of acknowledged expertise in the relevant area,"[66] This standard is clearly not one demanding conclusions that are infallible or not subject to reasonable dispute.[67]

The relevance of expert testimony on polygraphy turns on both the validity of the theory of the relationship between deception and physiological responses and the reliability of examiners in drawing the same conclusion from tests that measure changes in physiological responses. Critics contend that while many studies have been conducted which have been able to demonstrate with at least a fair degree of consistency the reliability factor of polygraphy,[68] they have not established the validity aspect because of the absence of what one critic terms a demonstrable, unique physiological correlative to deception.[69] Put another way, psychologists and psychophysiologists tend to agree that no theory of polygraphy has yet revealed it as a synthesis of theoretically acceptable components.[70] Explanations of the underlying premise tend to be in the form of a series of events, such as that "an individual's conscious attempt to deceive engenders various involuntary physiological changes due to an acute reaction in the synpathetic parts of the autonomic nervous system."[71] What is challenged is "the assumption of a regular relationship between lying and emotional states, and the assumption of a regular and measurable relationship between emotional change and autonomic activity."[72]

This paper will not dwell on the theoretical debate. The literature demonstrates that there has been a considerable amount of research, particularly in the relevant field of psychophysiology, and statistical studies provide sufficient evidence to warrant a finding of relevance in general because they show a far greater probability than mere chance. And by analogy, courts accept other kinds of expert testimony which is inherently unverifiable, such as opinions on a state of mind, on the basis of confidence in the experience of the expert and the usefulness of the evidence.[73] Courts should not admit techniques that are unfair or illegitimate, but legitimacy does not require the theoretical precision of the

physical sciences, and in fact, if the technique were accorded general scientific acceptance, there would be the danger that the courts would too readily accept the test results without sufficient inquiry into the basis of the particular procedure in question. The more important inquiry for present purposes is into the methods practiced by polygraph examiners generally. What follows is a summary of typical examination procedures as described in the most authoritative text on the subject by John Reid and Fred Inbau.[74] The summary also draws, however, on accounts provided by other practicing polygraph examiners which demonstrate that the procedures are substantially similar with only minor deviations, for instance, in the sequence of the tests.[75]

The purpose of the test is for the operator to come to the conclusion that the subject either is or is not lying when denying committing the crime of which he is accused. Test procedure itself consists of four basic stages: (1) data collection, (2) a pre-test interview, (3) the testing, and (4) the post-test interview. Each will be described briefly to outline the dangers of error and prejudice.

(1) The examiner accumulates pertinent information on the individual and the facts of the case. These should include medical data, because certain medical conditions may inhibit an accurate test, or preclude testing entirely. A concern in the case of unstipulated tests is that defense counsel will fail to provide all the relevant facts or that even something as important as a prior confession may be omitted. On the theory that the subject's concern over detection increases his physiological responsiveness, the examiner must avoid being placed in the "friendly polygrapher" syndrome by ensuring that the subject is properly persuaded on the importance of the test.

(2) Even before the pre-test interview, the subject is invited to review materials attesting to the potency of lie detection while his responses are carefully observed. In the interview itself, the accuracy of the lie detector is further touted, in order to reduce the fears of the innocent and enhance those of the guilty. The subject is observed and evaluated for reasons which might affect the test results and most of what the operator knows about the crime is discussed with the subject. The examiner then formulates the test questions, each of which is rehearsed with the subject. He is invited to provide any explanations or to voice any relevant suspicions he may have, because these may give rise to misleading reactions in that guilty knowledge may produce a deceptive response. The examiner may prove as widely as he deems necessary into anything he considers relevant to the crime or helpful to the preparation of the questions.

(3) There are three types of tests. The first is generally the "control" question series. It consists of neutral or irrelevant questions, the answers to which the operator already knows (e.g., "How old are you?"), control questions which are related to, but do not overlap with the crime in question (e.g., if the crime is a robbery, "Did you ever steal anything during X period?"), and relevant questions which ask whether the subject committed the crime or participated in it (e.g., "Did you rob the Y grocery store on Z date?"). The theory of the "control" question test is that it allows the measurement of a differential responsivity between no reaction to the irrelevant question, some reaction to the control question which is designed so that the subject is very likely to be deceptive to

it, and substantially stronger reaction to the question relevant to the particular crime-if the subject is guilty. Alternatively, if the response to the control question is substantially larger than that to the relevant question, the subject is likely to be innocent.

The primary purpose of what is known as a "card test" is "stimulation" and it may be given prior to the control question test. The subject is instructed to pick a card and then to answer "no" in answer to each card the operator calls out. In fact the operator knows the card in advance by the way the cards are arranged so he convinces the subject that he knows when he lied.

The examiner allows the subject to rest between tests and invites him to make further explanations. If he offers new information, the questions are amended for the next test (e.g., the control question may now be, "Besides stealing pieces from your neighbor when you were six, have you stolen anything during X period?"). After the third test, if the mechanical recordings and the subject's behavioral indications are clear as to either truthfulness or deception, the test is over. If the finding is deception, the operator consults the subject in an effort to identify other factors that could have caused the reading or interrogates him for the purpose of seeking an admission or confession. If the results are not dispositive, the testing goes on, again with efforts to secure additional information and amendment to the questions where necessary, but always with the subject's full knowledge of the questions that will be asked.

At the operator's discretion, additional tests, such as the "peak of tension" test or the "guilt complex" test are given. The first can only be used in cases where the examiner has specific details of the crime that would only be known to a guilty person. In the guilt complex test, one of the questions concerns a fictitious crime which is of exactly the same type and seriousness as the crime in question but involves some unique distinction. This allows the examiner to ensure that the subject does not give responses that would show deception when asked about any serious crime.[76]

The factors affecting the reliability of a test consist of those which are potential variables in any case and those which depend on the skill of the particular examiner. Of the former, however, the examiner is still largely responsible for detecting the variables.[77] These include: improper test conditions; medical problems; mental abnormalities; temporary physical disability; unusual mental states, and intentional efforts to avoid detection.

The skill of the examiner lies primarily in the formulation and delivery of the test questions, which most directly influence a test's reliability and in the reading and coordination of the responses. Each subject's responses form a unique pattern graphically, rather like the individuality of a signature. Thus the control question is used to establish an initial base line response, or, in other words, to calibrate the instrument to the particular subject's response pattern. The determination of how much change in the pen movements indicates deception, as well as to what question a significant pen movement is related, is complex. Physiological responses may precede a question if, for instance, it is repeated in successive tests and is thus anticipated. Alternatively, a response may follow a question if the subject continues to dwell on the

answer. Additionally, the tracings of different physiological measurements may give contrary indications-having more than one measurement would, of course, be superfluous if they all correlated perfectly-and examiners do not always agree on which variables are the most significant, nor will they neccessarily read any single chart in the same way. Unconscious bias in reading the chart, technically termed a "halo effect," may interfere if the examiner has a particular result in mind.

The inappropriateness of a control question may nullify the test if it intrudes at all on the subject of the relevant question. The pace at which the questions are delivered can affect reactivity and the precision with which the chart can be read. If they are ambiguous or not understood, the responses will be unclear, hence it is important that the examiner have sufficient familiarity with the facts. If the atmosphere established is accusatorial, it may engender excessive nervousness. There is always a danger that the operator may communicate, consciously or unconsciously, his subjective belief in the innocence or guilt of the subject. If the former, the subject may be reassured; if the latter, the subject may lose confidence in the operator. Both may affect the results of the test.

Generally, operators are trained to be sensitive to outward signs of deception, such as squirming in the chair or frequent coughing or sniffing. It is difficult, if not impossible, to know what weight he has accorded these impressions rather than the actual recordings. Because the signs are highly subjective in nature they may be misinterpreted or cause unconscious bias. Simmlarly, an examiner's diagnosis of an uncooperative subject may be a prejudicial interpretation of his conduct.

Finally, there are a number of ways the operator can affect the test which are yet unknown, for instance, the impact of feeding back to the subject a false interpretation of the data during the test. The catalogue of unknowns and potential prejudices appears enormous, and the following section suggests how best to accommodate them, if not overcome them.

III. Standards and Procedures For Admissibility of Polygraph Evidence

In the absence of constitutional objections or other policy reasons, and assuming the validity of the polygraph technique, each question of admissiblity will be a balancing test whereby the court weighs the probative value against the dangers of unfair prejudice, confusion of the issues or misleading the jury and other considerations of undue delay, waste of time or needless presentation of cumulative evidence.[78] While a court will thus be free to find the evidence needless or prejudicial, it seems more likely that the court would be inclined to admit the evidence once the probative value has been established, if these countervailing considerations can be minimized. What will be shown is that requirements for a finding of probative value can be defined so as to dispel some of the most commonly raised objections to admissibility. Similarly, rules controlling when and by whom polygraph testimony may be admitted will avoid its overuse and may overcome fears that reliance on it will somehow replace the jury system as the arbiter of guilt or innocence, that the judicial system will require the defendant to prove his own innocence or, on the other hand, that the government will be allowed to prove guilt from tests on the defendant rather than having to produce other extrinsic

evidence of guilt by its own independent labors.

The first section will consider a proper legal definition of polygraphy and the concomitant constitutional and other protections essential to a criminal defendant. The next section will deal with requirements for a finding of probative value which include practical solutions to meet the constitutional requirements, and the difficulties inherent in qualifying an expert and assessing the reliability of a particular test. The final sections will consider the balancing of advantages in allowing the defense and prosecution to introduce polygraph evidence at trial as well as their rights to pre-trial discovery and possible collateral uses.

A. The Legal Character of Polygraph Evidence and Constitutional Issues

The primary constitutional issue that arises in the context of the use of the polygraph by the prosecution and law enforcement agencies is whether the evidence should be regarded as testimonial, hence making the manner in which it is obtained subject to Fifth Amendment guarantees and conditioning admissibility on a prescribed standard of voluntariness. However, as will be seen, some of the concerns surrounding the constitutional issue interrelate with questions of reliability and hence probative value, and will apply to use by the defense as well as the prosecution. Other constitutional issues concern the validity of the evidence per se, regardless of probative value. One such issue is whether the use of the polygraph violates a fundamental personal immunity or right to privacy implicit in our concept of ordered liberty,[79] or under what conditions such an invasion of privacy is warranted. Another is whether use of polygraph evidence against a criminal defendant denies him the right guaranteed by the Sixth Amendment to confront and cross-examine witnesses against him. A final issue is whether the right of a defendant to use exculpatory polygraph evidence should be included to the right to present a defense, which is a fundamental element of the Due Process Clause.[80]

The difficulty in characterizing polygraph evidence stems from its hybrid or quasi-scientific nature.[81] What makes the polygraph expert's opinion qualitatively different from that of another expert offered on the results of scientific tests or on samples of physical characteristics is, first, the nature and breadth of the inference he draws. For example, the voiceprint examiner, relying on the voice characteristics that are isolated and measured by the spectrograph, seeks to do no more than compare voices. The polygraph machine, in contrast, does not measure "lying" characteristics. It records involuntary physiological responses to both stress and non-stress, which conditions have been created in the subject by the environment and questions of the examiner, the examiner then draws a conclusion about the signficance of the degree of variation from what he perceives as the normal patterns monitored, not in terms of the relative degrees of stress, but in terms of truthfulness of the subject's responses. The stress measured may, or may not, be generated by the controlled environment. Thus the conclusion offered, namely the credibility of the person examined, is one not directly related to measurements by the machine.[82]

That the expert's testimony relies on test results which do not relate directly to the conclusions reached and which include unmeasurable personal evaluations, does not necessarily make it different from other

expert testimony that courts regularly admit, as was suggested in the earlier analogy to psychiatric and psychological expert testimony on the state of mind of the defendant. Perhaps the tests they use, such as I.Q. or profile tests, may be distinguished in that they may be more standardized and recognized by a considerable group in the profession. In contrast, although the relevant/control question technique is generally recognized in the polygraph profession, the specific formulation of the questions used is unique to each test and the questions directly concern the crime in question. Nevertheless psychiatric and psychological opinions also depend in addition on numerous peripheral behavioral observations and information about prior history.[83]

The controlling characteristic of the polygraph test as a whole, however, is that it is a questioning technique closely analogous to interrogation, which is designed to elicit responses relating to guilt or innocence. The very explication of the polygraph procedure reveals elements strikingly similar to those in Chief Justice Warren's analysis of interrogation methods in Miranda v. Arizona.[84] His description is in fact based largely on Reid and Inbau's manual on criminal interrogation[85] which explicitly incorporates interrogation methods into the polygraph test. These include a setting of almost total isolation, which deprives the subject of any of the psychological advantages of outside support and prevents distraction, while the polygraph examiner assumes a role of omniscience as operator of an infallible and mysterious machine to which the subject is physically attached. Part of the examiner's role is to convince the examinee of the invincibility of the truthfinding process and to deprive him of any sense of confidence that he can withhold information. Through the questions, the process is both a source of information and potentially suggestive of the reasons for committing the crime, or perhaps legal excuses for commiting it. It thus raises policy questions similar to those applicable to the limitations on interrogation for purposes of entrapment.[86]

The evidence resulting from polygraph procedure, through its alliance with interrogation which is designed to elicit responses, must be characterized as testimonial rather than real or physical evidence. The Supreme Court implicitly affirmed this view in Schmerber v. California[87] wherein it recognized in dicta that polygraphy at least "evoke[s] the spirit and history of the Fifth Amendment."[88] And the policies underlying the Miranda decision support this conclusion: the policy against allowing the state to rely on the accused to be the instrument of his own conviction, the policy in favor of requiring the government to produce evidence by its own independent labors, and respect for the dignity of the citizen. As testimonial evidence, it will thus be admissible only if the test is taken on consent. Further, following Miranda's guidelines, there should be protective devices to ensure that when a subject consents to being tests, it is truly the product of his free and intelligent choice.

The importance of recognizing it as testimonial and the need to accord it special protective measures is evident when one considers that experts have developed "silent answer" tests that can record an examinee's responses without his ever uttering a verbal response and without prior discussion of the matter under investigation.[89] The right merely to remain silent is therefore meaningless in the context of a polygraph test. Also, once the question is asked, the involuntary response follows. Thus, no longer is silence "insolubly ambiguous,"[90] for the suspect cannot

control the examination in the same way that he can interrogation, which must cease at any time he chooses to terminate it. While tests requiring no verbal responses have been regarded as experimental, the experts developing them suggest that they decrease unintentional distortion in the results and make "beat the machine" tactics easier to spot. Also the experts suggest that subjects tend to relieve their tensions in voicing answers and the inability to respond heightens the anxiety about the questions. Such test methods may thus ultimately become preferred.

A second reason for mandatory protective measures is that techniques for testing breathing, pulse rate, galvanic skin response, eye blink rate and muscle tension without the knowledge and consent of the subject have been developed, have been used experimentally by the government and are now used by some security agencies in their screening operations.[91] For example, a seemingly normal chair can be equipped with sensing devices that register body heat, changes in limb volume and nervous movements. Hidden cameras can detect changes in eye pupil size. Devices can measure blood volume in fingertip arteries by photo electric cells and changes in blood color as well as pulse waves.[92] While this paper considers only the more conventionally practiced polygraphy, any standard adopted should be sufficiently broad to encompass technological advances that enable covert testing but do not change the basic interrogative nature of the procedure. That the above described scientific methods are available allies polygraphy with surveillance and necessitates adequate procedural rules if not regulations for its use in the hands of law enforcement offices. Unlike the regulation of surveillance where, for instance, the length and timing is important, the regulations in a polygraph test must go to the scope and nature of the questions used in the test, since what is recorded is generated as a result of those questions. This does not, however, eliminate or override the primary requirement that any test administered must be explicitly consensual. And it is not sufficient to suggest, as some courts and commentators have, that constitutional questions raised by compelling polygraph tests are academic because tests taken under compulsion cannot provide interpretable results.[93] A subject may be under compulsion in a legal sense without being so physically uncooperative as to give results that are inconclusive.

The mere fact that only the physiological data are recorded does not change the nature of the polygraph evidence to "real or physical" data which the Supreme Court has consistently found to be not within the scope of the privilege against self-incrimination, whether or not such data involves speaking or what appears to be communication.[94] Similarly, the Court has held that, if under an appropriate judicial order or in exigent circumstances, compulsion of such data is not an unreasonable search and seizure, even in the absence of probable cause to believe the accused committed the crime.[95] Polygraph procedure must be seen in its entirety, which is not a physical intrusion as much as it is a mental one.

The view that it is a mental intrusion is the core of the due process question raised which involves the issue of privacy. Some have criticized the courts for merely using the scientific imperfection argument to avoid the issue of the ethical justification for probing man's innermost sphere.[96] They contrast the veiw of European courts, legal codes and commentators who have rejected lie detection, not on the ground of its unreliability but because it is felt to violate the essential dignity, human personality and individuality of the citizen.[97]

Commentators have, however, offered confusing and conflicting views on how the test constitute an invasion of privacy. Some have criticized the view of Professor Helen Silving,[98] one of the leading experts on scientific ttechniques in law enforcement. Her analysis that what is probed is the unconscious is seen to be unhelpful because, unlike narco-analysis or hypnotism, the polygraph evokes responses from a fully conscious person.[99] A contrary argument is that because the responses are uncontrollable and unpredictable, no knowing or intelligent waiver may be given. However, the validity of a waiver of constitutional rights has consistently been upheld even where the defendant mistakenly believed that no incriminating evidence would result.[100]

A sounder analysis is the invasion of privacy in a criminal context would seem to stem from the recognition that the right of privacy is not an absolute one. Under circumstances analogous to "reasonable grounds for suspicion", that is, where there is motive, opportunity, inconsistent stories, etc., such that there is a meaningful link between a specific person or persons and a particular crime, a request to a suspect to submit to a polygraph test should be legitimate.[101] The establishment of this prior link balances the interest of the state in being able to use available investigative methods to aid in the apprehension of criminals against that of individuals in being free from unnecessary intrusions. Just as in Chambers v. Mississippi[102] the Court condemned the use of dragnet-type mass fingerprinting without probable cause, so any such investigative use of polygraph must be eschewed unless there is sufficient evidence to support a finding of the standard here recommended, which is a "reasonable suspicion."

It may be argued against such a standard that one of the important functions of investigative use of polygraphy is to eliminate suspects. However, the standard is confirmed from a practical viewpoint because the very process itself depends for its reliability on whether the polygrapher has sufficient data about both the crime and the suspect to enable him to develop the test questions accurately and narrowly. A number of cases have shown why evidence must be rejected on the basis of faulty questions that result from insufficient knowledge or inadequate preparation.[103] Polygraph experts in their teachings endorse the veiw that testing should be used neither at the outset of an investigation nor as a last ditch effort where all else has failed.[104]

The "reasonable suspicion" test only applies to pre-arrest situations because once the subject is under arrest and in custody, the higher probable cause standard will presumably have been met. In addition, Miranda warnings will have been given. However, as has been indicated with respect to the right to silence, these warnings alone are inadequate to encompass criteria necessary to a finding of voluntariness that passes constitutional muster.[105]

The argument that polygraph evidence precludes a defendant from exercising his Sixth Amendment right to confrontation because the machine cannot be cross-examined,[106] is surely the most spurious mask for other legitimate concerns of the court, such as that it will replace the jury system. It may be based on a misconception of polygraph evidence, however, for it is clear that neither the machine nor the graphs it produces are the evidence introduced. In themselves they are meaningless. It is the polygraph expert who testifies and he is fully as cross-examinable as

any other witness. Perhaps the comment serves to emphasize that the examiner who conducted the test must be the one to offer his opinion. This is reinforced practically by a recognition of the considerable impact of the individual examiner upon the reliability of the particular test conducted.

Finally the argument has been made that an evidentiary bar against polygraph evidence is inconsistent with the due process right of a defendant to present important exculpatory evidence. Most courts have rejected constitutional attacked on this ground,[108] and the constitutional basis is unfounded if it is recognized that a court has no obligation to admit unreliable evidence. The argument appears to have arisen as a means of circumventing the lingering application of the per se rule of inadmissibility spawned by Frye. Some commentators claim that the argument is an extension of the rationale in United States v. Hart[109] discussed supra. It is suggested that the prosecutor could be estopped from objecting to the reliability of the favorable results of a polygraph test administered to the defendant by the government, just as it was estopped from objecting to that of its own witness.[110] The argument is not compelling since the government has clearly not relied on the defendant's testimony as it has in the case of its own witness, and it is possible that it had found the test unreliable, since it had continued to prosecute, undoubtedly on the basis of independent evidence.[111]

A due process argument might be more legitimate where there has been a threshold showing of the reliability of the test results taken by the prosecution and where the defendant wishes to introduce the exculpatory results to raise a reasonable doubt of his guilt. This view is suggested by criticisms of the due process precedent used by the court in State v. Dorsey.[112] The state appellate court there relied on Chambers v. Mississippi[113] for its holding that the exclusion of critical evidence denied the defendant a fair trial. However, in Chambers the state rule barring admissibility was a technical one which did not allow declarations against penal interest as an exception to the hearsay rule.[114] The Supreme Court found that the rejected testimony in fact bore persuasive assurances of truthworthiness such that it fell within the rationale for exceptions to the hearsay rule. In Dorsey, on the other hand, the rule controlling admissibility was directly founded on the reliablity of the evidence and no independent showing of reliability was made, nor was it called for in the affirmation by the state supreme court, which did not mention Chambers.

In general, however, a due process challenge will not be appropriate under the modern evidentiary standard proposed for the admissibility of expert testimony. The reliability of the test is only one of many questions which must be addressed and weighed by the court in determining admissibility, and the discretion of the trial court in refusing to admit the expert evidence will be overturned only if the exercise of such discretion was clearly erroneous.[115]

B. Criteria Required For a Finding of Voluntariness

Because of the likelihood that an accused will readily submit to the test rather than arouse suspicion by refusal, which is the experience of many polygraphers,[116] a mere expression of willingness may not be "knowing and intelligent", the standard required for waiver of a constitutional

right.[117] Also, a number of the confession cases suggest that an accused may appear to take a test voluntarily, when in reality police behavior has rendered such consent tainted by coercion.[118] Similarly, the isolation of the suspect and the length and circumstances of examination all suggest its potential for psychological intimidation. The teaching of Miranda of the appropriateness of prophylaxis seems applicable here, namely that the expedient of giving adequate warnings is so simple that "[the court] will not pause to inquire in individual cases whether the defendant was aware of his rights without warning."[119] A test administered to a suspect without warnings should thus be regarded as per se involuntary.

The warnings must include, at a minimum, the right to remain silent, the right to refuse the test, the right to advice and presence of counsel, the explanation that anything said as well as the results of the test may be used against the suspect. However, to be "intelligent", the scope of the warning must be tailored to the special circumstances of the polygraph test. This includes first, a truthful explanation of the polygraph's potency and of the test procedure, and second, the right to limit the content and scope of the test. Each of these will be discussed in terms of their effect on the reliability of the test and to show why the right to advice and presence of counsel is mandated.

The cases cited in Section I and the explication of the procedure in Section II reveal that polygraph examiners often recommend that examinees be persuaded that the machine will "know" if he lies. They themselves use misleading statements or "stimulation" tests that are really tricks to make the examinee believe in the test's efficacy, on the theory that such belief enhances either the fear of detection for the guilty, or lessens anxiety for the innocent. This supposedly increases responsivity and achieves clarity in the results.[120] Others are more subtle, limiting their emphasis to confidence in the extreme effectiveness of the procedure for establishing the truth and encouraging the mention of tests that have indicated innocence as well as guilt.[121]

Obviously it is important that the examinee have confidence in the examiner. However, this should not be established at the cost of deceit or psychological ploys that undermine a full and free choice.[122] It is not necessary that complete details of the test procedure or statistics on reliablity be provided. Statistics may in fact be misleading without complex qualification about their derivation.[123] The suspect need only be told that the process is useful and reasonably reliable, but is not infallible. That deceit accomplishes any marginal gain in the effectiveness of the test is a fact disputed by those experts who warn against scaring or bluffing examinees. They find that the mental attitude of one who is overwrought or determines or believes he has been deceived is likely to cause erratic responses that lead to inconclusive test results.[124]

If, as has been suggested, no test can be requested until the suspect has become the focus of investiagion,[125] and because the test itself has all the trappings of custodial investigation, the importance of the assistance of counsel is obvious. Its value derives both from his probable knowledge of the effects of testing - the likelihood it may produce a confession - and of possible trial consequences, as well as from his ability to mitigate the dangers of untruthful or incomplete information being given to the defendant prior to the test.

As shown by the explication in Section II supra, polygraph examiners claim a license to question broadly or to invite collateral explanations when the results of the tests are apparently inconclusive or indicate deception. That they do arrogate to themselves the sole responsibility for determining the relevance of information sought is evidenced by their teachings,[126] the stipulation agreements they endorse,[127] and occurrences documented by prior cases.[128] Any waiver to questioning about a specific crime may thus become meaningless unless the scope of questioning can be circumscribed, and as explained above, the inability of the examinee to control his responses exacerbates the need for pre-test definition and limitation to questions that are legally relevant. While the right to counsel may be waived without more in a pre-arrest situation, the suspect himself should be given the right to limit the scope of his consent and this must be adhered to by the examiner. In a post-indictment situation, the right should be accorded the same importance as that to counsel's presence at a line-up where possibilities of suggestiveness inhere.[129] The recognition of the need for counselled consent is perhaps implicit in the decisions of those courts which do admit polygraph testimony but condition admissibility on a prior stipulation, for the stipulation is a legal decision separate and apart from the defendant's decision to take a test, although it does not necessarily cover the scope of the test.[130]

Such pre-test definition of the questions should not affect the practical administration of the test. Polygraph examiners themselves recommend that it be done in the pre-test interview to eliminate the possibility that the examinee will not understand the question precisely and to eliminate the element of surprise, which can generate a reaction in and of itself that can interfere with the response to the actual question.[131]

It is recognized that in certain tests, such as the "guilt complex" test, the examiner is supposed to ask the suspect about a fictitious crime, and it is not intended that this be eliminated. Nor is it intended that the control or "known lie" questions, which are supposed to be questions to which the examinee is likely to give a response indicating deception or concern, should now be prohibited. It is urged rather that emphasis on the right of the suspect to limit the questions, the right to silence and the right to the presence of counsel especially will tend to make polygraph examiners more circumspect in their questioning and rid them of the notion that they have absolute license.[132] Similarly, examiners should not be barred from exploring possible explanations for a deceptive or an inconclusive response during the test such that the effectiveness of their testing is jeopardized. However, they should realize that such explorations are valid only when they report the results of the tests accurately, rather than being allowed to use false suggestions as a psychological ploy. Recognition that the introduction of matter irrelevant to the issue will make the test suspect should act as a prophylactic measure to control an examiner's unnecessarily broad problem.[133]

In summary, the defendant in a criminal case may not be asked to submit to a polygraph test unless there is sufficient evidence to warrant a finding of a reasonable suspicion of his guilt or unless he is already under arrest. Any consent to take a test must be shown to be knowing and intelligent. Such consent will be vitiated if he has not been given prior warnings, which in addition to regular Miranda warnings, must include a specific and truthful statement of the reliability of the test and a fair explanation of the procedures. While the right to counsel may be waived

in a pre-arrest situation, the suspect must have the right to limit the scope of the questions asked, in addition to the right to silence and the right to terminate the test at any time, and these rights must be adhered to by the examiner. After an indictment, the right to counsel's presence should be automatic and any purported decision to take the test without counsel's presence will be suspect. How counsel may be "present" both at the pre-test interview and during the test to prevent suggestiveness or deceit without destroying the examiner's requirement of isolation, quiet and lack of distraction, and also how all these standards may be subjected to adequate review in the absence of counsel, will be dealt with in the following section.

C. Videotape: A Practical Solution to Minimize Objections to Admissibility

If the criminal justice system is to be aided by the use of modern procedures in its investigation of the truth, then it should be entitled to require the use of modern machinery to aid the court in assessing its findings as evidence. It is this writer's view that the videotaping of all polygraph examinations administered, including the giving of pre-test warnings, and the pre-test interview, will provide answers to a great many objections to admissibility, foremost of which have been the inability to replicate the test and the lack of a basis from which to demonstrate the expert's conclusions.[134] As one commentator prophesied: "Lie detection will become an accepted technique in a court of law only when its accuracy derives almost entirely from recorded behavior and less on intuition." [135]

One of the advantages of videotaping all tests is that it will, in many instances, obviate the need for retesting by an independent examiner of the adversary's choice, or by a court appointed expert, both of which have been offered as solutions to the preceived problem of the expert's reliance on too many subjective indicia as well as to the suspicion that too many examiners are insufficiently qualified.[136] It may also moot the question of whether, if the defendant moves for admission of his exculpatory test, the prosecution has the right to request a second examination by its expert without falling foul of Fifth Amendment guarantees. [137] The use of videotape will not elmiinate the possibility of conflicting expert testimony and the potential for jury confusion, but this is generally unavoidable whenever opinion testimony is used and is not a legitimate reason for per se exclusion. By avoiding retesting, the reliability of an expert's conclusion may also be enhanced, since one of the experts' objections to multiple tests on a single subject is that he may become less responsive through familiarity with the questions and the order in which they are asked.[138] There is also ample evidence to support the conclusion that other experts can critique and evaluate polygrams produced in tests by other examiners. Hence, there is reason to expect that the quality of their testimony will be far superior if they have the entire procedure on videotape.[139]

On the analogy of the requirement that the trial judge initially determine any issue of the voluntariness of a confession outside the hearing of the jury,[140] such a preliminary hearing requirement is necessary to determine both voluntariness and reliability before polygraph testimony is admitted into evidence. This threshold determination must be made with the assistance of the testimony of the expert who conducted the

examination as well as that of any other experts offered by opposing counsel or appointed by the court. While it is true that such hearings are often time consuming and may duplicate evidence that must come before the jury as relevant to weight and credibility, the use of videotape should streamline the process as much as possible. The actual videotape plus the expert testimony, together with the court's findings will also provide the best possible record on any appeal questioning the court's discretion in either admitting or rejecting the evidence.[141] Even if the evidence is excluded, the record may at least be helpful in encouraging courts to state reasons for exclusion that are hinged more firmly to the basis for the evidentiary rulings, a legitimate request of which courts have not been particularly mindful. The better the record, the more likely it is that courts themselves will develop guidelines for their exercise of discretion, as for instance when the disagreement of experts will arguably develop into a lengthy and collateral battle that would not aid the jury.[142]

The videotaping process will allow counsel to monitor the test as it is being given from an adjacent room, thereby not disrupting the controlled test environment, yet affording maximum prophylactic restraint. Such monitoring could just as easily be accomplished by observation via a one-way mirror as has been suggested.[143] However, any objections that counsel may raise to questions or procedures can be weighed more accurately by a review of the videotape than they could by arguments in the abstract.

Finally, if the admission of polygraph evidence includes the videotape, the polygram and the expert opinions, critics will be robbed of their argument that the evidence intrudes upon one of the most important jury functions: that of collectively determining credibility and finding facts.[144] The jury will be able to determine for itself the demeanor of the subject during the testing. Additionally, its education value will make the expert's conclusion from the results of the polygram less oblique and so aid the jury in assessing its weight. No longer will the conclusions appear to be reached by inscrutable technology, "shrouded with an aura of near infallibility, akin to the ancient oracle of Delphi."[145] The videotape is clearly the next best thing to having the actual test conducted before the jury, a suggestion that has always been rejected, and it would do away with the objectionable "dramatics."[146]

That the videotaping requirement is neither premature nor too sophisticated or cumbersome in execution is evidenced by the small marginal cost of adding the equipment to current polygraph machinery, which already contains tape recording equipment, as well as a review of present police department uses of videotape. The superiority of the evidence and the time saved in resolving disputes has already been recognized in jurisdictions such as the District of Columbia where all lineups are routinely videotaped. Objections by counsel as to undue suggestivity are recorded as part of the procedure, and from personal observation, administration appears extremely efficient.[147]

A recent report on the use of videotape to cover all interviews between an assistant district attorney and a defendant who had been arrested and charged with a serious felony under the Bronx Videotape Project also affirms the practicality and effectiveness of the proposition.[148] The report describes how a district attorney and a videotape technician report

to the precinct when notified of the arrest. The technician is stationed behind a one-way mirror with his portable equipment which uses a low light lens that requires no unusual light source, while a microphone is concealed in a radio on the table in the interviewing room. The tape is set in motion as soon as the attorney begins to speak, and records the defendant being advised of his constitutional rights and afforded the opportunity to make a statement after being told that the statement will be videotaped.[149] The report intimates that substantial savings of valuable resources were achieved while the quality of justice in Bronx County was immeasurably enhanced. Unfortunately these views are conclusory rather than substantiated by statistics. However, the report suggests that a substantial amount of court time that is now devoted to pretrial hearings on the issue of voluntariness or the propriety of an identification, and which costs approximately $12,000 a day, could be considerably shorted by the use of videotape. An example is also given of a defendant changing his plea to guilty after the court had ruled the videotape of his confession admissible, so avoiding a time-consuming and expensive trial. Noteworthy also is the fact that over a three-year period, 473, or 81 percent, of all defendants who were given the opportunity to make a statement allowed these to be videotaped. None who declined to make a statement cited the videotape as the reason for his refusal.[150] In addition, where the prosecutor sought to perpetuate the testimony of a witness, it was the defendant who requested that videotape be employed.[151] Thus, defendants apparently have no inherent objection to being videotaped.

The admissibility of videotape in court appears to present no obstacle, although relatively little authority exists at present. The videotape is included within the definition of photographs under Federal Rules of Evidence 1001, as are x-ray films and motion pictures, and cases have been uniform in applying the same rules of admission.[152] Authentication by the original cameraperson is not required. Instead, the testimony of a witness that the tapes clearly and accurately portray that which they purport to represent is sufficient. Authorities on scientific evidence[153] list a number of purposes for which motion pictures and videotapes have been admitted: to prove the circumstances surrounding the making of a confession; to show the identity of a bank robber; to depict the demeanor, appearance and mannerisms of one arrested driving while intoxicated, among others.[154] They point out that in instances where reviewing courts have upheld the use of videotape as the issue of voluntariness has been determined by the trial court, the presentation of the videotape to the jury does not infringe on any of the defendant's constitutional rights.[155]

It seems logical that if polygraph results are admissible in court, one of the results of making videotaping standard procedure would be that police departments would be less likely to allow unqualified personnel to administer tests. This view is reinforced if, as will be suggested, all tests administered to a defendant may be the subject of discovery, which of course the videotaping makes eminently practicable. On the other hand, the videotaping requirement coupled with discoverability, will likely bring equal pressure to bear on private practitioners, because responsible defense counsel will not seek to have their clients submit to tests by examiners who do not, at a minimum, qualify as experts on the face, and they would probably look to those with a substantial professional reputation.[156] Whether used by law enforcement officials or private practitioners, the fact of videotaping together with established procedures to ensure protection of the defendant's rights, also make it appear less

likely that the examiners would indulge in pseudo-interrogation or overly suggestive techniques, or use unnecessary deception. What the essential "qualifications" of experts should be will be addressed next. However, it should be noted that a videotape will provide a focus for both court inquiry as well as cross-examination into the methods practiced by the examiner and his training. Thus while inquiry into the theoretical underpinnings and reliability of the polygraph technique in general may, at least initially, be an extensive part of the foundation laid, the videotape may channel inquiry away from a hypertechnical application of the Frye standard of general acceptance and focus concern instead on whether the expert has a relevant conclusion in this case, which is supported by his prior experience and is confirmed on a threshold level by other experts.

D. Qualification of Experts

The general argument recited by hostile courts is that there is a lack of established national standards for experts, that over half of the states lack adequate licensing requirements, and that, particularly because of the extraordinary influence of the examiner on test results, the courts are incapable of ensuring that only qualified polygraph examiners are permitted to testify.[157] The unwarranted blanket conclusion is that to allow any polygraph testimony would open a "Pandora's box."[158] Perhaps this notion has been unduly fueled by reiterated quotation of a few reputed polygraph experts' admissions that there are incompetent or corrupt examiners.[159] An argument offered in response is that there are also incompetent physicians,[160] and those who will frequently appear on only one side of the issue,[161] yet this has not barred the courts from allowing expert medical or other testimony, or even requiring it sua sponte. While the acknowledged rigors of medical training and licensing requirements weaken this rebuttal,[162] such credentials are not absolute prerequisites to being qualified as an expert.[163] Although the expert's academic background and experience are fundamental to the admission of his opinion as evidence, the rules of qualification of experts in general are not solidified and much is left to the discretion of the court.[164]

The opposing arguments pale in face of a review of the standards for qualification that have been proposed by recognized authorities on polygraphy and have in fact been accepted and documented in judicial opinions [165] as well as in practical legal texts.[166] A comparison of the basic areas that have been established as necessary to the qualification of experts in general with those proposed or required for polygraph experts tends to show that the latter are remarkably specific. And the videotaping of tests may provide the answer to the criticism that "[a]lthough the profession of polygraph experts is becoming standardized and professionalized, it has not yet developed adequate ways and means to police itself."[167]

The fact of disagreement by experts should not be fatal, provided the conclusions are relevant and the witnesses qualified. In such instances, objections to the evidence go to the weight rather than to admissibliity. There is thus no reason to conclude from the experience of conflicting expert testimony in any single case that "the time required in order to explore and seek to adjudge [the] factors would be virtually incalculable *** . Accordingly *** the administration of justice simply cannot tolerate the burden of litigation inherently involved in such a process."[168]

One of the propositions offered to alleviate the judiciary's hesitancy to qualify experts offered by the parties is the use of court appointed experts,[169] although this has generally been an alternative to a stipulation by the parties to the competence of the examiner. It has rightly been suggested that an inherent danger in the use of a court-chosen expert is that it might give the results an unjustified sanction and weight in the minds of the jury.[170] Another consequence is that cross-examination in the form of collateral attack is discouraged because the expert is theoretically the court's witness, hence unbiased.[171] The Advisory Committee Note on Federal Rule of Evidence 706 suggests the more appropriate context for the court's power to appoint experts: "The ever-present possibility that the judge may appoint an expert *** must inevitably exert a sobering effect on the expert witness of a party and upon the person utilizing his service."

Finally, the qualification of the expert as such is only a small part of the foundation for the expert's opinion which must be laid before the evidence may be admitted in court. Other factors are the general operation of polygraph instruments, the state of the art and the reliability of polygraph instruments, the general purpose and method of conducting the interview procedure, the general description and analysis of polygram and the expertise of this particular polygraph examiner in examining the subject and analyzing the charts. It will be part of the court's function in assessing the threshold questions of whether the examiner is qualified and whether the results are relevant and probative to determine whether the examiner has carefully scrutinized the signs that might identify a subject as unfit for testing, for instance those which indicate inherent or induced physical or mental abnormalities or deficiencies. Beyond that, if the evidence is admitted, these considerations will lie within the jury's province of attributing whatever weight they deem appropriate to the evidence. Presumably their decision will be added by thorough and extensive cross-examination, as is customary with any expert testimony, as well as appropriate instructions by the court.

Our information on the decision-making process of the jury is extremely sparse, but there are a few accounts about the impact of polygraph testimony. In People v. Kenny,[172] a poll of the jury indicated that over half the members had been swayed by it. This was in 1938, however, before its use was as widespread as now and prior to significant experimentation and debate which has provided additional material for cross examination. In United States v. Grasso,[173] in which the jury returned a verdict of not guilty, the jurors were questioned about their comprehension of the expert testimony as well as its effect on their decision. Eight of them said that they were impressed with the foundation testimony and were convinced that the polygraph did what it purported to do, i.e., verify the truthfulness of a response to any given question. But they first resolved to arrive at a verdict without it. Although they did reach their verdict without it, each of the eight admitted that if the outcome had been closer, the integrity of the testimony and the test result on its own would have been sufficient to raise a reasonable doubt and they would have voted not guilty.[174] While in Commonwealth v. Edgerly[175] the jury acquitted the defendant of murder, although stipulated polygraph results adverse to the defendant were admitted, in Coney v. State[176] the jury found the defendant guilty although he was allowed to introduce evidence of exculpatory results. Although scanty, such results tend to confirm the views of courts favorable to polygraph evidence that juries are

well educated, attentive and capable of sorting out the evidence which is believable from that which is incredible.[177]

E. Discovery of Polygraph Evidence[178]

One of the difficulties of fitting polygraphy into the existing Federal Rule of Criminal Procedure on Discovery and Inspection, Rule 16, arises through its hybrid nature as both testimonial and scientific evidence. If it is to be regarded as the equivalent of "reports of physical and mental examinations and of scientific tests or experiments" under Rule 16(a)(1)(D), should it be eligible for discovery only if it is "material to the preparation of the defense or *** intended for use by the government as evidence in chief at trial" as required by that section? Or should it be discoverable as are all relevant written or recorded statements by the defendant under Section (a)(1)(A) of Rule 16? This latter choice would misconceive the statements as substantive evidence rather than as the basis for the polygraph expert's opinion. Section (a)(1)(A) should only be applicable if the defendant made admissions or confessed to the examiner before, during or after the examination, and the prosecution intends to call the examiner not as an expert but only as a witness.

Another consideration is that if the defendant's discovery request is included under Rule 16 (a)(1)(D), then the prosecutor is entitled to reciprocal discovery under Rule 16 (b)(1)(B). However, by not exercising any pre-trial discovery requests, the defendant can thus preclude any pre-trial discovery of its expert's opinion by the prosecution. On the other hand, the prosecution would be under a due process compulsion to disclose at least any expert testimony favorable to the accused under the Brady v. Maryland[179] doctrine, as refined by United States v. Agurs,[180] whether or not he had requested it. One of the primary purposes perceived for the discovery rule is, however, to eliminate the practice of defendants "shopping for experts." The Advisory Committee Note to Federal Rule of Evidence 706, providing for court appointed experts, saw the practice as a matter of "deep concern." That defendants shop around for an expert who will provide an exculpatory result has also been one of the reasons advanced by polygraph experts for their insistence on a prior stipulation to admissibility by the parties.[181]

Federal Rule of Evidence 705 is not helpful in this regard as it allows an expert to testify in terms of opinion without prior disclosure of the underlying facts and data, unless the court orders otherwise, although the expert may be required to disclose the underlying facts or data on cross-examination. The Advisory Committee Note to this rule recognizes the imperfect discovery afforded the cross-examiner in a criminal case notwithstanding its assumption that the cross-examiner will have advance knowledge which is essential to effective cross-examination.

Because of the importance of both adequate cross-examination and the necessity for the evaluative testimony of an expert from the opposing side in the case of polygraph evidence, together with the relative ease of pre-trial exchange of the information in the form of the expert's report and the videotape, the rule here proposed is the following: Not only should the government's disclosure of polygraph examination reports of the defendant made in connection with the particular case be mandatory,[182] but also the defendant should be required to disclose the report on an expert he intends to call to testify, including the basis for the opinion. The

Advisory Committee Note to Rule 16[183] found mandatory disclosure of tests by the prosecution justified because, among other reasons, "(1) it is difficult to test expert testimony at trial without advance notice and preparation; (2) it is not likely that such evidence will be distorted or misused if discovered prior to trial. ***" A number of different bodies, including the National Advisory Commission on Criminal Justice Standards and Goals,[184] the American Bar Association[185] and the Committee on Rules of Practice and Procedure of the Judicial Conference of the United States in its proposed revision of Rule 16(b),[186] have taken the position that disclosures by the defendant, at least in the case of reports by experts, should not be limited to those situations in which the defendant invokes his right to discovery.[187] As for sanctions for non-disclosure, Federal Rule of Criminal Procedure 16(d)(2) would apply and the court, at its discretion, could exclude the evidence or grant a continuance and permit discovery.

Support for the rule may also be found by comparison with various Supreme Court decisions. First, the defendant may still choose not to rely on the polygraph expert's opinion at trial and he is, therefore, not unduly prejudiced. Justice White writing for the majority in Williams v. Florida[188] which upheld Florida's notice-of-alibi statute, noted: "Nothing in the Fifth Amendment privilege entitles a defendant as a matter of constitutional right to await the end of the State's case before announcing the nature of his defense, any more than it entitles him to await the jury's verdict on the State's case-in-chief before deciding whether or not th take the stand himself."[189]

Because the discovery rule is one of mutual obligation to prosecution and defense, it also does not fall foul of the Due Process Clause under the rule of Wardius v. Oregon.[190] The Supreme Court there held that "[A]lthough the Due Process Clause has little to say regarding the amount of discovery which the parties must be afforded, *** it does speak to the balance of forces between the accused and the accuser." While it does not require a state to adopt discovery procedures for the benefit of criminal defendants, "in the absence of a strong showing of state interest to the contrary, discovery must be a two-way street."[191]

Finally, if the defendant does choose to offer the polygraph expert's testimony at trial, the court on a motion by the prosecution may order the defense to produce both the names and opinions of any other experts who had tested the defendant and any other opinions of prior tests administered by the same expert. The production of prior tests may be analogized with the requirements of Federal Rules of Civil Procedure 26(4)(B) and 35(b)(1) and (2) which apply to the mutual exchange of reports of all prior mental or physical examinations upon the request of the party against whom an examination was ordered, or the person examined, or upon a showing of exception circumstances. The court may order disclosure of any prior opinions of the testifying expert by analogy with a broad interpretation of the principle of United States v. Nobles[192] that no statute or privilege bars the disclosure of any part of a defense witness's prior statements as long as it is relevant and material to matters covered in his testimony.[193] Additionally, if the prosecutor offers expert polygraph testimony, his witness may be required to disclose any prior opinions of tests administered under the Jencks Act.[194]

The reason production of collateral test results is reserved for

trial rather than made part of pre-trial disclosure is that a test is not necessarily unreliable merely because it is not the very first administered. It may merely have been inconclusive and the test offered should first be reviewed independently. Of course, if former test results unfavorable to the defendant are revealed at the foundation hearing, the court may well exclude the evidence altogether under Federal Rule of Evidence 403 on the ground of undue consumption of time, etc., rather than allow the defendant to undertake the burden of proof that the unfavorable tests were unreliable. However, the discovery requirement in itself is likely to make defense counsel cautious in their use of polygraph evidence.

This is not to suggest that they are guilty of its overuse, as one might infer from some courts' fears that admissibility will usher in an era of trial by lie detection. While polygraphists themselves caution that the procedure should not be a substitute for thorough investigation, few have dealt with the potential impact of its use on the attorney-client relationship as a deterrent to overuse. One commentator who has considered at length the potential disadvantages aptly points out that a request to submit to a test, because of its accusatorial nature, "may obliterate whatever trust has been carefully built up" or that "[t]he client may long harbor resentment and even conceal important information before trial or refuse to cooperate during trial,"[195] aside from the potential impact on family members or other witnesses. Hence his conclusion that "[t]he polygraph test will often not be worth the emotional cost it occasions, ***".[196] The consequence which may accompany a negative test may be even more serious,[197] and there is always the risk that an incriminating admission may be divulged during the test, or that a confession will result.[198]

One caveat in connection with both the pre-trial disclosure and in-trial use of the videotape concerns the control questions. These may give rise to admissions of various wrong-doings or even actual crimes unrelated to the subject of the polygraph test. If the prosecution were allowed to present these, they might be tantamount to evidence of prior crimes or wrongs to show character in violation of Federal Rule of Evidence 404. Thus, the defense should, if necessary, be allowed to follow a process similar to the in camera inspection by the court provided for in Section (c) of the Jencks Act, whereby irrelevant statements may be excised prior to the in-court presentation. There is a similar provision in Federal Rule of Criminal Procedure 16(d)(1) for protective and modifying court orders. The examiner's testimony would thereafter only reveal that the control questions concerned unrelated but similar matters, the comparative purpose of the questions and the nature of the responses. This analysis was suggested by that of Moenssens and Inbau,[199] although they deal only with the expert's testimony and the polygraph tracings, not the use of videotape. Editing the tape would be a minimal court task.

F. Funds For Indigent Defendants

One further pre-trial, or possible in-trial, question is whether a court should appropriate funds for polygraph testing under the Criminal Justice Act, where the defendant is indigent.[200] The analogy is, once more, precedents that have allowed an indigent defendant funds for a psychiatric examination provided that need is established in an ex parte hearing required by the statute.[201] The polygraph funding issue was

explicitly addressed in United States v. Wilson[202] where the court refused to grant defendant's motion, based primarily on its review of the unreliability of a privately administered test to which a co-defendant had earlier submitted. It distinguished psychiatric testimony in that it is indispensable to the resolution of the legal defense of insanity. The court commented that a defendant would only seek to introduce the test results if they were favorable to him, and alluded to the ability of defendants with means to shop for experts. It found that admitting polygraph evidence would discriminate against indigent defendants because the indigents could not take the examination without the government's financing or knowledge.[203] There would be no discrimination if courts were willing to grant funds, and under the above proposed discovery rules, the defendant's tests would only be discoverable if he intended to offer it in evidence, although it is true that this would be only when it was favorable.

In United States v. Oliver,[204] the trial court had granted defense counsel's motion for funds for a second polygraph test after an earlier appellate ruling had reversed on other grounds the conviction for transportation for the purposes of sexual gratification and had noted that no prejudice would result if the court held an evidentiary hearing on the admissibility of the polygraph.[205] However, the defendant stipulated that the second test, to be taken by an expert of his choice, could be offered in evidence by the government if unfavorable. The appellate court found that the district court had admitted the second expert's unfavorable opinion after full consideration of whether the defendant's waiver was knowing and intelligent, that it had rejected the first favorable opinion because of the lack of qualification of the examiner and, therefore, affirmed the conviction. The opinion points out the dangers of the defendant's calculation that he would pass the second test. While the results seem fair and reasonable and based on the findings of comparative reliability of the two tests, the court unfortunately upheld the admission on the basis of the stipulation rather than the reliability of the second test.[206]

There is a line of cases which has recognized a duty on behalf of the state to provide defendants an opportunity to discover and conduct an independent inspection or testing of the state's evidence because expert opinions can, and do, differ.[207] Especially in a drug case, for example, one of the primary defense strategies is to raise a reasonable doubt as to the identity of the substance. Courts have, therefore, recognized a due process right to know of the evidence and to have an opportunity to rebut it.[208] In a case where an indigent defendant had submitted to a test by the prosecution, he may also have a due process right to an opportunity for rebuttal if it is unfavorable, or for a second opinion, if it is favorable. Because the test is preserved on videotape, the granting of funds would be for the limited purposes of a review of the initial test by a polygraph expert of the defendant's choice and the expert's time for trial preparation and testimony in court.

Ultimately, the decision on the granting of funds must be on a case by case basis. Courts will probably be inclined to allow the tests only where the perceived need for any additional evidence is greatest, or where an ultimate issue of truthfulness exists. However, the choice of a polygraph examiner should be that of the defendant and his counsel, although the court may offer him a list of approved examiners if is has compiled

one, and there should be no stipulation to admissibility.[209] Admissibility must always be conditioned upon the court's finding of reliability in the particular test and the customary weighing of countervailing considerations. Perhaps an unfavorable result should be discoverable to the prosecution, for in this situation the court has already determined the need for some additional evidence, the state's interest is clear in having provided the funds and the defendant has voluntarily sought to be tested. However, the better rule would be not to penalize the indigent defendant in this manner.

G. Limitation of Admissibility to Defendant's Polygraph Tests

Before considering either defense or prosecution use of polygraph evidence at trial, it is necessary to clarify why the above discovery rules have been limited to tests administered to defendants only, and to show why, in all but rare instances, admissibility will also be limited to defendants' tests. The primary considerations are the need for the evidence and its probative value, the consumption of court time in the use of expert testimony and the risks of jury confusion through the injection of too many collateral issues.

The defendant's need is perceived as the greatest in that, if the results are found reasonably reliable, it enables him to present evidence that may raise a reasonable doubt of his guilt, a goal which policy considerations favoring avoidance of injustice affirm. Some courts have gone so far as to create specific exceptions to the rule against not admitting unstipulated polygraph evidence based on such need, for instance where there was the possibility that a conviction would stand or fall on a single eye-witness identification which was recognized as "proverbially untrustworthy," regardless of the good faith of the witness.[210] A number of commentators have, in fact, used a comparison of the unreliability of eye-witness identification as a reason for not excluding polygraph testimony that is at least more reliable than such identifications.[211]

The relevance of a test is clearly greatest when it deals with the defendant himself because it concerns his truthfulness during questioning that goes to the heart of the crime of which he is accused. Even aside from the problems of recollection, suggestivity or even perjury by witnesses, there are many other "facts" that make up the prosecution's reconstruction of the crime, which is probably somewhat different and possibly significantly different from the actual event.[212] Thus the right of the defense to call opinion evidence of a polygraph expert supporting the accused's belief that he did not commit the crime should be recognized. And the theory of polygraphy, which hinges on the concern of the subject and his fear of detection, supports the conclusion that a test of an accused is likely to be more reliable than a test administered to one not under the pressure of accusation.

Just as the procedural rules have been developed here for the protection of the defendant such that a test may never be compelled, and hence the pre-trial means have been suggested whereby even the need for court-ordered retesting has been eliminated, so the defendant should not be allowed to compel a witness against him to be tested, that is, he may not use the procedure as a sword. Of course, the prosecution may conduct a test on anyone who volunteers to be tested. Where due process would demand access by the defense to polygraph test results obtained by the state

from its principal witness would be in a situation such as occurred in United States v. Hart.[213] Without discoverability, evidence that the witness had been tested by the prosecution would likely only appear through the witness's mention of it on direct or through cross-examination. It seems preferable to accept the inevitable trial interruption by a grant of a continuance for discovery rather than to allow blanket pretrial discovery of all tests administered to trial participants.

Both the consumption of court time and the potential jury confusion militate strongly against admitting polygraph evidence of witnesses whenever there is a conflict in testimony.[214] Even with the streamlined procedure described above, at least two experts would have to be qualified and cross-examination allowed. Besides, there appears to be no inherent reason why a defendant should not be singled out in terms of evidentiary rights and restrictions. He is already entitled to be confronted with all witnesses and to cross-examine them, while he is privileged to remain mute himself. Without removing this privilege at trial, whether the polygraph evidence is used for or against him at trial, it provides the jury at least some direct view of his "testimony" which it otherwise might not have, whereas the jury always has the chance to scrutinize directly the testimony of witnesses.

H. Evidentiary Use By the Defense

Some courts and commentators have suggested that the expert's opinion be permitted only as bearing on the defendant's credibility or his character for truthfulness.[215] If a defendant can only use the expert's opinion to corroborate his credibility, he must first take the stand. Some courts have made this a prior condition of any use by a defendant.[216] The corollary is that he may avoid the government's use of polygraph expert's opinion unfavorable to him by not taking the stand. While a defendant need not take the stand to put his character in issue, he may only introduce polygraph evidence to support his character for truthfulness once this has been attacked by the prosecution.[217]

Many courts have, however, recognized that the polygrapher's expert opinion may concern an ultimate issue. This is also now expressly allowed by Federal Rule of Evidence 704.[218] In United States v. Ridling,[219] for example, the court found the issue was whether the defendant was lying and therefore the polygraph opinion was "direct evidence on this point and may be offered by either side regardless of whether the accused takes the stand or puts his character in issue."[220] Other ultimate issues have been those of consent in a case involving transportation for the purpose of committing a sexual crime,[221] or knowing falsification in a case involving fraud or forgery.[222]

Almost inevitably, however, the relevance of polygraph evidence will only be sufficient to warrant admission if it does relate to some element essential to the successful prosecution, most broadly to the commission of the act itself, or presence at, or participation in, the crime.[223] This distinction has in fact been the subject of lengthy objection to any admission of polygraph evidence. In United States v. Alexander,[224] for example, the court distinguished other scientific tests for the purposes of identifying persons or objects which "do not purport to indicate with any degree of conclusiveness that the defendant who is so identified or connected with the object actually committed the crime."[225]

McCormick long ago correctly identified the two purposes for evidentiary use: "*** to show the state of mind of the subject on the occasion of the test, the state of knowledge of the fact of the crime or other transaction in issue or ignorance of it."[226] Thus, it is this writer's view that the defendant should be allowed to offer the expert opinion as direct evidence and it should not be contingent upon his waiving his privilege against self incrimination by taking the stand.[227]

If the defendant voluntarily submitted to a test by the government that concluded he was truthful in denying criminality, he may call the government's expert witness.[228] No doubt he will also present his own expert to support the original expert's findings. Since the government had continued to prosecute the case, it must either have believed that the test results were not reliable, whether because the defendant was an unsuitable subject, or the test itself was flawed, or the examiner insufficiently qualified, or it must have had considerable additional inculpatory evidence. The court will have to weigh whether the evidence is overwhelming or whether, if it finds the government's expert was qualified and the results reasonably reliable, the evidence should be permitted.[229]

The unique advantage of the in-court videotape presentation is precisely that the jury will not be deprived of the defendant's "live" testimony despite his choice not to take the stand. It is also, of course, the reason that such stringent protections are accorded him in the taking of the test. The fact that he is allowed to present the evidence directly in his own support without testifying himself does not raise a hearsay problem as some have suggested.[230] Although apparently testimonial evidence, it is admitted not for the empirical truth of the statements or answers, but for the limited purpose of showing the basis of the expert's opinion. One court has attempted to find polygraph evidence an exception to the hearsay rule under Federal Rule of Evidence 803(24) "because of its high degree of trustworthiness."[231] Such a view confuses the issue of reasonable reliability for purpose of admissibility with an assumption about its weight. A commentator has also found an exception based on the fact that the polygraph examination is an adequate substitute for cross-examination which guarantees reliability because polygraph evidence "fits the description" of the customarily offered substitute "'where even though a desire to falsify might present itself, other considerations, such as danger of easy detection or fear of punishment would probably counteract its force.'"[232] This argument is circuitous as it substitutes the theory of the validity of polygraphy for a guarantee of reliaiblity, and in any case, is simply unnecessary.

Allowing a defendant to use polygraph testimony as direct evidence will not necessarily stimulate its overuse or discourage adequate investigation because of the discovery requirements, the potential risks and disadvantages already mentioned and the discretionary powers of the court concerning admissibility and prejudice. It should also not be feared that as polygraph evidence becomes admissible, a jury will necessarily view the absence of an offer by the defendant as prejudicial. Rather, as courts and juries become educated about the process, they will better understand the reasons why tests may be inconclusive, subjects not suitable for testing, examiners unqualified or the results collateral.[233] In any case, any potential prejudice may simply be as unavoidable as that which a defendant must suffer from his choice not to take the stand. Just as the prosecutor may not comment on the defendant's failure to testify,[234] so

comment on a defendant's refusal to take a polygraph test should not be permitted because it would penalize him for the exercise of his privilege against self-incrimination. However, it is less likely in the case of polygraphy that courts will find such an error so prejudicial as to warrant reversal if the court has adequately cautioned the jury to ignore the comment.[235] Until much greater confidence in the reliability of the tests is established, a jury might well understand a person's resistance to taking a test without drawing an inference of guilt from it.

I. Evidentiary Use By the Prosecution

The prosecution should not be allowed to offer unfavorable polygraph evidence in its case in chief to prove guilt unless the defendant's truthfulness itself is one of the ultimate issues. Its use should otherwise be restricted to impeaching the defendant if he has taken the stand or otherwise put his crediblity or character in issue, or to rebut his favorable polygraph evidence.

One argument for the initial restriction on the government is the lack of need for evidence that goes to an evaluation of crediblity if it may be presented more directly by the defendant's own testimony. Another argument stems more from an instinct for fair play which has led courts to disallow certain kinds of evidence, such as a trait of character from which the jury can infer the probable doing of an act, until the defendant has had a chance to present character evidence which might draw a contrary inference.[236]

A further reason for the restriction is that research has shown that a false results showing deception (for instance, from innocent anxiety or fear) might occur more frequently than one falsely showing innocence.[237] It is also true that a diagnosis of deception does not necessarily mean that a subject is guilty, it may only imply that he is not telling the whole truth. A deceptive response might mean, for example, that the subject has some guilty knowledge of the crime or suspects who did it.[238] It thus seems preferable to allow a defendant to use the evidence to raise a doubt of his guilt rather than to allow the prosecution to use it as proof of guilt, although the prosecution may later use it in rebuttal. If as a result of admissibility and additional research, doubts about the reliability of a finding of deception are dispelled, or if more sophisticated methods of lie detection techniques develop, then these evidentiary restrictions may be relaxed.

J. Jury Instructions

Careful limiting instructions should always be given by the court upon request, or any time the court determines that cross-examination has not been adequate to summarize the limitations of the technique.[239] In general, the jury members should be told not to consider the polygraph examiner's opinion as conclusive, but that they are privileged to consider the opinion along with all the other evidence in the case and to give the opinion whatever weight and effect they think it reasonably deserves.[240] A number of courts have, in fact, provided model limiting instructions although these are based only on use for impeachment or corroboration.[241]

K. Appellate Review

Although the trial judge has broad discretion in the matter of admission of expert testimony,[242] some jurisdictions have developed specific tests for admissibility by which the trial court must be guided.[243] These decisions are important in that they establish that "there is an important tradeoff for giving the trial court such latitude; it must exercise its discretion with reference to all the necessary criteria (citations omitted) [o]therwise the very reason for such deference *** will be compromised."[244] Thus an appellate court should not affirm a ruling "unless the record clearly manifests either (1) that the trial court has ruled on each essential criterion, or (2) that the trial court, as a matter of law, had 'but one option.'"[245]

Conclusion

This paper has suggested a practical method whereby the realiability of the polygraph procedure may most easily be tested in the courtroom, coupled with the procedural safeguards to guarantee fairness to a defendant, it also ensures that the trial use of polygraph evidence will not displace a defendant's right to review by a jury of his peers. A side effect of the protective guarantees and the increased objectivity and reviewability of tests should be that many more cases will be dismissed or settled before trial. This should ease the burden of the judiciary so that it may to an extent balance the added burden that would result from admissibility. As some courts have already found, there are additional purposes ancillary to trial where the evidence may be used, such as in bond and sentencing hearings[246] and post conviction hearings on a motion for a new trial, where trial evidentiary rules are relaxed.

Certainly there are many pitfalls in the use of polygraph evidence which have not been considered. Admissibility will place a heavy burden on the courts because of the flexibility afforded the trial judge who may consider an infinite number of variables in each particular case. A potential disadvantage is the lack of uniformity, and therefore predictability in the decisions that will be made. Perhaps it is only the Supreme Court that can finally mandate basic police procedures as it did in Miranda, absent legislative action by either the state or federal governments. The most that can be hoped for is that the lower courts will attempt to meet every objective test of fairness in their fact findings on evidentiary hearings. In this way, perhaps a somewhat coherent analytical framework may be developed and the system will look less like the proverbial horse drafted by a committee which turned out to be a camel.[247]

Footnotes

1. E.g., Chambers v. Mississippi, 410 U.S. 284 (1973) (state rule that declarations against penal interest are not exceptions to the hearsay rule was held inapplicable because persuasive evidence of trustworthiness warranted an exception).

2. E.g., Williams v. Florida, 399 U.S. 78, 82 (1970) (sustaining the constitutionality of a pretrial alibi notice statute by emphasizing that criminal trials are a "search for truth" which should not be handicapped by a broad Fifth Amendment interpretation) and United States v. Nobles, 422 U.S. 225, 232 (1975) (requiring a defendant to surrender a witness's

prior written statement to the prosecution for purposes of cross-examination). Following Williams and Nobles the Court proposed amendments to the Federal Rules of Criminal Procedure embodying these principles in Proposed Rules 12.1, 12.2 and 26.2. Congress subsequently modified Rules 12.1 and 12.2 to require the prosecution to demand notification of an alibi defense and to preclude the use in evidence of any statements by the accused made in the course of a psychiatric examination. See Pub. L. 94-64, §§3(13) and 3(14), 89 Stat. 372, 373 (July 31, 1975). The effective date of new Rule 26.2, which makes defendants reciprocate the disclosure imposed on the prosecution by the Jencks Act, was postponed from August 1, 1979 until December 1, 1980, or until and then only to the extent approved by Act of Congress whichever is earlier. See Pub. L. 96-42, 93 Stat. 326 (July 31, 1979).

3. Congress has, however, limited some of the broad provision proposed by the Court, e.g., Proposed Rule 801(d)(1)(A), which would have permitted the introduction as substantive evidence of prior inconsistent statements of any witness. 56 F.R.D. 183, 293 (November 20, 1972); and Proposed Amended Rules 16(a)(1)(E) and 16(b)(1)(C) which would have required prosecutors and defendants to exchange names and addresses of their prospective witnesses prior to trial. 62 F.R.D. 271, 305-06 (April 22, 1974).

4. For the view that the notion of a search for truth lacks substance, see Pulaski, Criminal Trials; A "Search for Truth" or Else Something? 16 Crim. L. Bull. 41 (1980). Of the most recent examples of the Supreme Court's affirmation of its goal, see Jenkins v. Anderson, __U.S. _, 100 S. Ct. 2124 (June 10, 1980)(Fifth Amendment not violated by the use of pre-arrest silence to impeach a criminal defendant's credibility once he has taken the stand in his own defense: "Thus, impeachment follows the defendant's own decision to cast aside his cloak of silence and advances the truth-finding function of the criminal trial." 100 S. Ct. at 2129.)

5. As Justice Frankfurter reminded us, "[t]he history of liberty has largely been the history of observance of procedural safeguards" McNabb v. United States, 318 U.S. 332, 347 (1943). For the view that the most important reason for a review of the status of polygraphy is to bring it in line with the modern rules of evidence, rather than any claims that the state of the art has advanced significantly in recent years, see, Note, The Emergency of Polygraph at Trial, 73 Colum. L. Rev. 1120 at 1137-38 (1973) [hereinafter Polygraph at Trial].

6. Compare also the view that there appears generally to be a readier acceptance of the need for scientific evidence as manifested in the increased admissibility of spectrographic or voiceprint evidence, e.g., Greene, Voiceprint Identification: The Case in Favor of Admissibility, 13 Am. Crim. L. Rev. 171, 200 (1975).

7. E.g., United States v. Zeiger, 350 F. Supp. 685, 687 (D.D.C), rev'd per curiam, 475 F.2d 1280 (D.C. Cir. 1972).

8. E.g., United States v. Alexander, 526 F.2d 161, 166 (8th Cir. 1975); Skolnick, Scientific Theory and Scientific Evidence: An Analysis of Lie Detection, 70 Yale L. J. 695 (1961). For a list of some of the leading articles supporting the rule against the admission of polygraph evidence see, Polygraph at Trial, supra note 5 at 1122 n. 12.

9. "Unfortunately, the 'admission within the trial court's discretion' approach of [United States v.] DeBetham has often been used to exclude polygraph evidence at the whim of the trial court." Tarlowe, Admissibility of Polygraph in 1975: An Aid in Determining Credibility In a Perjury-Plagued System, 26 Hastings L.J. at 950 (1975). Tarlowe's apprehension is based on such cases as United States v. Watts, 502 F.2d 726

(9th Cir. 1974), United States v. Alvarez, 472 F.2d 111 (9th Cir. 1973) and extensive experience in other federal courts since United States v. DeBetham, 470 F.2d 1367 (9th Cir. 1972), cert. denied, 412 U.S. 907 (1973). Tarlower at 950 n. 163.

10. Masri v. United States, 547 F.2d 932 (5th Cir.), cert. denied, 434 U.S. 907 (1977) (White, J., dissenting) (trial judge had found that polygraph evidence proffered by the defense to prove lack of criminal intent was appropriate but Fifth Circuit excluded because of absolute rule barring polygraph evidence). The Court mentioned lie detection in Schmerber v. California, 384 U.S. 757 (1966), in discussing the privilege against self incrimination under the Fifth Amendment and suggested that despite its apparent focus on physical evidence, lie detector tests measuring changes in bodily functions during interrogation might actually be viewed as eliciting responses which were essentially testimonial.

11. 293 F. 1013 (D.C. Cir. 1923).

12. Lie detector tests had "not yet gained such standing and scientific recognition among physiological and psychological authorities, as would justify the courts in admitting expert testimony deduced from the discovery, development and experiments thus far made." Frye v. United States, 293 F. 1013, 1014 (D.C. Cir. 1923). This was the first appellate decision which considered the lie detector in its experimental stage when only blood pressure was monitored, See, e.g., United States v. Alexander, 526 F.2d 161 (8th Cir. 1975) (all United States Courts of Appeals addressing the issue have excluded the results of unstipulated polygraph tests as not commanding scientific acceptibility and not being sufficiently reliable to justify use in the trial process); United States v. Marshall, 526 F.2d 1349 (9th Cir. 1975), cert. denied, 426 U.S. 923 (1976); United States v. Russo, 527 F.2d 1051 (10th Cir. 1975), cert. denied, 426 U.S. 906, rehearing denied, 427 U.S. 913 (1976). For a comprehensive list of federal cases see Comment, The Truth About the Lie Detector in Federal Court, 51 Temple L.Q. 69 at 72 n. 13 (1978). See also Annot. "Modern Status of Rule Relating to Admission of Results of Lie Detector (Polygraph) Test in Federal Criminal Trials," 43 A.L.R. Fed. 68 at 70-71.

13. E.g., United States v. Lanza, 356 F. Supp. 27 (M.D. Fla. 1972), aff'd in a connected case, 489 F.2d 554 (5th Cir.), cert. denied, 421 U.S. 909 (1975); United States v. Infelice, 506 F.2d 1358 (7th Cir.), cert. denied 419 U.S. 1107, rehearing denied, 420 U.S. 956 (1974); United States v. DeBetham, 348 F. Supp. 1377 (S.D. Cal.), aff'd, 470 F.2d 1367 (9th Cir. 1972), cert. denied, 412 U.S. 907 (1973) (trial court found polygraph evidence reliable yet thought it did not have discretion to disturb settled rule of inadmissibility; reviewing court said it had not abused its discretion).

14. E.g., United States v. Flores, 540 F.2d 432 (9th Cir. 1976) (polygraph evidence injected confusing collateral issue into trial); United States v. Urquidez, 356 F. Supp. 1363 (C.D. Cal. 1973) (three long days spent listening to experts dispute variables affecting validity-administration of justice could not tolerate the burden of litigation inherently involved in such a process); United States v. Wilson, 361 F. Supp. 510 (D. Md. 1973) (cross examination posed formidable task and not even court, let alone a jury, could properly access competence). See also, Silving, Testing of the Unconscious in Criminal Cases, 69 Harv. L. Rev. 683 at 691 (1956) ("[t]he issue before us is whether we are to abandon our traditional system of adversary litigation with emphasis upon dignity, for 'scientific' trial with emphasis on truth").

15. United States v. Stromberg, 179 F. Supp. 278 (S.D.N.Y. 1959) (machine cannot be cross-examined and expert testimony interpreting it is

blatant hearsay - trial by jury of peers is not to be displaced); United States v. Bursten, 560 F.2d 779 (7th Cir. 1977) (whole panopoly of reasons advanced). See, C. McCormick, Evidence §207 at 507 (2d Ed. 1972) for view that the prospect of trial by lie detector is the unarticulated reason for the court's rejection of polygraph evidence. See also, Radek, The Admissibility of Polygraph Results in Criminal Trials: A Case for the Status Quo, 3 Loyola U.J.L. 289, 295 (1972).

16. Probably the leading case on stipulation is State v. Valdez, 91 Ariz. 274, 371 P.2d 894 (1962), although it also initiated a compromise by not merely accepting the reliability of the test results but making it subject to the trial judge's discretion if he was not convinced that the chosen examiner was qualified or that the test was properly conducted. It also guaranteed cross-examination rights and required jury instructions. Its standards have been adopted by numerous states and it has been followed also by federal courts, e.g., Herman v. Eagle Star Ins. Co., 283 F.Supp. 33 (C.D. Cal. 1966), aff'd, 396 F.2d 427 (9th Cir. 1968); United States v. Oliver, 525 F.2d 731 (8th Cir. 1975), cert. denied, 424 U.S. 973 (1976).

17. E.g., Pulaski v. State, 476 P.2d 474, 479 (Alas. 1970) ("A stipulation for admission does not increase the reliability of polygraph results and therefore should not lead to any deviation from the exclusionary policy.") For a reinterpretation of prior decision admitting polygraph evidence on stipulation, see, State v. Biddle, Crim. No., 61784, Mo. Sup. Ct. May 13, 1980, 27 Crim. L. Rep. 2210 (1980) (reexamined State v. Fields, 434 S.W.2d 507 (Mo. 1968) which had been read to permit stipulated polygraph evidence, and clarified the rules of the jurisdiction to be one of per se exclusion.

18. E.g., United States v. Ridling, 350 F.Supp. 90 (E.D. Mich. 1972). Commentators have agreed that only tests by court-appointed experts should be eligible evidence, e.g., Kaplan, The Lie Detector: An Analysis of Its Place in the Law of Evidence, 10 Wayne L. Rev. 381, 400 (1964); Note, Evidence: Lie Detectors: Discussions and Proposals, 29 Cornell L.Q. 535, 544 (1944).

19. See, e.g., Axelrod, The Use of Lie Detectors by Criminal Defense Attorneys, 3 J. Crim. Def. 107 at 154 (1977).

20. Although half of the states now require licensing of polygraph examiners, some only require minimal training as a prerequisite to holding oneself out as a lie detector operator. Other jurisdictions, because of steadily increasing polygraph use, have augmented attempts by polygraphists at self-regulation by following closely the standards they advise, e.g., Fla. State. §493.40-56 (1977), which regulates equipment, education, training, and financial responsibility. See, Note, Truth by Ordeal: The Growing Acceptance of Polygraph, 6 Fla. St. U. L. Rev. 1373 at 1375 and n.16 (1978) [hereafter Truth by Ordeal].

21. United States v. DeBetham, 348 F.Supp. 1377 at 1390 n.60 (S.D. Cal. 1972). For a list of states which have statutes proscribing pre-employment use, see, Truth by Ordeal, supra note 20 at 1378 n. 28. For reasons for opposition to the polygraph, see, e.g., Osterman v. Paulk, 387 F. Supp. 669 (S.D. Fla. 1974).

22. E.g., State v. Dorsey, 88 N.M. 184, 539 P.2d 204 (1975); People v. Daniels, Sup. Ct. Westchester Cty. Dec. 21, 1979, 26 Crim. L. Rep. 2385 (1980); State v. Anderson, Crim. No. 8805, D. Colo. Jan. 22, 1980, reported in 2 Nat'l L.J. at 10, col. 4 (April 14, 1980).

23. House Com. on Govt. Operations, The Use of Polygraphs and Similar Devices by Federal Agencies, H.R. Rep. No. 94-795, 94th Cong., 2d Sess. at 16-17 (1976) [hereinafter 1976 House Report]. This report virtually

reiterated the findings of the 1964 Hearings Before a Subcomm. of the House Comm. on Govt. Operations on Use of Polygraphs as "Lie Detectors" by the Federal Govt., 88th Cong., 2d Sess. (1964), that "There is no 'lie detector', neither machine nor human. People have been deceived by a myth that a metal box in the hands of an investigator can detect truth or falsenees." H.R. Rep. No. 198, 89th Cong., 1st Sess. at 1 (1965). In contrast, the Dept. of Justice has contracted for several studies, e.g., D.C. Raskin, G.H. Barland, M.A. Podlesny, Validity and Reliability of Detection of Deception, Final Report, Contract 75-NI-99-001 (1976), which have been favorable, and continues to use the lie detector test extensively, e.g., to investigate internal news leaks on the Abscam operation. Yet officials find no paradox in having a policy against admitting polygraph evidence at trial. See, 2 Nat'l. L.J. 1(April 14, 1980), and The Washington Post, March 18, 1980, at A18, col. 1. It was also apparently the basis on which the Dept. urged dismissal of the U.S. Attorney in Sacramento, Herman Sillas, Jr., for taking bribes. See, The Washington Post, January 13, 1980, at A6, col. 1.

24. E.g., United States v. Brown, 461 F.2d 134, 145-146 (D.C. Cir. 1972) (Bazelon, J., dissenting) (although eyewitness identifications may be less reliable than lie detector tests which are excluded by courts for their unreliability, the real difference is in the need for the information).

25. Tarlowe, supra note 9. On the unreliability of informers, see, United States v. Marshall, 488 F.2d 1169, 1170-71 (9th Cir. 1974) (appellate court overruled trial court's fact-finding on the basis of the stories of narcotics agents and instead found them thoroughly impeached, almost branding them as perjurors).

26. As far back as 1967, it was stated that approximately 95.5% of all criminal convictions in New York were by plea. President's Comm. on Law Enforcement and the Administration of Justice, Task Force Report: The Courts, 9 (1967). Many urban District Attorney Offices now employ full time polygraph operators. Polygraph at Trial, supra note 5 at 1127-28.

27. "[T]he Court was especially impressed with the evidence of widespread acceptance that the polygraph has received among federal and state law enforcement agencies, who apparently rely upon the technique in their day-to-day prosecutorial decision making." United States v. DeBetham, 348 F.Supp. 1377, 1389 (S.D. Cal. 1972); "[E]xtensive use by law enforcement agencies, governmental security organizations, and private industry throughout the country is testimony to the undeniable efficacy of the technique." United States v. Zeiger, 350 F.Supp. 685, 688 (D.D.C. 1972).

28. People v. Cutler, No. A176965, Super. Ct. Los Angeles Cty. Nov. 6, 1972, 12 Crim. L. Rep. 2133, 2134 (1972). We do not know, of course, the extent to which in any case the polygraph results are used in corroboration, rather than as a principal indicator of guilt or innocence. Note also that some courts require witnesses to undergo polygraph examinations in non-criminal cases. See, Pfaff, The Polygraph: An Invaluable Judicial Aid, 50 A.B.A.J. 1130 (1965).

29. "The result of such agreements is to revert the judicial process to a more sophisticated modern analogue of the ancient practice of trial by ordeal: if a defendant is able to pass the mechanical test he will go free; if not, he will be punished." Polygraph at Trial, supra. note 5 at 1140.

30. See the discussion on this in Pugach v. Klein, 193 F.Supp. 630, 633-35)S.D.N.Y. 1961).

31. See, e.g., Santobello v. New York, 404 U.S. 257, 260-61 (1971).

32. Compare the Court's recognition of its needed role in Fifth Amendment areas, particularly in Miranda v. Arizona, 348 U.S. 435 at 490 (1966), where the Court refused to defer its decision on the constitutionality of taking confessions from uncounselled suspects pending the action of state legislative bodies and advisory groups. See also, Amsterdam, Perspectives on the Fourth Amendment, 58 Minn. L. Rev. 349 at 378-379 (1974) for the view that legislatures have not been, are not now, and are not likely to become sensitive to the concerns of protecting persons under investigation by the police except in those areas where they may be stimulated by Court decisions that involve constitutional controversy, e.g., the court judging that resulted in the Omnibus Crime Control and Safe Streets Act of 1968.

33. In view of one polygraph expert, if the instrument is first properly explained, very few people refuse to be tested: an innocent person is usually happy to take the test to prove his truthfulness, while guilty persons will almost always agree to take the test because they feel they must if their pleas of innocence are to be believed. R.O. Arther, The Scientific Investigator, 37 (1970).

34. E.g., United States v. Jenkins, 470 F.2d 1061 (9th Cir. 1972), cert. denied, 411 U.S. 920 (1973) (after taking a private test, defendant offered to stipulate to another test and have both admitted, but the government refused and the trial court rejected the offer of defendant's "electrical oath helper"). Note also that by stipulating to what may be crucial evidence against his client, defense counsel could be deemed to be withdrawing a crucial defense. See, People v. Reeder, 65 Cal. App. 3d 235, 135 Cal. Rptr. 421 (1976). It would be incumbent on defense attorneys to have their clients pre-tested in advance of any stipulation. See, Axelrod, supra note 19 at 156-59.

35. The leading authorities on lie detection have estimated that a confession is secured in 50% to 70% of all tests. J. Reid and F. Inbau, Truth and Deception, 168 (1966). See also, R. Arthur and R. Caputo, Interrogation for Investigators, 212 (1959); C. Lee. The Instrumental Detection of Deception, 161 (1953) (rate of between 60% and 85%). These figures are consistent with those reported for some large metropolitan police department. Trovillo, Scientific Proof of Credibility, 22 Tenn. L. Rev. 743, 748 (1953).

36. Reid & Inbau, supra note 35 at 168 suggest that the "chief function" of the polygraph "appears to be to induce confessions by deception." Others agree: "To obtain a confession where guilt is indicated is the purpose and ultimate goal of the deception test, though a collateral and equally important objective is elimination of the innocent." Lee, supra note 35 at 161. Lee also advises the operator to tell the subject he is being deceptive, even before the conclusion is certain, in order to elicit a confession. "Some may question the ethics of such a procedure, but in the types of crimes in which the test is applied, it would seem that the interests of justice outweigh considerations of ethics, especially in this country, where the defendant's legal rights are so thoroughly protected". Id. at 187. See also, Axelrod, supra note 19 at 130-36.

37. E.g., Thompson v. Cox, 352 F.2d 488 (10th Cir. 1965) (accused's voluntary submission to lie detector test was a circumstance probing but not invalidating as a matter of law the voluntariness of a subsequent confession); United States v. McDevitt, 328 F.2d 282 (6th Cir. 1964) (confession was not rendered involuntary, and thus inadmissible, by reason of potential coercive effect of the polygraph examination itself, although examiner did not testify on the results). See generally, Annot. "Admissibility in evidence of confessions made by accused in anticipation of,

during, or following polygraph examinations," 89 A.L.R.3d 230 (1979) and Note, Polygraphy: Short Circuit to Truth? U. Fla. L. Rev. 286 at 312-16 (1977), [hereinafter Short Circuit to Truth].

38. E.g., Keiper v. Cupp, 509 F.2d 238 (9th Cir. 1975) (that defendant was crying and emotionally upset and that the test was taken in the early morning hours was insufficient to warrant setting aside funding of voluntariness of subsequent confession where Miranda warnings had been given prior to the taking of the test); People v. McGuffin, 55 App. Div. 2d, 772, 389 N.Y.S.2d 478 (1976) (record did not clearly reflect trickery and, in any case, trickery without more does not make a confession inadmissible; it must be accompanied by a threat or promise); cf., Frazier v. Cupp, 394 U.S. 731 (1969) (once waiver obtained, confession not involuntary although police knowingly and falsely informed defendant that co-conspirators had confessed).

39. E.g., People v. McCue, 48 I11.App.3d 41, 362 N.E.2d 760 (1977) (failure to give Miranda warnings prior to polygraph test not fatal to admissibility of confession where defendant voluntarily came to sheriff's office and was free to leave at any time, nor were statements to defendant that he might not go to jail impermissible promises).

40. Tyler v. United States, 193 F.2d 24 (D.C. Cir. 1951), cert. denied, 343 U.S. 908 (1952), accord, United States v. McDevitt, 328 F.2d 282 (6th Cir. 1964). Some of the cases may be given and the possibilities of coercion, e.g., United States ex rel. Monks v. Warden, 339 F.Supp. 30 (D.N.J.), aff'd per curiam, 474 F.2d 1337 (3d Cir. 1972) (series of 9 polygraph examinations over a 6-hour period on a 15-yr. old was product of police coercion); People v. Leonard, 59 App. Div.2d 1, 397 N.Y.S.2d 386 (1977) (defendant had had only 3 hours sleep, was physically sick and under severe stress, also operator told defendant that machine was infallible and knew the truth just like the defendant and God, and police told defendant that polygraph proved he was lying and would testify to this in court although such evidence was not admissible).

41. State v. Green, 271 Ore. 153, 531 P.2d 245 (1975) (prosecution cannot be the first to introduce evidence of defendant's polygraph test as an element of the circumstances surrounding the confession, but may do so once the defendant has chosen to inject the polygraph issue to show coercion).

42. See, Griffin v. California, 380 U.S. 609, 614 (1965) (comment on defendant's refusal to take the stand is impermissible).

43. E.g., Stack v. State, 234 Ga. 19, 214 S.E.2d 514 (1975) (jury might infer that defendant had failed test and accomplice had passed it because accomplice was allowed to plead to manslaughter with a 15-year sentence, while state demanded death penalty for defendant).

44. E.g., People v. Babcock, 223 Cal. App.2d 813, 36 Cal. Rptr. 178 (1963) (prompt objection by counsel which was sustained by the court and accompanied by a jury instruction to disregard remarks cured error in police officer's testimony from which it could be inferred that defendant either had failed the test or had refused to take it).

45. For a compilation of alternatives, see, Truth by Ordeal, supra note 20 at 1284-5.

46. 344 F.Supp. 522 (E.D.N.Y. 1971).

47. 373 U.S. 83 (1963). Brady only required disclosure to the defendant, however, not to the jury, and it can be distinguished also because the court there found that the declaration against penal interest carried an independent guarantee of reliability which satisfied the policy reasons behind exceptions to the hearsay rule.

48. 344 F.Supp. at 524. But cf., United States v. Glover, 596 F.2d

857, 867 (9th Cir., 1979) (test voluntarily taken by complaining witness, a gem dealer who had been robbed, was not admissible because it was unreliable, the examiner noting that the witness had gone without sleep and was not in an ideal state emotionally or physically; there was no Brady violation because the government had revealed the results of the polygraph test to the defendants).

49. 344 F.Supp. at 523.

50. See, discussion infra in text at 46-47 and accompanying notes.

51. E.g., United States v. Alexander, 526 F.2d 161, 168-69 (8th Cir. 1975). It is interesting to note that the same judge who found expert polygraph opinion relevant in a perjury case, precisely because it went to an ultimate issue, United States v. Ridling, 350 F. Supp. 90 (E.D. Mich. 1972), did not allow its use in a prosecution under the False Claims Act where the issues were not sharply defined and the evidence would not be useful. United States v. Levinson, 369 F.Supp. 575 (E.D. Mich. 1973).

52. E.g., instructions defining the function of the expert witness and informing the jury on the standards for evaluation in cases dealing with insanity defenses, as in United States v. Brawner, 471 F.2d 969 at 1008 (D.C. Cir. 1972).

53. Jenkins v. United States, 307 F.2d 637 (D.C. Cir. 1962).

54. Id. at 652 (dissenting opinion of Bastain, J., that majority ignored amicus curiae brief of Am. Psych. Ass'n urging the court not to qualify psychologists as experts to express opinions on medical diagnoses).

55. Id. at 651.

56. Id. at 643-45.

57. Id. at 645.

58. The number of examiners rose 50% to 1,200 between 1968 and 1973. See, Truth by Ordeal, supra note 20 at 1378. In United States v. Brown, 577 F.2d 541 at 557-58 (6th Cir. 1877), the court rejected an expert's ion microbic analysis of hair samples because the tests were not duplicated elsewhere and no other experts existed in the field. Thus there could be no expert to rebut the evidence and hence no basis for an evaluation of its weight.

59. For a comprehensive description of the polygraph, see. J. Reid and F. Inbau, Truth and Deception: The Polygraph ("Lie-Detector") Technique, (1966). (The second edition of 1977 shows no great variation in the technique.) [Hereinafter cited as "Reid and Inbau"].

60. E.g., a cardiotachometer can now be employed so as to display directly otherwise subtle variations in the rate of the subject's heartbeat. See, Axelrod, supra note 19 at 114 n.25.

61. Reid & Inbau, supra note 59 at 10. See also, Lykken, Psychology and the Lie Detector Industry, 29 Am. Psych. 725 (1954): "A point that must be emphasized is that the professional polygrapher almost never arrives at his final diagnosis on the basis of the polygraph records alone; the examiner, rather than the polygraph, is the actual 'lie detector'." Id. at 730.

62. Fed. R. Evid. 104(a): "Preliminary questions concerning the qualifications of a person to be a witness, the existence of privilege, or the admissibility of evidence shall be determined by the court ***."

63. Fed. R. Evid. 401: "'Relevant evidence' means evidence having any tendency to make the existence of any fact that is of consequence to the determination of the action more probable or less probable than it would be without the evidence."

64. Fed. R. Evid. 702: "If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by

knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise."

65. R. Lempert and S. Saltzburg, A Modern Approach to Evidence, 998 (1977).

66. R. Porro, Expert Witnesses: Crossroads of Law, Science and Technology, 2 Am. J. Trial Advocacy, 291 at 293 (1979). This standard has long been endorsed by McCormick in his insistence that it will allow courts to "arrive at a practical way of utilizing the results of scientific advances." C. McCormick Evidence, § 203 at 491 (2d Ed. 1972).

67. This would be the standard for judicially noticed facts under Federal Rule of Evidence 201(b): "A judicially noticed fact must be one not subject to reasonable dispute in that it is *** capable of accurate and ready determination by resort to sources whose accuracy cannot reasonably be questioned."

68. Reid & Inbau, supra note 59 at 234. See generally, studies cited in Short Circuit to Truth, supra note 37 at 289-283; Tarlowe, supra note 9 at 931-34. Some of the more frequently cited studies on reliability have been those done by D.C. Raskin and G.H. Barland, e.g., supra note 23, also Bersh, A Validation Study of Polygraph Examiner Judgments, 53 J. Applied Psych. 399 (1966). But see, e.g., Axelrod, supra note 19 at 130-33 who claims that accuracy for "verified" deceptive subjects may be substantially higher than that for unverified deceptive subjects because verification is generally by confession and the procedure encourages confessions, some of which may be false, with or without abuse on the part of the operator.

69. Axelrod, supra note 19 at 109 and 123-25.

70. See, e.g., Skolnick, supra note 8 at 694.

71. United States v. Alexander, 526 F.2d 161 at 163 (8th Cir. 1975).

72. Skolnick, supra note 8 at 703.

73. Cf., Jenkins v. United States, 307 F.2d 637 at 642 (D.C. Cir. 1962): "Though [the psychologists'] opinions were not mathematically demonstrable certainties, neither were they mere conjectures, suspicions or hunches." citing, Blunt v. United States, 244 F.2d 355, 364 (D.C. Cir. 1957).

74. Truth and Deception, supra note 59.

75. S. Abrams, Polygraphy Today, 3 J. Crim. Def. 85 (1977). (Abrams holds a Ph.D. in Clinical Psychology and is a Polygraphist at the Permanente Clinic in Portland, Oregon); Richard O. Arther, Director of The National Training Center of Polygraph Science and Managing Editor of, and primary contributor to, The Journal of Polygraph Science, which is the official publication of the Training Center. Arther holds a Master's Degree in Educational Psychology and is a Charter Member of the American Polygraph Association, aside from being a founding member of numerous other state and local polygraph organizations. In addition to numerous articles in The Journal, reference has also been made to his book, The Scientific Investigator, 26-38, 216-225 (1970).

76. For a detailed discussion of the extreme care and precision with which the formulation of questions is undertaken, see, Arther, 4:3 J. Polygraph Sci., Nov.-Dec. 1969).

77. See, Short Circuit to Truth, supra note 37 at 296-303 for an extremely comprehensive and well documented list of all variables affecting the reliability of a test.

78. Fed. R. Evid., 403: "Although relevant, evidence may be excluded if its probative value is substantially outweighed by the danger of unfair prejudice, confusion of issues, or misleading the jury, or considerations of undue delay, waste of time, or needless presentation of cumulative evidence."

79. Griswold v. Connecticut, 381 U.S. 479 (1965).

80. Washington v. Texas, 388 U.S. 14, 19 (1966).

81. This question was specifically raised in recent case considering and approving the use of polygraph evidence in post-conviction hearings. People v. Barbara, 400 Mich. 352, 255 N.W.2d 171 (1977). See also, Note, "People v. Barbara": The Admissibility of Polygraph Test Results in Support of a Motion for a New Trial, 2 Detroit Coll. L. Rev. 347 (1978).

82. See, discussion in Commonwealth v. Lykus, 367 Mass. 191, 327 N.E.2d 671 at 678 (1975).

83. "This court will not close the doors of the court to the light which is given by a diagnosis which all the rest of the world accepts and acts upon, even if the diagnosis is in part based upon facts which are not established by the sworn testimony in the case to be true." Jenkins v. United States, 307 F.2d 637 at 661 (D.C. Cir. 1962), citing, Sunquist v. Madison Ry., 197 Wis. 83, 221 N.W. 392, 393 (1928).

84. 384 U.S. 436, 448-54 (1966).

85. Reid and Inbau, Criminal Interrogation and Confessions (1962), a revision and enlargement of Lie Detection and Criminal Interrogation (3d ed. 1953), cited in Miranda at 448 n.9.

86. See, Axelrod, supra note 19 at 127-29 on the potential for use of the technique as a brainwashing device.

87. 384 U.S. 757 (1966).

88. Id. at 764. See also, the district court opinion in United States v. Zeiger, 350 F.Supp. 685 at 692 n. 33, where the court distinguished the case before it in which the defendant had voluntarily submitted to the test from one in which the taking of the test was opposed by the government.

89. Horvath & Reid, The Polygraph Silent Answer Test, 63 J. Crim. L.C. & P.C. 285 (1972). See also, Note, Pinocchio's New Nose, 48 N.Y.U.L. Rev. 339 at 351 n. 79 (1973).

90. Doyle v. Ohio, 426 U.S. 610 (1976).

91. A. Westin, Privacy and Freedom, 239-40 (1967).

92. Id. at 133-34 and notes thereto.

93. Note, Pinocchio's New Nose, supra note 89 at 351; United States v. Ridling, 350 F.Supp. 90 at 97 (E.D. Mich. 1972).

94. United States v. Dionisio, 410 U.S. 1, 5-7 (1973) (compelled voice exemplars not testimonial in nature).

95. Id. at 8-16. Cf., United States v. Mars, 410 U.S. 19, 21-22 (1973).

96. Westin, supra note 91 at 237, citing G.O.W. Mueller, "The Law Relating to Police Interrogation, Privileges and Limitations," in C.R. Sowle, Ed., Police Power and Individual Freedom, 141 (1963).

97. Id. at 237-38. See also, Note, Pinocchio's New Nose, supra note 89 at 350, and Axelrod, supra note 19 at 109 and n.7.

98. Testing of the Unconscious in Criminal Cases, supra note 14 and cited in Westin, supra note 91 at 238.

99. Westin, supra note 91 at 238.

100. C. McCormick, Evidence, § 154 at 337 (2d Ed. 1972).

101. Westin, supra note 91 at 238. Westin's analysis of the privacy issue is threefold: (1) the penetration into the domain of individual belief, tendency and inclination, which violates the constitutional injunction against the government's inquiring into beliefs as against acts; (2) the interference with the individual's sense of personal autonomy by the public machine sensing of his emotional responses; (3) the increased psychological power over individuals that authorities acquire when they can apply the black box/wires/interrogation panopoly to citizens seeking

employment. Compare, Time, Inc. v. Hill, 385 U.S. 374 (1967), cited in United States v. DeBetham, 348 F.Supp. 1377 at 1390 (S.D. Cal. 1972). In this case, however, the defendant was presumed to have waived his right because he had himself moved for the introduction of the polygraph results.

102. 410 U.S. 284 (1973).

103. E.g., United States v. Lanza, 356 F.Supp. 27 (M.D. Fla. 1972) (questions by Reid unsatisfactory because of sketchy knowledge of case and lack of precision); United States v. Wilson, 361 F.Supp. 510 (D. Md. 1973) (control question in controversy as possibly overlapped with relevant question).

104. R.O. Arther, The Scientific Investigator, 219 (1970): "The polygraph is a supplement not a substitute for field investigation. Generally, results of a polygraph examination will only be as good as the investigation which preceded the testing." (emphasis in original).

105. But, cf., United States v. Ridling, 350 F.Supp. 90, 97 (E.D. Mich. 1972), where the court suggested that consent to a test following regular Miranda warnings would constitute a valid waiver.

106. United States v. Stromberg, 179 F.Supp. 278, 280 (S.D.N.Y. 1959).

107. Douglas v. Alabama, 380 U.S. 415, 418 (1965). See also, 5 Wigmore, Evidence § 1395.

108. E.g., United States ex rel. Shadowy v. Fay, 284 F.2d 426 (2d Cir. 1960), cert. denied, 365 U.S. 850 (1961) (no constitutional right implicated by the failure to admit lie detector evidence); United States v. Bohr, 581 F.2d 1294 (8th Cir. 1978), cert. denied, 439 U.S. 958 (1978) (in wire fraud prosecution court properly excluded evidence concerning results of unstipulated evidence).

109. 344 F.Supp. 522 (E.D.N.Y. 1971).

110. Short Circuit to Truth, supra note 37 at 306-7.

111. Compare the argument in Truth By Ordeal, supra note 20 at 1392 n.100, that if the Brady argument raised in Hart had been raised in United States v. Zeiger [350 F.Supp. 685 (D.D.C.)., rev'd per curiam, 475 F.2d 1280 (D.C. Cir. 1972], where the polygraph test sought to be admitted had been administered by the police, it is possible that the admission would have been upheld. The government expert in Zeiger, Dr. Martin Orne, first expounded extensively upon the theory that examinations administered by a "friendly" examiner are less reliable. (For a discussion of the theory, see People v. Adams, 53 Cal. App.3d 109, 125 Cal. Rptr. 518 (1976), which cites Orne's published work on "The Friendly Polygrapher" in Norman Ansley, Ed., Legal Admissibility of the Polygraph (1975). In the Zeiger context, this proposition would have added support to arguments for the test's reliability, contrary to the government's intentions. However, Orne's own research refutes his theory since it demonstrates that criminal defendants, even when tested by a "friendly" examiner, are sufficiently motivated to allow the production of conclusive polygraph results. See, Tarlowe, supra note 9 at 959 and n.207, citing, Gustafson & Orne, Effects of Heightened Motivation on the Detection of Deception, 47 J. Applied Psych. 408-11 (1963).

112. 87 N.M. 323, 532 P.2d 912 (Ct. App.), aff'd, 88 N.M. 184, 539 P.2d 204 (1975).

113. 410 U.S. 284 (1973).

114. It also involved an application of the ancient voucher rule which the court rejected: "The availability of the right to confront and cross-examine those who give damaging testimony against the accused has never been held to depend on whether the witness was initially put on the

stand by the accused or by the state. We reject the notion that a right of such substance in the criminal process may be governed by that technicality or by any narrow and unrealistic definition of the word 'against'." Id. at 297-98.

115. E.g., United States v. Stifel, 433 F.2d 431, 435-41 (6th Cir. 1970), cert. denied, 401 U.S. 994 (1971) (wide discretion in trial court in determining whether state of neutron activation analysis technology warrants admission of expert testimony).

116. Compare the view that "*** usually only a defendant who thought he could attain a satisfactory result would agree to take the test." United States v. Alexander, 526 F.2d 161, 167 (8th Cir. 1975).

117. See generally, Johnson v. Zerbst, 304 U.S. 458, 465 (1938). See also, United States v. Oliver, 525 F.2d 731 at 734-35 (8th Cir. 1975), cert. denied, 424 U.S. 973 (1976), which admitted stipulated polygraph evidence, for the court's review of the strict standard required for a waiver.

118. See cases cited supra in notes 38 and 40.

119. 384 U.S. 436, 468 (1966).

120. Reid and Inbau, supra note 59 at 13, 26.

121. Arther, The Scientific Investigator, supra note 75 at 217, 220.

122. The "Catch 22" irony that the more the subject knows about the accuracy of the test, the less anxious and afraid of deception he will be and the less conclusive the results will be is noted in Note, Pinocchio's New Nose, supra note 89 at 354, 355 n.100.

123. Statistical evidence on reliability in the form of percentages was found to be prejudicial when presented to a jury because it did not warrant a finding of reliability in any particular case. Comm. v. Foley, Mass. App. Ct. May 21, 1979, 25 Crim. L. Rep. 2292 (1979).

124. Arther, The Scientific Investigator, supra note 75 at 217.

125. Miranda v. Arizona, 384 U.S. 436, 470 (1966).

126. Inbau & Reid, Lie Detection and Criminal Investigation, 181 (1953).

127. E.g., R.O. Arther, Model Polygraph Agreements & Stipulation, 8:2 J. Polygraph Sci., Sept.-Oct., 1973.

128. E.g., State v. Cunningham, 324 So.2d 173 (Fla. 2d Dist. Ct. App. 1976) (Stipulation was to polygraph test on robbery, but the suspect was questioned whether he had killed anyone), cited in Truth By Ordeal, supra note 20 at 1385 n.63, 1386.

129. E.g., United States v. Wade, 388 U.S. 218, 222-23 (1967), but cf., Neil v. Biggers, 409 U.S. 188 (1972) (evidence of pre-trial identification must be excluded if procedures unnecessarily suggestive unless, considering the totality of the circumstances, the identification was reliable).

130. In a recent case reconsidering and affirming the rule excluding polygraph evidence for any purposes, dissenting Justice Tate rejected the per se rule, although he suggested strict safeguards, including adequate counselled consent and strict monitoring of the conditions of the test. State v. Catanese, La. Sup. Ct. March 5, 1979, 25 Crim. L. Rep. 2061 (1979). The large degree of control which the attorney has over the content of the test, since he supplies information to the examiner and reviews the questions, may "come back to haunt him" in cross-examination if his conduct can be categorized as an attempt "to weave a path by which an otherwise deceptive witness can tell what appears to be the truth." Axelrod, supra note 19 at 153. Cf., United States v. Oliver, 525 F.2d 731, 738 (8th Cir. 1975) (one of the reasons the first polygraph test was held to be unreasonable was the limitations imposed by defense counsel on the

scope of the questioning--in fact evading the most important issue--but it was not prejudicial that the second expert was bound not to seek a confession).

131. Abrams, Polygraphy Today, supra note 75 at 99-100; Reid & Inbau, Truth and Deception, supra note 59 at 12-13. This does not, however, eliminate reaction such as embarrassment about prior illicit activity that the suspect has concealed. For discussion of this, see, Axelrod, supra note 19 at 171-72.

132. This is not to suggest that they do not necessarily formulate their questions very carefully, and that the process itself is teachable. See, e.g., R.O. Arther, Crime Question Wording, 4:2 J. Polygraph Sci., Sept.-Oct., 1969.

133. Compare the arguments in Truth by Ordeal, supra note 20 at 1388 n.73, that violation of the limits of a stipulation agreement which produced an admission or confession might force the courts to balance the public interest in punishing criminals against the public interest in enforcing or interpreting stipulation contracts strictly against the state.

134. In urging the admissibility of voiceprints, it has been argued that, in contrast to the polygraph, "the process of voice identification by an expert in an individual case can be demonstrated in court and questioned by an expert for the opposing side because both the voice recordings and the speech spectrograms taken of the recordings can be made available for other scientists, and indeed for the jury, to examine. On the other hand, the polygraph examination process cannot be reproduced because each polygraph examiner asks questions in different ways, and there is an individual psychological input to the polygraph examination that varies with each polygraph examiner." H.F. Greene, Voiceprint Identification: The Case in Favor of Admissibility, 13 Am. Crim. L. Rev. 171 at 197 (1975). Compare the conclusion of the Supreme Judicial Court of Massachusetts that "polygraph has, for decades, been the subject of study, debate and controversy. It is too late in the day for just another study. Rather the time is ripe for cautious judicial examination and evaluation. *** Actual testing in the courts is necessary before [a decision as to rejection or acceptance of the concept] can be made." Comm. v. A Juvenile, 365 Mass. 421, 313 N.E.2d 120, 129 (1974).

135. Axelrod, supra note 19 at 136.

136. E.g., United States v. Ridling, 350 F.Supp. 90, 96-7 (E.D. Mich. 1972) (experts chosen by the court under Fed. R. Crim. P. 28 and then Proposed Fed. R. Evid. 706 to retest defendant as an independent check).

137. Although the court in United States v. DeBetham did not have to reach this question, it suggested that to require submission to a test "would not seem unreasonable in light of the present procedures surrounding the admission of psychiatric evidence concerning a defendant's sanity." 348 F.Supp. 1377, 1389 (C.D. Cal. 1972) (citations omitted). There seems to be considerable difference, however, because a finding of insanity is an absolute defense to the crime, which polygraph evidence can never be, and a court must know whether a defendant is competent to stand trial, whereas it is precisely the function of the trial process to come to a conclusion about the truthfulness of the defendant's story, and the defendant has certain constitutionally protected rights by which he can control his contribution to that process.

138. Arther, Model Polygraph Agreement & Stipulation, supra note 127. See also, United States v. Alexander, 526 F.2d 161, 167 (8th Cir. 1975): "The test could also be taken by [a defendant] privately a number of times so that he might be able to so condition his reflexes as to beat the machine."

139. See, Tarlowe, supra note 9 at 960-61, particularly on the description of the experiment by Barland wherein five trained examiners reached identical conclusions in evaluating over 200 charts from over 70 subject examinees, having only the charts and the relevant questions on which to base their conclusions.

140. 18 U.S.C. § 3501; Fed. R. Evid. 104(c). See also, Jackson v. Denno, 378 U.S. 368 (1964).

141. Compare the requirement under Fed. R. Crim. P. 11 that the court determine that a guilty plea or one of nolo contendere was voluntarily made and that there was a factual basis for the plea. See also, Boykin v. Alabama, 395 U.S. 238 (1969).

142. That such guidelines are entirely practical is illustrated by Gordon v. United States, 383 F.2d 936, 939-40 (D.C.Cir. 1967), in which the court set out comprehensive guidelines on the factors trial courts should consider in exercising discretion to exclude or admit prior felony conviction offered by the government for impeachment, and the fact that subsequent opinions expressly relied on Gordon.

143. Note, Pinocchio's New Nose, supra, note 89 at 354.

144. United States v. Wilson, 361 F.Supp. 510, 513 (D. Md. 1973): "The specter of 'trial by polygraph' replacing trial by jury is more than a felicitous slogan."

145. United States v. Alexander, 526 F.2d 161 at 168 (8th Cir. 1975).

146. The offer was made in the original Frye case and was rejected. McCormick states that "[n]o one could reasonably contend that the lie-detector test should be conducted in the courtroom at trial. The conditions are too exciting, and the judge and jury are not competent to interpret the results." Evidence, §207 at 505 (2d Ed. 1972).

147. In Michigan, lineups are also videotaped. See, People v. Heading, 39 Mich. App. 126, 197 N.W.2d 325 (1972), which indicates that the court permitted the showing of a videotape of a lineup.

148. M. Merola, Modern Prosecutorial Techniques, 16 Crim. L. Bull., 232 at 245-251 (1980). The project was started in December 1975 and was funded by a grant from the Law Enforcement Assistance Administration, through the Office of Planning and Services of the New York State Division of Criminal Justice. Perhaps it is in just such an experimental project that the videotaping of polygraph tests could be initialed and a court could begin to make findings on its admissibility in court.

149. It is also recorded by a stenographer in case the video equipment malfunctions or the defendant is unwilling to be videotaped. Id. at 249 n.39. To show that no part of the tape has been erased and that the record is continuous, the camera at all times includes a view of a large clock on the wall in the interviewing room. After the interview, the technician makes one copy of the videotape and files the original under seal.

150. Id. at 250, n.40.

151. Id. at 251, citing People v. Stone, N.Y.L.J., March 28, 1978 at 6, col. 2 (Crim. Ct. N.Y. Cty. 1978).

152. See, Comment, Videotape: A New Horizon in Evidence, 4 J. Marshall J. Prac. & Proc. 339 (1971), and Annot. "Admissibility of Videotape Film in Evidence in Criminal Trials," 60 A.L.R.3d 333.

153. Moenssens and Inbau, Scientific Evidence in Criminal Cases (2d Ed. 1978).

154. Id. at 558-61.

155. Id. at 561.

156. "In this day and age the offeror [of polygraph testimony] is

unlikely to produce a 'quack' who supplements his income by doing occasional police or private eye investigations ***." Axelrod, supra note 19 at 148.

157. E.g., United States v. Wilson, 361 F.Supp. 510, 513 (D. Md. 1973).

158. Id.

159. Reid & Inbau estimate that in 1964 only 20% of those holding themselves out as examiners were competent. 50 A.B.A.J. 470, 473 (1964).

160. E.g., Tarlowe, supra note 9 at 965.

161. E.g., Note, Pinocchio's New Nose, supra note 89 at 359.

162. E.g., "It is also noteworthy that the educational prerequisites for a degree in psychiatry are uniformly higher than for completion of training in polygraphy," United States v. Wilson, 361 F.Supp. 510, 513 (D. Md. 1973). Cf., Axelrod, supra note 19 at 138: "The courts should not reason by analogy that the expert has had standardized training as does every doctor who possesses a medical degree ***."

163. See text supra p. 11 and accompanying notes.

164. Porro, Expert Witnesses: Crossroads of Law, Science and Technology, supra note 66 at 294-5.

165. E.g., United States v. DeBetham, 348 F.Supp. 1377, 1386 (S.D. Cal. 1972), quoting Reid & Inbau, supra note 59 at 257.

166. E.g., 14 Am. Jur. Proof of Facts 2d 1, which also gives comprehensive guidelines to cross-examination techniques.

167. United States v. Ridling, 350 F.Supp. 90, 96 (E.D. Mich. 1972). If the profession is not willing to have its methods so publicized, then the discipline may be a worthy target of the criticism that the whole process is a myth.

168. United States v. Urquidez, 356 F.Supp. 1363, 1367 (C.D. Cal. 1973).

169. E.g., United States v. Ridling, 350 F.Supp. 90 (E.D. Mich. 1972).

170. Note, Pinocchio's New Nose, supra note 89 at 359.

171. Compare the statement of this thesis in F. Haddad, Cross-Examination of the Medical Expert, 3 Am. J. Trial Advocacy 239 at 245-46 (1979).

172. 3 N.Y.S.2d 348, Queens Cty. Ct. 1938, cited in Axelrod, supra, note 19 at 139 n.112.

173. CR-79-179-LC (D. Mass. June 1973).

174. This case and a number of others are discussed in detail in Tarlowe, supra note 9 at 968-69 and accompanying notes.

175. No. 95459, Middlesex Superior Court, Mass. 1961.

176. 258 So.2d 497 (1972), cited in People v. Daniels, Sup. Ct. Westchester Cty. Dec. 21, 1979).

177. See, e.g., United States v. Ridling, 350 F.Supp. 90 at 98 (E.D. Mich. 1972).

178. Polygraph experts have been able to relax thus far, secure in the knowledge that courts have generally found no right to pre-trial discovery of polygraph evidence. See, Reid & Inbau, supra note 59 at 244-247.

179. 373 U.S. 83 (1963).

180. 427 U.S. 97 (1976).

181. E.g., R.O. Arther, Model Polygraph Agreement & Stipulation, supra note 127 at side 2: "*** the unscrupulous attorney can go from one expert to another until--at last--his client comes up truthful. Of course, each new polygraphist is never told that the person had been previously examined."

182. Compare the requirement of Fed. R. Civ. P. 26(b)(1), where the information requested must be relevant, and if inadmissible, must be calculated to lead to the discovery of other admissible evidence. The standard was applied to polygraph evidence in Frankenhauser v. Rizzo, 59 F.R.D. 339, 351 and n.3 (E.D. Pa. 1973).

183. This note accompanied the transmission to Congress in 1974 of proposed amendments to Rule 16 and are printed in H.R. Doc. No. 93-292, 93rd Cong., 2d Sess. (1974), and in 62 F.R.D. 271 (1974).

184. National Advisory Commission on Criminal Justice Standards and Goals, Courts, (1973). Standard 4.9: Pre-trial Discovery.

185. American Bar Association Project on Minimum Standards for Criminal Justice, Standards Relating to Discovery and Procedure Before Trial, Standard 3.2 (Approved Draft, 1970).

186. Committee on Rules of Practice and Procedure of the Judicial Conference of the United States, Preliminary Draft of Proposed Amendments to Rules of Criminal Procedure for the United States District Courts, Rule 16(b)(1970).

187. None of these proposals included discovery of defendant's statements or those by defendant's witnesses. Compare also the proposed new Canadian Evidence Code which specifically requires notice of proposed expert testimony, including the opinion and its grounds in both civil and criminal cases. Report, Canadian Law Revision Commission, Evidence, Code Section 72 (1976), cited in Rothstein, Practice Comment to Rule 705, Rules of Evidence for United States Courts and Magistrates, 292 (2d Ed. 1979).

188. 399 U.S. 78 (1970).

189. Id. at 85. Although the rule for polygraph requires full discovery, whereas a notice-of-alibi statute calls only for the defendant to disclose names and addresses of witnesses he intends to use to establish the defense, the comment still appears applicable because the importance of polygraph evidence is less. It may only raise a reasonable doubt of guilt, whereas an alibi is a complete defense.

190. 412 U.S. 470 (1973) (refusing to enforce a notice-of-alibi statute which did not grant criminal defendants reciprocal rights).

191. Id. at 474-76.

192. 422 U.S. 225 (1975).

193. Id. at 239. Cf., United States v. Wright, 489 F.2d 1181 (D.C. Cir. 1973) (pre Nobles view that with a few carefully limited exceptions of evidence which defense intended to reveal at trial, the defense was under no obligation to reveal evidence of any sort). For a narrower view of Nobles which would limit it to only an impeachment witness's prior statement, see, the detailed discussion in M. Scheininger, "United States v. Noble": A Prosecutor's Perspective, 14 Am. Crim. L. Rev. 1 (1976) and C. Rosenbleet, "United States v. Noble": A Defense View, Id. at 17.

194. 18 U.S.C. §3500 (1970). Cf., State v. Schlater, 170 N.W.2d 601 (Iowa 1969), where the defendant was denied his motion for the state to produce results of a polygraph test conducted upon an accomplice who testified against the accused and whom the defendant wished to impeach by the use of this evidence. The Iowa Supreme Court suggested that the polygraph test report is "the product of the investigator's selections, interpretations and interpolations and is not a substantially verbatim recital of the witness's narrative statements as required for application of the Jencks Act." Cited in Note, The Polygraph Technique: A Selective Analysis, 20 Drake L. Rev. 330 at 339 (1971).

195. Axelrod, supra note 19 at 157-58.

196. Id. at 158.

197. "[W]hether or not [the client] was actually lying, he may never

again believe anyone will trust what he says. His prospective testimony may thus plummet in value." Id. at 159.

198. E.g., State v. Bennet, 17 Ore. App. 197, 521 P.2d 31 (1973) (defendant questioned pursuant to stipulation revealed crimes for which he had not been charged), cited in Axelrod, supra note 19 at 117 n.40. Once the attorney feels he has a guilty client, Axelrod suggests that "it cannot be doubted that on some level, the attorney may work less hard for someone he thinks deserves punishment." Id. at 159. On the contrary, if he realized that deception may only mean a half-truth, he may work harder to ferret out the real story.

199. Scientific Evidence in Criminal Cases, supra note 153 at 622-23.

200. 18 U.S.C. § 3006A(e)(3), (1970).

201. As expressed in United States v. Theriault, 440 F.2d 713 (5th Cir. 1971), the right is founded on a due process requirement of fair administration of justice and equality of right for the indigent defendant. The request could not be denied merely because arrangements had previously been made to have the defendant examined by a prison psychiatrist. See also, United States v. Chavis, 486 F.2d 1290 (D.C. Cir. 1973) (funds granted where necessary for preparation and presentation of an insanity defense).

202. 361 F.Supp. 510 (D. Md. 1973).

203. Id. at 514.

204. 525 F.2d 731 (8th Cir. 1975).

205. United States v. Oliver, 492 F.2d 943 at 944 n.1 (8th Cir. 1974).

206. "We cannot conclude that the stipulated or consented to polygraph is so unreliable as to be inadmissible in this particular case. We deem it unnecessary to determine whether the polygraph has attained sufficient 'general scientific acceptance' to justify admission of polygraph results absent waiver or stipulation." Id. 525 F.2d 731 at 737 (8th Cir. 1975) (footnote omitted). See also, United States v. Penick, 496 F.2d 1105 (7th Cir.), cert. denied, 419 U.S. 897 (1974) (sustaining court's discretion to approve funds under 18 U.S.C. § 3006(a) for polygraph on only one of four counts as not a denial of due process, approving admission of the test results after adequate foundation had been laid in an evidentiary hearing, and affirming conviction).

207. See, Newman, The Right to Independent Testing: A New Hitch in the Preservation of Evidence Doctrine, 75 Colum. L. Rev. 1355 (1975).

208. E.g., People v. Taylor, 54 Ill. App. 3d 454, 369 N.E.2d 573, 575 (1977); see also, Recent Decisions, 1 Am. J. Trial Advocacy 372 (1978).

209. Cf., Comm. v. Vitello, 381 N.E.2d 582 (Sup. Jud. Ct. Mass. 1978) and Comm. v. Moynihan, 381 N.E.2d 575 (Sup. Jud. Ct. Mass. 1978), where funds were granted subject to a stipulation of admissibility. See also, discussion of these cases in note 216 infra.

210. People v. Daniels, Sup. Ct. Weschester Cty. Dec. 12, 1979, 26 Crim. L. Rep. 2385 (Feb. 6, 1980).

211. E.g., O'Connor, "That's the Man": A Sobering Study of Eyewitness Identification and the Polygraph, 49 St. John's L. Rev. 1 (1974); R.J. Ferguson, Jr., A.L. Miller, The Polygraph in Court, 6 (1973). But cf., "Unquestionably, identifications are often unreliable-perhaps consistently less reliable than lie detector tests, which we have in the past excluded for unreliability. *** The difference between our approach to polygraph tests and to identification is, no doubt, attributable at least in part to the perceived differences in our need for the information." United States v. Brown, 461 F.2d 134 at 145 n.1 (D.C. Cir. 1972) (Bazelon, J.,

dissenting opinion).

212. See, e.g., Brayley, "R. v. Phillion": An Intelligent Canadian Decision on the Admissibility of Polygraph Evidence? 13 U.B.C.L. Rev. 307 at 332-34 (1978), for a consideration of the difficulty in reconstructing the history of a crime for trial.

213. 344 F.Supp. 522 (E.D.N.Y. 1971), discussed supra at p.9.

214. See, e.g., Gideon v. Gideon, 314 P.2d 1011 at 1014 (Cal. App. 1957): "[T]he judge or jury charged with finding the truth could be confronted by as many lie detector opinions as to whether or not witnesses who gave conflicting testimony told the truth as there are conflicts. One of the primary functions of our trial courts, to find and declare truth, would then, like flotsam caught in a whirling eddy, go round and round and get nowhere."

215. One of the few detailed considerations of the rights and restrictions in the evidentiary use of polygraphy is in Note, Pinocchio's New Nose supra note 89 at 360-68. Another careful analysis, although outdated, appears in Kaplan, The Lie Detector: An Analysis of Its Place in the Law of Evidence, 10 Wayne L. Rev. 381 (1964).

216. E.g., Comm. v. Vitello, 381 N.E.2d 582 (Sup. Jud. Ct. Mass. 1978). The court described the polygraph examiner's role as that of an expert character witness because he has no special knowledge of the acts or circumstances surrounding the criminal event. At most, he can claim special knowledge of the truthfulness of the subject at the time of the examination. It conditioned both the defendant's and the prosecution's use of polygraphy testimony on the defendant's taking the stand. One of the policy reasons it gave was that if the polygraph evidence were favorable, a defendant with a criminal record might elect to testify where he otherwise would not, on the theory that the impact of the polygraph evidence would offset the prejudicial impact of his criminal history. In a companion case, Comm. v. Moynihan, 381 N.E.2d 575 (Sup. Jud. Ct. Mass. 1978). It upheld the trial court's ruling that the defendant, who had a long criminal record, could not introduce the favorable test results until he testified. See also, Case Comment, 63 Mass. L. Rev. 267 (1978).

217. See, e.g., United States v. Ridling, 350 F. Supp. 90, 98 (E.D. Mich. 1972).

218. "Testimony in the form of an opinion or inference otherwise admissible is not objectionable because it embraces an ultimate issue to be divided."

219. 350 F.Supp. 90 (E.D. Mich. 1972).

220. Id. at 98.

221. United States v. Oliver, 525 F.2d 731 (8th Cir. 1975).

222. United States v. Dioguardi, Crim. No. 72-1102 (E.D.N.Y. 1972).

223. In People v. Daniels, Sup. Ct. Westchester Cty. Dec. 21, 1979, the test concerned Daniel's presence and participation in a robbery and, pitted against a single eyewitness, the court said it could be introduced as direct evidence by either party on their direct case, regardless of whether the defendant had taken the stand.

224. 526 F.2d 161 (8th Cir. 1975).

225. Id. at 169. However, scientific tests such as speed detection by radar where speed is the central issue or a breathalizer or blood test where a central issue is intoxication are as conclusive as polygraph evidence.

226. C. McCormick, Deception Tests and the Law of Evidence, 15 Calif. L. Rev. 485, 502 (1927) (emphasis in original).

227. This view has also been explicitly rejected by states other than Massachusett, e.g., in State v. Souel, 53 Ohio St. 2d 123 at 132, 372 N.E.

2d 1318 at 1323 (1978). In addition to requiring a prior stipulation, it limited the use of polygraph evidence to corroboration and impeachment. See also, Note, "State v. Souel": Ohio Turns the Corner on Polygraph Evidence, 8 Cap. U.L. REv. 287 at 301 (1978). In R. v. Phillion, 74 D.L.R.3d 136 (1977), one of the reasons for the High Court's refusal to admit the polygraph evidence was that the defendant, who had previously confessed, elected not to give evidence on his own behalf and instead called 3 expert witnesses, a psychologist, a psychiatrist and a polygraphist: "[I]t seems to me to run contrary to the basic rules of evidence to permit the substitution of the opinion of a polygraph technician for the evidence which could have been given by the appellant himself." Id. at 140. (The psychiatrist's opinion was that the defendant had a deranged personality and that he tended to make up stories to attract attention to himself. The polygrapher, John Reid, concluded that Phillion had been lying when he had confessed.)

228. This was the posture in United States v. Zeiger, 350 F.Supp. 685 (D.D.C.), rev'd per curiam, 475 F.2d 1280 (D.C. Cir. 1972), where the defense offered the opinion and results of a test administered by a police officer. The trial court, after an extensive evidentiary hearing, ruled the test admissible and noted "the failure of the government to demonstrate significant disagreement with this basic proposition [of polygraph reliability], the absence of statistical data pointing to any other conclusions, and the accepted and widespread absorption of the polygraph into the operations of many government agencies." 350 F.Supp. at 689-90. (The reasons for reversal was probably through adherence to Frye, as is confirmed in United States v. Skeens, 494 F.2d 1050, 1053 (D.C. Cir. 1974), although there may have been technical reasons as well as narrated by Tarlowe, supra note 9 at 931 n.72.

229. One commentator has suggested that "[s]ome kind of best evidence doctrine may ultimately arise with regard to lie detectors. Were there no eyewitnesses? Is there no physical evidence that yields any conclusion? Are the only eyewitnesses interested parties? Is there currently a lawsuit between the complaining witness and the defendant? Does the case turn on relatively non-observable phenomenon, such as intent or knowledge? Is there a jury? Is this kind of evidence the only real form of rebuttal which a defendant in a particular case has?" Axelrod, supra note 19 at 154-55. This suggestion must be balanced against the view that the more polygraph procedure becomes standard procedure in a court or normalized as a form of evidence, the more it will be simply weighed along with all the rest of the evidence rather than accorded special significance.

230. E.g., Note, Pinocchio's New Nose, supra note 89 at 363. Compare, United States v. Stromberg, 179 F.Supp. 278, (S.D.N.Y. 1959) (the machine's "testimony" as interpreted by an expert is in that sense the most glaring and blatant hearsay.)

231. United States v. Ridling, 350 F.Supp. 90, 99 (E.D.Mich. 1972).

232. Note, Pinocchio's New Nose, supra note 89 at 363-64, citing, 3A.J. Wigmore, Evidence §§ 1420-22 (Chadbourn rev. 1970).

233. Id. at 365-66.

234. Griffin v. California, 380 U.S. 609 (1965).

235. The Griffin Court reserved the question whether an accused can require that the jury be instructed that his silence must be disregarded, while in Lakeside v. Oregon, 435 U.S. 333 (1978), the Court held that such protective instructions could be given, even over the objection of the accused that it drew attention to his silence.

236. Fed. R. Evid. 404(a)(1). Cf., Comm. v. Vitello, 381 N.E.2d 582 (Sup. Jud. Ct. Mass. 1978) (error to admit polygraph evidence as

substantive proof in the government's case in chief, notwithstanding prior stipulation; any admission only after the defendant testifies.)

237. See, Brayley, supra note 212 at 311 for an account of the Canadian court's decision in R. v. Wong. The expert, Dr. David Raskin, testified on his favorable opinion which confirmed an initial favorable test administered by the police on a murder suspect. Raskin testified that studies showed that if error results from the control question technique, it would tend to incorrectly identify an innocent party as guilty--a false positive. Here both results showed the subject to be truthful, which adds support to admissibility. (Nonetheless, the jury convicted Wong.)

238. See, e.g., Restak, "Brain Potentials: Signaling Our Inner Thoughts," Psychology Today, March 1979 at 42 (method of monitoring brain far superior to lie detector).

239. See, Fed. R. Evid. 105 (although this suggests that the instruction must be "on request" of a party).

240. Cf. Fed. R. Evid. 201(g), where even in the case of judicially noticed facts, the jury is not required in a criminal case to accept such facts as conclusive.

241. A leading example is State v. Valdez, 91 Ariz. 274 at 280, 371 P.2d 894 at 900 (1962). State v. Souel, 53 Ohio St.2d 123 at 132, 372 N.E.2d 1318 at 1323 (1978) reiterates the Valdez instructions. Another model instruction is given in Forum, "Fulton v. State and Anderson v. State" Insurmountable Barriers For the Polygraph." 12 Tulsa L.J. 682 at 696 (1977). See also, United States v. Zeiger, 350 F.Supp. 685 at 691 (D.D.C.), rev'd per curiam, 475 F.2d 1280 (D.C. Cir. 1972), for the conclusion that the burden on the judiciary to educate and instruct the jury was outweighed by the "comprehensibility and compressibility" of the expert's testimony.

242. Salem v. United States Lines Co., 370 U.S. 31, 35 (1962).

243. E.g., Dyas v. United States, 376 A.2d 827 at 832 (D.C. Ct. App. 1977).

244. Ibn-Tamas v. United States, 407 A.2d 626 at 635 (D.C. Ct. App. 1979).

245. Id., citing, Johnson v. United States, 398 A.2d 354 at 364 (D.C. Ct. App. 1979).

246. E.g., People v. Barbara, 400 Mich. 352, 255 N.W.2d 171 (1977); see also note 81 supra. But cf., United States v. Francis, 487 F.2d 968 (5th Cir. 1973), cert. denied, 416 U.S. 908 (1974) (trial judge not in error in ruling that no consideration could be given to the results of a polygraph test contained in a pre-sentencing report where the test had been made in the absence of and without notice to the government's counsel, and also noting that the identity and qualifications of the polygraph examiner were not provided).

247. With acknowledgement to Professor Anderson, who soothed the frustrations of studying the Supreme Court's decisions on the Fourth Amendment with this analogy, Perspectives on the Fourth Amendment, supra note 32.

* * * * * *

[Note: Where footnotes mention R.O. Arthur, it should read R.O. Arther. This was an error in the original copy.]

* * * * * *

William M. Waid, Stuart K. Wilson, and Martin T. Orne. "Cross-Modal Physiological Effects of Electrodermal Lability in the Detection of Deception." Journal of Personality and Social Psychology 40 (6)(1981): 1181-1125.

This study examined the effects of individual differences in electrodermal lability on cardiovascular, respiratory, and electrodermal responses (EDRs) in the detection of deception. On Day 1 each of 74 subjects rested quietly for 3 min. while skin conductance was recorded. Electrodermal lability was scored for each subject, those giving frequent nonspecific EDRs being labiles and those giving few being stabiles. On Day 2, usually 1 week later, 40 of the subjects attempted to deceive a professional polygraph examiner in a field-type test. The 34 remaining subjects attempted to convince the examiner, who was blind as to each subject's condition, that they were indeed being truthful. Deception by stabile subjects was detected less frequently than was deception by labile subjects. Among truthful subjects, the more labile were falsely detected as deceptive on more questions than were their stabile counterparts. Although accuracy of detection was greatest with EDR, the effects of lability on detection were similar for electrodermal, cardiovascular, and respiratory measures. Labiles also had a higher heart rate during the polygraph test than did stabiles. [author abstract]

William M. Waid, Emily Carota Orne, and Martin T. Orne. "Selective Memory for Social Information, Alertness, and Physiological Arousal in the Detection of Deception." Journal of Applied Psychology, 66 (2)(1981): 224-232.

This study examined the role of selective attention, as indexed by subsequent memory, in the social stress of a lie detection test. Forty deceptive and 34 truthful male college students attempted to convince a polygraph examiner, who was blind as to each subject's condition, that they were not lying. An experimenter tested the subject's recall of the questions he had been asked 1 1/4 hours after the polygraph test, without warning. Questions that were recalled had evoked significantly larger skin conductance responses (SCRs) (i.e., gave a larger SCR to relevant than to control questions) with control questions they did not recall, and the greater a deceptive subject's tendency to recall control questions rather than relevant questions the less likely he was to be detected. Innocent subjects were correctly classified mainly on the basis of SCR to relevant questions they did not recall compared with the SCR to control questions they did recall. [author abstract]

* * * * * *

One of the sublimest things in the world is plain truth.
Bulwer.

* * * * * *

* * * * * *

IF YOU HAVE MOVED OR ARE PLANNING TO MOVE - REMEMBER TO NOTIFY THE FOLLOWING PEOPLE:

APA MEMBER OR APPLICANT:

Al E. Clinchard, APA Treasurer
123 Bryan Street
Gretna, Nebraska 68028

William L. Bennett, APA Secretary
Ste. # 106 - Central Office Park
5805 Lee Highway
Chattanooga, Tennessee 37421

PUBLICATIONS' SUBSCRIBER:

Jan Pumphrey, Managing Editor
American Polygraph Association
P.O. Box 1061
Severna Park, Maryland 21146

* * * * * *

Correction to September 1981 Issue: page 129 footnote: Should read Both are now in private practice.

* * * * * *