

# *Polygraph*

JOURNAL OF THE AMERICAN POLYGRAPH ASSOCIATION

Volume 9

March 1980

Number 1

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PUBLISHED QUARTERLY

Polygraph 1980, 09(1) ©AMERICAN POLYGRAPH ASSOCIATION, 1980  
P.O. Box 74, Linthicum Heights, Maryland 21090

*The American Psychological Association  
Symposium on Preemployment Screening*

*Edward L. Levine  
Chairman*

[Editor's Note: On September 5, 1979 a symposium on the use of the polygraph in preemployment screening was held at the American Psychological Association convention in New York City. The symposium was chaired by Edward L. Levine of the University of South Florida. The participants included J. Kirk Barefoot of Cluett, Peabody & Company in New York; David C. Raskin of the University of Utah; Philip Ash of the University of Illinois at Chicago Circle; Marcia Atcheson, counsel to Senator Birch Bayh; and Edgar D. Gates of the American Maize-Products Company in New York. The papers presented herewith are the prepared remarks of the participants, and are presented in the order of presentation.

*Introductory Remarks for the Symposium  
Polygraph Examining for Preemployment Screening*

*Edward L. Levine  
University of South Florida*

Welcome to our Symposium on Polygraph Examining for Preemployment Screening. I am Ed Levine of the University of South Florida, Chairperson of the Symposium.

When used for preemployment screening, the polygraph is one of a set of reference and background checking procedures that may provide several types of information pertinent to employee selection. Among these types of information are excellence of past school or job performance, physical or mental health, character, and veridicality of information provided to the prospective employer by applicants.

Certain assumptions underlie the use of the polygraph for preemployment screening. First, polygraph exams presumably provide access to past behaviors of applicants that will predict their job behavior in the future. Secondly, polygraph examiners presumably know what aspects of past behavior to cover in the polygraph exam. In other words, within the framework of their portion of the selection process they know the predictive value of various types of information for selecting employees and choose the most predictive elements for the exam. Third, disclosures about any sort of applicant behavior are supposedly the right of the polygraph examiner, and through the polygraph examiner, the right of the employer.

Without a doubt the polygraph exam is controversial. The controversy surrounding its use is due to a crystallization in that exam of a conflict among several important societal values. On the one hand, polygraph examining is contrary to such societal values as equality and liberty. Any personnel selection procedure, the polygraph included, entails making invidious distinctions among applicants. Discrimination on grounds of individual differences, even where these differences are crucial for job performance, is antithetical to the value of personal equality. Moreover, the societal value of liberty may be construed as protecting persons from unwarranted interference with their actions, speech, attitudes and personality. People should be permitted to keep secret, even from polygraph examiners according to this value, any areas of their life they may desire to.

On the other hand, the polygraph exam is consistent with such values as liberty, property, profit and society's need to discover and reward normative behavior or punish non-normative behavior. The same liberty value that leads to concern for privacy, also may be interpreted to reinforce the view that employers should be free to do whatever they wish, including polygraph examining, to select new employees. The property value contributes to this point of view as well, since the property value holds that persons should be free to manage their own property in any way they see fit. Property in this instance of course refers to a business concern as a place of employment.

Central to a free enterprise system is the societal value of profit. Polygraph examining is consistent with this value to the extent that it enhances profitability by contributing to the appointment of those applicants who turn out to be productive, honest, long-tenured employees. Although governmental employers are not directly concerned with profit, polygraph examining would still be appropriate for them, to the extent that it leads to the appointment of better employees to serve the populace most efficiently, safely and effectively.

Finally, the polygraph exam contributes to society's need to insure that people behave according to its rules or norms. Those who have behaved consistently with societal values and norms, as determined by the polygraph exam, are rewarded by enhanced opportunities for a job. Those who have not are disqualified.

The continuing conflict among the societal values intrinsic to the use of the polygraph exam has resulted in battle lines being drawn among proponents and opponents in professional, scientific and legal arenas. In a recent study I and a colleague conducted on the polygraph exam and related background checking techniques, we learned that more "Sound and Fury" have been generated than cold, hard, scientific facts (Levine & Rudolph, 1977). With strong legislation concerning the polygraph exam waiting in the wings, and with the debate on its utility being conducted in the scientific and professional journals, it seems timely to take stock of the current state of the art in polygraph examining for pre-employment screening. To do this we are privileged to have with us today a distinguished panel, who will address this topic from several points of view; professional, scientific and legal. The session will begin with an abbreviated, role-played version of a more or less typical polygraph exam, administered by our first speaker, Kirk Barefoot, who is substituting for Ed Gelb. May I request that you hold questions

until all speakers have made their presentations.

Reference:

Levine, E.L. & Rudolph, S.M. Reference checking for personnel selection: The state of the art. Berea, Ohio: American Society for Personnel Administration, 1977.

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[Editor's Note: Kirk Barefoot described the pretest interview of a typical preemployment polygraph examination. He is a member of the American Polygraph Association. He did not speak from a prepared paper, so his remarks are unavailable for publication.]

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*Comparison of Polygraph Examinations in  
Criminal Justice and Personnel Selection*

*David C. Raskin  
University of Utah*

There are three major issues on which I would like to comment today. The first deals with the accuracy of detection of deception techniques and the scientific evidence which gives rise to conclusions concerning their accuracy. The second deals with the nature of deception testing techniques in the preemployment screening situation, and the third involves the legal and social aspects of the use of detection of deception techniques in our society. Unfortunately, there is great emotion surrounding each of these issues, and there have been erroneous and misinformed statements made with respect to each of those three aspects of the use of detection of deception techniques. Today I would like to attempt to present detailed information concerning each of those areas and correct some of the misconceptions which have been put forth by well-meaning but uninformed individuals and organizations.

Brief History and Current Uses

The attempt to use physiological measures for detecting truth and deception goes back to the latter part of the 19th century. Their initial development and application was motivated by a pressing need to aid investigation in criminal matters. Thus, lie detection, as it is commonly called, grew up within the law enforcement and criminal investigation efforts by duly constituted social agencies. Over a period of more than 80 years there have been major improvements in both the technology and instrumentation for recording physiological measures and the techniques of interviewing and question

structure for examining criminal suspects. Such techniques have gained widespread acceptance and usage in local and federal law enforcement agencies, military criminal investigation and security agencies, and intelligence efforts. Today there are virtually no major law enforcement agencies in our nation which do not make extensive use of polygraph techniques as aids in their investigations. Furthermore, such techniques have been used with increasing frequency in our judicial system and are becoming increasingly accepted by courts of various jurisdictions within our nation.

The most recent development involves the use of polygraph techniques and voice analysis techniques in the commercial sector of our society. It is stated by some that the use of those techniques by commercial firms and organizations has become the single largest application of lie detection techniques in our society. It is this use of the polygraph and voice stress analysis equipment which has caused the most controversy and the most concern among various sectors of our society.

Unfortunately, in the rush to stem the growing use of detection of deception techniques in the commercial sector, many well-meaning individuals and organizations have failed to adequately distinguish between their use in the commercial sector and their use as a legitimate law enforcement investigative tool and as aids in the defense of innocent individuals accused of crimes. I hope that my remarks today will help to clarify the differences both in accuracy and application between the commercial use in preemployment screening and the use in criminal investigation and the judicial process.

#### Detection of Deception Techniques

Since physiological detection of deception evolved in the context of criminal investigation, the techniques were designed to investigate and test the veracity of individuals accused of specific criminal acts, and the issue of the examination was fairly simple and straightforward. However, the design and conduct of such an examination and its interpretation are not as simple as one might wish. It is a very complex and subtle technique requiring extensive training and experience in interviewing and interpretation of physiological recordings. It also requires a question structure which is adequate to deal with the many problems which arise in attempting to draw inferences about truth or deception from a set of physiological recordings from the human subject.

The earliest type of test to be developed was called the relevant-irrelevant test. This test was developed by John Larson and Leonarde Keeler in the 1920's and 30's in this country. For many years it was the standard type of test used in law enforcement until the development of more adequate techniques after World War II. In its simplest form, the relevant-irrelevant technique includes questions about the crime (relevant) and questions totally unrelated to the crime (irrelevant). The relevant questions deal with the subject's direct involvement in the crime, and the irrelevant questions are items such as the subject's name, age, etc. The simple-minded theory of that test is that an individual who is being deceptive about his involvement in the crime feels very threatened by the relevant questions and shows larger autonomic physiological reactions to those questions. However, the innocent subject does not have those strong concerns, and therefore shows no greater

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reactions to the relevant as compared to the irrelevant questions. As we pointed out in a recent article in the Psychological Bulletin (Podlesny & Raskin, 1977), the relevant-irrelevant technique has many problems and does not adequately protect against the erroneous finding of deception on the part of an individual who is actually being truthful. Such errors are called false positives, and they occur when an individual shows strong autonomic responses to the relevant questions even though he is being truthful to those questions. Since all subjects know which are the relevant questions and would naturally be more concerned and threatened by such questions, it is likely that an innocent subject would respond strongly to those questions in spite of a truthful verbal response to them.

In order to overcome those problems of the relevant-irrelevant test, the control question test was developed by John Reid in 1947. That test has subsequently been modified by Cleve Backster and the United States Army, and it may include certain changes which have been made on the basis of research done primarily in my laboratory. The control question technique has become widely accepted in the polygraph field because it provides an opportunity for an innocent subject to become more concerned about other questions in the test as compared to the relevant questions. The control question test includes questions which are designed to provide a greater psychological threat to an innocent subject than do the relevant questions. For example, in a theft case a control question might be "During the first 18 years of your life did you ever take something which didn't belong to you?" This is a very difficult question to answer "No" with confidence that you are being completely truthful. Using a detailed pretest interview, all subjects are led to believe that such questions are important in determining their truth or deception with regard to the relevant issue of the test, and the theory states that those subjects should show stronger reactions to the control as compared to the relevant questions. On the other hand, the guilty subject is still more threatened by the relevant questions, and he should show stronger reactions to the relevant as compared to the control questions. Thus, we have a situation wherein the guilty subjects should show stronger reactions in the direction of the relevant questions and the innocent subjects should show stronger reactions in the direction of the control questions. If such a technique is to be successfully employed, it is clear that the examiner must have adequate training in psychological interviewing skills in order to be able to create the proper psychological atmosphere for such a phenomenon to occur.

### Accuracy of Control Question Tests

There are many conflicting claims with regard to the accuracy of control question techniques for the detection of deception. On the one hand, field examiners frequently testify to an accuracy rate of 99% or greater. On the other hand, organizations such as the American Civil Liberties Union testify to an accuracy rate which is no better than chance. Other critics sometimes acknowledge that the techniques work better than chance but no better than 70%. In the face of such conflicting reports and claims, how can one assess the accuracy of those techniques? It is that very question which led me into this field approximately nine years ago.

There are two basic methods which can be used for assessing the accuracy of detection of deception techniques: field research with actual cases, and laboratory research with simulated crime situations. Ultimately, the desire is to obtain enough information to make a reasonable estimate of the accuracy of those techniques in the field situation. However, there are a number of problems in regard to directly assessing accuracy by using actual field cases. The main problem is that it is extremely difficult to get absolute confirmation of truth or deception in a real case. In many instances the real facts are never known with absolute certainty, and the use of such a criterion is questionable in some cases. Therefore, the best one can do is to approximate the criterion of guilt or innocence in the field situation by using some substitute for absolute knowledge of the facts. Another possibility is to determine the accuracy of detection of deception techniques by selecting cases in the field which have been clearly confirmed with regard to the guilt or innocence of the individual involved. The problem with the latter approach is the selection of the sample which occurs by choosing only cases which have been definitely confirmed. It is difficult to generalize from such results to the total population of polygraph examinations and criminal investigations.

In spite of the limitations on field research, it is useful and enlightening to look at the data which have been obtained. Although there are many published reports of the accuracy of polygraph techniques with criminal suspects (see Barland & Raskin, 1973), the vast majority of such studies has serious flaws in design or is so lacking in scientific merit as to render the data nearly useless. There are a few studies which have been carefully designed and can provide some information on the question of accuracy in the field.

The most extensive study of field cases was reported by Bersh (1969) who used cases from the Criminal Investigation Division of the United States Army. From their files he obtained several hundred cases in which polygraph examinations and results and submitted the remaining file to a panel of expert criminal attorneys from the Judge Advocate General's Office. He asked those attorneys to make decisions about guilt or innocence based upon the information in the file and disregarding legal technicalities. When the four panel members independently agreed upon a decision of guilt or innocence, the decision of the panel was in agreement with the polygraph results in 92% of the cases. When a majority of three or more panel members agreed on the decision, the rate of agreement between the panel and the polygraph was 88%. These results provide strong evidence as to the accuracy of the polygraph technique, but it is not possible to separate the various sources of information which led to the decision by the polygraph examiner. The extent to which the decisions were based solely on the polygraph charts and not on the observation of the subject or the material contained in the case file is not possible to determine. However, it should be stated that the overall technique resulted in a high rate of accuracy using that panel criterion. To date, this remains the best study of that type in the field situation.

There are two other studies which attempted to assess accuracy using criminal cases in the field situation. One of those was done in my laboratory (Raskin, Barland & Podlesny, 1976), and it used procedures similar to

the Bersh study. The findings indicated an accuracy of approximately 86-88% using a panel criterion and the criterion of judicial outcomes in the actual trials. However, the sample was relatively small, particularly with regard to the number of innocent subjects obtained, and the information provided to the panel was relatively sketchy compared to the files provided to the panel members in the Bersh study. Thus, the results of that study cannot be accepted with the same level of confidence as those of the Bersh study. It should be pointed out, however, that the apparent rate of false positive errors in that study was fairly high, but it is not possible to determine whether that was a result of the personal characteristics of the single examiner who conducted all of the examinations, or the nature of the sample, or the weakness of the technique. At any rate, I do not consider this to be as compelling a study as the Bersh study.

The third study using criminal subjects was reported by Horvath (1977). It is not a validity study in the same sense that the Bersh and Raskin et al. studies are. It utilized only cases which were confirmed by confession of the guilty party in each case, and the main part of the results was based on the independent chart evaluations by examiners who had no contact with the subjects nor any information about each case. Therefore, the sample was relatively restricted in terms of its representativeness of the general population of polygraph cases, and the results refer mainly to the extent to which those polygraph examiners accurately interpreted a set of polygraph charts in the absence of contact with the subject or other information. Horvath reported accuracy rates of only 64% when the blind polygraph chart interpretations were compared to the actual result which was obtained by the original examiner. However, it should be pointed out that the polygraph examiners who were utilized in that study did not have adequate training in the interpretation of polygraph charts. In fact, 9 of the 10 examiners were trained at a school which is extremely deficient in terms of the adequacy of their instruction and chart interpretation. Therefore, the results of the Horvath study cannot be given serious consideration in assessing the accuracy of polygraph techniques.

There are five other published studies of the type reported by Horvath in which the object was to assess the accuracy of blind chart interpretation by polygraph examiners of examinations obtained from confirmed criminal cases. In a recent article (Raskin & Podlesny, 1979) we described the results of those five studies. Using 1204 decisions by 55 polygraph examiners the results indicated an overall accuracy rate of 90% with guilty subjects and 89% with innocent subjects. When numerical evaluation techniques were used those figures were 100% with guilty subjects and 95% with innocent subjects. We have obtained similar findings in three laboratory experiments, and it is clear that properly trained persons can blindly interpret polygraph charts with an extremely high degree of accuracy. Therefore, the results of the Horvath study seem to be mainly a function of the inadequate training given to the polygraph examiners in the area of chart interpretation.

Although the type of field studies which I have just described are useful in attempting to assess the accuracy of polygraph techniques with criminal suspects, they do have serious limitations with regard to obtaining a representative sample of such cases and the necessary information to assess



the accuracy of the polygraph test with absolute certainty. Therefore, it is important and extremely useful to use controlled scientific laboratory studies to obtain additional information on the accuracy of polygraph techniques. For many years such studies have been reported in the literature, but it is unfortunate that very few of them are directly relevant to the problem of assessing the accuracy of field polygraph techniques. In general, those studies reported by scientists can be characterized as being of more interest to the scientific community and to psychologists in particular than of use in answering the question of accuracy of field polygraph techniques. That is mainly due to the fact that such studies have typically failed to employ the actual techniques which are practiced in the field situation, and the scientists who have conducted such studies have had little or no training in the use of polygraph techniques for the detection of deception. The research from our laboratory has attempted to overcome those problems.

In 1970 I embarked upon a research program to assess the accuracy of field polygraph techniques using a carefully controlled situation which simulated as closely as possible the actual field situation of a person accused of a crime. Before embarking upon this research, my student assistants and I obtained training in field polygraph techniques from recognized schools which teach those techniques. We then designed experiments which were reasonable simulations of the real-life situation and employed techniques as they are utilized by field polygraph examiners. We also employed carefully constructed experimental designs and used sophisticated scientific equipment and methods of analyzing the physiological responses. All of this work has been conducted and funded under grants from the National Institute of Law Enforcement and Criminal Justice (LEAA), the National Institutes of Health, and the University of Utah.

The major advantage of laboratory research is the control which it provides over the situation and the absolute certainty of ground truth which is available for the assessment of the accuracy of the polygraph technique. Furthermore, it allows control over many other variables, it brings to bear the power of sophisticated scientific equipment and computer techniques for evaluation of physiological responses, and it allows a detailed statistical analysis using the techniques which are commonly accepted by scientists within the fields of psychology and psychophysiology. It also overcomes the sampling problem inherent in those studies which select only cases which have been confirmed by confession.

In our studies the subjects are randomly assigned to either a guilty or innocent condition using a mock crime situation, and half of the subjects are guilty and the other half are innocent. However, the examiner who conducts the actual polygraph examination is completely uninformed with regard to the guilt or innocence of the subject. It is his job to employ the polygraph technique to arrive at a decision of guilty or innocent, and his accuracy using that technique can be assessed in terms of the ground truth which is known only by the other experimenters. Furthermore, extensive interpretations and analyses of the charts are done by individuals who have no contact with the subjects, and the extent to which decisions can be based purely on the polygraph charts can then be assessed. In all of our experiments, the accuracy of the results is reported on the basis of blind polygraph chart interpretations.

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In the last few years we have completed three major experiments which attempted to assess the accuracy of control question polygraph tests along with a number of other questions which were included in the research. They employed a mock theft in which half of the subjects were guilty and the other half were innocent of taking money or jewelry from an office. All of the subjects were offered a monetary bonus for producing a truthful outcome on the polygraph test, which is a simulation of the reward structure in real life where every guilty and innocent person attempts to produce a truthful outcome. In one experiment (Raskin & Hare, 1978) all of the subjects were convicted felons, half of whom were clinically diagnosed as psychopathic. In the other two experiments (Podlesny & Raskin, 1978; Rovner, Raskin & Kircher, 1978) the subjects were obtained from the general community by means of newspaper advertisements, and they were paid for their participation. Those samples seemed to have obtained a fairly good cross section of the community and they probably represent the general type of person who would be most likely to be taking polygraph examinations in a criminal investigation context. The last experiment which we conducted also assessed the extent to which detailed knowledge about the control question technique and actual practice in attempting to beat the test would influence the accuracy of the examinations conducted on those people. That experiment was funded by LEAA in order to attempt to assess the risks posed by the increasing amount of information available to the general public concerning the control question techniques and the extent to which access to such information might reduce the accuracy of such techniques employed by law enforcement and other agencies in the judicial process.

The results of these studies have been quite consistent. The study with the convicted felons and psychopaths produced an accuracy rate of 96% in terms of decisions rendered by the polygraph examiner. Furthermore, not a single guilty subject was able to produce a truthful outcome on the polygraph test, including the psychopaths who were part of the subject population. Therefore, the study also shows that polygraph techniques are highly accurate even with a population of psychopathic criminals. The second and third studies produced accuracy of decisions of 94% and 95%, respectively, when the standard control question test was employed. Again, the results were highly favorable to the accuracy of the control question technique. It should be pointed out, however, that extensive information and practice and suggestions on ways to beat the test enabled a few subjects to produce truthful outcomes when they were lying and also caused a few subjects to produce deceptive outcomes when they were being truthful. Therefore, there does appear to be some risk of erroneous results when individuals are not only provided with extensive information and suggestions on ways to beat the test but are also given extensive, detailed training and practice tests which are highly similar to those employed in the final examination. However, we do not see this as a very serious problem, because the practicalities of the situation would seem to indicate that such circumstances would not readily arise due to a lack of availability of the proper training from individuals who are both competent to do it and unethical enough to provide the services.

The overall results of our laboratory research with the control question technique indicate an accuracy in that situation of approximately 95%. The data from field studies which can be reasonably interpreted as providing

useful information on the accuracy issue seem to indicate an overall rate of accuracy somewhere on the order of 90%. When one combines the accuracy of those reported field studies with that obtained from our extensive laboratory research, it appears that the accuracy of properly-conducted control question examinations is somewhere in the neighborhood of 90%, perhaps slightly higher. However, it should be pointed out that the majority of the errors obtained in these situations seems to be in the area of false positives, that is, innocent or truthful people appearing to be deceptive on the polygraph test due to their overly strong reactions to the relevant questions. Therefore, the accuracy of the technique is slightly higher with guilty subjects than it is with innocent subjects, a finding which is not as disturbing as it might appear at first glance.

### Polygraph and the Judicial Process

If the accuracy of polygraph tests of the control question type is higher with guilty subjects than it is with innocent subjects, for practical purposes one can put higher confidence in a result which indicates truthfulness than in a result which indicates deception. In other words, when a truthful result is obtained, that is more likely to be correct than when a deceptive result is obtained. Therefore, one would have higher confidence in acting on the basis of an obtained truthful result than in taking action on the basis of a deceptive result. The latter should provide more cause for caution.

As we have pointed out elsewhere (Raskin, 1978; Raskin & Podlesny, 1979), the higher confidence in a truthful result as compared to a deceptive result fits nicely with our judicial standards for acquittal and conviction. Since polygraph evidence is simply another piece of evidence in a complex set of data, a deceptive result on a polygraph test does not provide an adequate basis for conviction or even for proceeding with a prosecution. No competent and ethical prosecutor would take a case to trial where the only strong evidence against the defendant is a deceptive outcome on a polygraph test. Far more than that is required for trial and conviction, and a deceptive polygraph examination would simply be the cause for pursuing the investigation in that direction.

The usefulness of a truthful outcome on a polygraph examination is much greater. In a system where conviction must be based on the standard of "beyond a reasonable doubt," the high confidence one can place in a truthful polygraph examination should be adequate to cast a reasonable doubt in the absence of overwhelming evidence of guilt. Therefore, in cases where the evidence is not extremely compelling, a truthful result on a polygraph examination should be adequate to either dismiss the charges or to lead a jury or court to a decision of acquittal. In many jurisdictions it has become widespread practice for district attorneys and prosecutors to dismiss cases when a truthful polygraph result is reported by a reputable examiner and there is not extremely compelling evidence of the guilt of the suspect. Furthermore, truthful results on polygraph examinations are widely used by law enforcement agencies to eliminate innocent suspects in the early stages of the investigation process and to concentrate their efforts in more fruitful areas. This is of great benefit to law enforcement agencies in their

efforts to solve cases and to minimize the impact of investigations and arrests on innocent people. Polygraph examinations are also of great usefulness to defense attorneys in the preparation of their cases and in their attempts to gain acquittals for innocent defendants. When properly used by law enforcement or private attorneys, such techniques can be of great benefit to individuals and to society.

It has been suggested that the extensive use of polygraph evidence in the courtroom situation will overwhelm the jury because of its scientific aura and it will essentially replace the jury system. However, in recent years there has been enough experience to indicate that such a fear is unfounded. There are many reported cases in which polygraph evidence has been given little weight by juries. They have shown a healthy scepticism of such evidence, and in some instances they have convicted defendants in spite of testimony that the defendant passed a polygraph examination. In the State of New Mexico polygraph examinations have been admissible at trial on the basis of a 1975 New Mexico Supreme Court decision. After several years of extensive experience with polygraph examinations in New Mexico courts, such evidence has been clearly shown to be of benefit to the judicial process and has not caused many of the problems which so many opponents of polygraph have feared. Juries have not come to expect to hear polygraph evidence in most cases, and they have not been overwhelmed with the presentation of such evidence in those cases where it has been utilized. However, it is my impression that the use of properly conducted polygraph tests by competent examiners has been a great aid to the administration of justice in the State of New Mexico as well as other jurisdictions where it has been increasingly used in recent years.

#### Preemployment Screening

So far my remarks have been directed at the area of polygraph examinations on specific issues arising out of a criminal investigation situation. It is my opinion that examinations in such instances are highly accurate and useful when employed by competent and ethical examiners. However, the situation changes dramatically when one considers the use of polygraph examinations in the commercial sector, particularly for the preemployment screening of employees. Such tests differ markedly from the specific control question examinations which I have already described. Given the information and data which I have presented concerning criminal specific control question examinations, it is now possible to examine the use of polygraph techniques in preemployment screening and to assess their desirability on both a technical and a social basis. There are at least 10 ways in which preemployment testing differs from criminal specific control question tests.

One of the basic requirements for obtaining highly accurate results with polygraph examinations is the voluntary cooperation of the subject. In the criminal investigation context all examinations are voluntary in the formal sense, because the individual's rights are protected by the United States Constitution, and those rights must be knowingly waived in order to consent to a polygraph examination. Only when the subject feels that he has the option of refusing to submit to the examination can the examination be conducted in the proper atmosphere of professional objectivity and confidence which is required for accurate results. Unfortunately, the application of

polygraph techniques in the preemployment situation violates this requirement of voluntariness. In most instances the subjects are required against their will to take the examination as a precondition for employment. Under such circumstances the examination is coercive and is likely to produce feelings of resentment which could strongly interfere with the accuracy of a polygraph examination. It can also cause the individual a great deal of emotional stress and anguish which is undesirable from a social point of view.

The second problem with commercial examinations involves the amount of time devoted to the examination and the nature and duration of the pretest interview. A properly conducted specific examination using the control question technique typically requires approximately two hours or more to conduct. It involves an extensive pretest interview for the establishment of a proper psychological atmosphere in which the test has a chance of producing an accurate result. The application of polygraph techniques in preemployment screening typically violates those procedures and requirements. The examination often run as little as 10 minutes, with a typical examination running approximately 30 minutes. Under those circumstances it is impossible to establish the proper psychological atmosphere and the proper psychological set for the examination to be accurate to the extent that I have described in regard to criminal specific examinations.

A third difference with regard to employment testing involves the nature of the polygraph test itself. In contrast to the carefully constructed control question test format, the employment screening test does not employ the same number and type of control questions, and it deals with rather vague and general issues. It often employs a long series of relevant questions, in contrast to the maximum of three or four relevant questions which are employed in the criminal investigation context. The lack of a rigorous format with carefully constructed control questions and the overly large number of relevant questions typically used in the employment screening polygraph test certainly reduces the accuracy of such tests.

A further problem with the employment type test involves the nature of the relevant questions. Since the questions are general and involve large periods of time in the subject's life as well as a wide variety of behavior and intentions, the relevant questions are not true relevant questions in the same sense as those employed in specific examinations. The vagueness of the relevant questions and the general nature of those questions makes them much more like the control questions which are employed in criminal specific tests which would lead to a higher rate of reactions to those questions than would be found with the usual, narrowly-defined questions which are used as relevant issues in criminal examinations. Therefore, the accuracy of employment tests is again suspect.

A fifth problem with employment polygraph examinations is that there is not a specific issue to be covered by the examination. In the criminal investigation context there is a particular crime which has occurred, and the problem is to assess the subject's truthfulness with regard to his denials of participation in that crime. In the employment screening situation there is no specific issue and no particular past incident which is to be investigated. Instead, there is a variety of vague questions regarding a long period of prior activities in a number areas, some of which may be

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very personal in nature and have no proper place in the employment situation. As a result, it is difficult to assess the accuracy of such tests. The personal nature and invasion of privacy engendered by some of the questions can cause strong emotional reaction and resentment on the part of the subject which would produce physiological reactions that are indistinguishable from those associated with deception.

In contrast to the specific criminal examination which investigates a past event, the purpose of the employment screening test is to assess the suitability of the subject for employment by that company in a particular position. Therefore, rather than attempting to assess truthfulness with regard to involvement in past events, the employment screening test attempts to assess and predict future performance on the job. This is a totally different enterprise from polygraph examinations on specific issues, and we know that prediction of future performance in any situation is an extremely difficult thing to do, even with the most sophisticated of psychological tests. Therefore, we could not expect employment polygraph examinations to approach the accuracy of specific examinations which deal with possible involvement in a past event.

One of the greatest problems with the use of polygraph examinations for employment screening purposes is the fact that there are no scientific data with regard to the accuracy of preemployment polygraph examinations. In contrast to what I consider to be fairly extensive research and data leading to the conclusion of approximately 90% accuracy for criminal specific polygraph examinations, there is not a single scientific study with regard to the accuracy of preemployment polygraph examinations. In fact, it would be extremely difficult to design a scientifically adequate study to assess the accuracy of employment screening examinations. In order to accomplish such a study in a successful manner, it would probably be necessary to institute a highly sophisticated surveillance system in a real work situation which would allow the establishment of ground truth in those areas covered by the employment screening examination. Such a surveillance system would not only be costly and impractical, but it would offend our sensibilities and notions of social justice and privacy which are basic to our social structure. Therefore, I do not foresee the development of adequate data for the assessment of the accuracy of employment testing in the very near future.

Even if polygraph examinations in the employment situation were known to be highly accurate, it is interesting to note that the results of the polygraph test itself are typically not used by the employer for making hiring decisions. It is not the outcome on the polygraph charts and the interpretation of truth or deception by the examiner which cause the employer to hire or not to hire, it is typically the admissions made by the subject in the pretest phase or posttest phase of the examination. It has been recently reported (Barland, 1977) that approximately 90% of job applicants rejected after having taken a preemployment polygraph examination were rejected on the basis of their own admissions, not on the basis of the results obtained from the polygraph test itself. It has been my experience that most polygraph examiners who conduct preemployment tests readily acknowledge that their main purpose is to obtain admissions from the subject which would then disqualify him from the job. In that sense, the polygraph examination

is a subterfuge and is simply used as a cover-up for eliciting damaging admissions against interest by the subject so that such admissions can be reported to the employer. The subject is usually admonished to tell the truth and to admit any past activity in the areas of the questions so that he can then pass the polygraph examination. He is thereby led to believe that his admissions will be of benefit to him, but in fact it is those very admissions which in approximately 90% of the cases of rejection are used as the basis for failing to hire the applicants. The polygraph testing atmosphere simply serves the function of increasing the likelihood of such admissions, and it does not provide useful information based on the polygraph charts themselves.

Another major argument against the use of polygraph examinations as a screening device is based upon the notions of conditional probability. If one accepts the assumptions that polygraph tests are 90% accurate and approximately 20% of job applicants are being deceptive on some of the major questions (Barland, 1977), then one can calculate what percent of truthful and deceptive subjects will be correctly and incorrectly diagnosed in a large sample of subjects. Given those assumptions, preemployment polygraph tests on 1000 subjects would yield the following results: of the 200 deceptive subjects, 180 would be correctly diagnosed as deceptive and 20 would be incorrectly diagnosed as truthful; of the 800 truthful subjects, 720 would be correctly diagnosed as truthful and 80 would be incorrectly diagnosed as deceptive. Of the 260 diagnosed as deceptive, 80 of those were actually truthful. Thus, of those found to be deceptive, 31% were actually being truthful. That is a very high rate of false positives leading to denials of employment if the polygraph examinations were used as the basis for a decision. Similar results would not occur in the criminal investigation context, since the base rate for deception in that situation is probably 50% or higher, and the accuracy of the technique would not lead to such a high rate of false positives. One would have to assume an equally high rate of approximately 50% deception in the employment situation in order to achieve the 90% accuracy of which the technique is capable with regard to truthful subjects.

#### Voice Stress Analysis

So far I have not dealt with the question of voice stress analysis as employed by the Psychological Stress Evaluator (PSE), the Mark II Voice Analyzer, or the Hagorth HS/2. Those techniques are fairly recent developments in the attempt to detect truthfulness and deception. It appears that such techniques are attracting increasing interest in the commercial and business community. Such interest is based on frequent claim of near infallibility of those techniques in identifying truthful and deceptive subjects. However, almost all of those claims are based upon a lack of scientific data or on studies which have no scientific merit. In fact, the testimony of a witness representing the International Society of Stress Analysts at your hearing on November 16, 1977 made glowing claims for the accuracy of voice stress analysis, but the testimony failed to include reference to a single scientific study assessing the accuracy of decisions of truthfulness or deception in an investigation context.

To my knowledge there are only four scientifically conducted studies which assessed the accuracy of voice stress analysis in detecting truth and deception. The study of Professor Kubis at Fordham University performed under contract with the U.S. Army indicated an accuracy of the Psychological Stress Evaluator which did not exceed chance levels. Similar findings have been reported by Professor Frank Horvath at Michigan State University and researchers at the Royal Ottawa Hospital in Canada. Using criminal suspects in a situation which is more difficult to evaluate, one of my students, Gordon H. Barland, also obtained results which did not exceed chance. Therefore, the present state of the scientific literature does not support the claims of high accuracy of voice stress analysis.

### Summary and Conclusions

I would like to conclude by summarizing my findings and opinions with regard to the use of detection of deception techniques in our society. It seems clear to me that there is ample evidence to support a rate of accuracy of approximately 90% using polygraph techniques in a criminal investigation context with qualified and ethical polygraph examiners administering the tests. Such techniques can have important benefits for our society in terms of more efficient law enforcement, greater protections for innocent suspects, and the reduction of processing time in the judicial system as well as the reduction in personal anguish and economic losses suffered by innocent defendants.

The situation is dramatically different with regard to preemployment testing of job applicants. In such cases there are compelling scientific and social reasons to eliminate such practices. The nature of such tests does not meet the requirements for obtaining accuracy rates comparable to those obtained in the criminal suspect situation, and there are many other social and personal privacy arguments against the use of polygraph or other detection of deception tests in the commercial context. It should be pointed out that the investigation of specific losses in a commercial context is not the same as preemployment screening. If there is a specific incident or loss or other serious problem within an employment context, properly conducted polygraph examinations could be useful in identifying those responsible and rectifying the situation. However, it is my opinion that such uses of polygraph techniques should not be left in the hands of the employers, but they should be employed as part of a proper criminal investigation by the duly constituted law enforcement authorities. Only under those circumstances of protection of individual rights and voluntariness in submitting to the tests can the technique be employed with a high degree of accuracy and also meet our standards for social justice and protection of people's rights.

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"Every Science has been an outcast."

- Robert G. Ingersoll

*The Polygraph in Preemployment Screening:*

*Research on Preemployment Polygraph Use*

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The use of the polygraph to detect deception and assess guilt or dishonesty is only to a minor degree a scientific question. Like abortion, drug use, cigarette smoking and alcohol consumption it is buried within a complicated set of values and counter values. At the core of the debate, I believe, is the only morality we have left: the morality of the protestant work ethic. All else has gone down the drain. But the idea that maybe one out of three people in the labor market have in place the appropriate attitudes to take other people's money and property, given the need and opportunity, is too much to swallow. One solution is, therefore, to deny the problem and to suppress it. For the problem is there. Everyone from high government officials, or ex-officials, to security guards on warehouse decks, gas station attendants, and sales persons in your local department store cut themselves in for a little or big skim. One oil company that monitors its cash loss carefully estimates a loss of \$200 or so, average, per employee per quarter.

There are not enough security gimmicks or security guards to stop the leak. How much is it? A credible estimate is probably \$3 billion a year. David Lykken, no friend of the polygraph, put it at \$6 billion in 1974. A department store survey in Chicago in 1970 found that losses due to employee theft amounted to 2 to 4 percent of gross sales income.

To reduce employee theft, it is reasonable to attempt to seek employees among the two out of three applicants who are reasonably honest. Over the past couple of decades, a principal method of achieving this end has been polygraph screening.

I will address myself to four points: the reliability of the polygraph, its validity, attitudes of examinees, and alternative methods of screening for dishonesty.

Reliability of the Polygraph

It is not necessary to dwell overlong on the issue of polygraph interpretation reliability. Although based for the most part on polygrams derived from criminal cases, I see no reason for believing that they should be different for polygrams based upon employment interviews. Both inter-rater agreement and intra-rater agreement are of the order of 75 percent for inexperienced polygraphers to 95 percent for experienced analysts (Hunter & Ash, 1973; Horvath & Reid, 1971; Barland, 1975). These rates apply both to the assessment of overall deceptiveness and question by question deceptiveness.

Validity of the Preemployment Polygraph

Dr. Raskin and Associates (1977), Ash and others (Ansley, 1975), Reid and Inbau (1977), and many others have convincingly demonstrated, both

through their own research and summaries of the research of others, that the polygraph procedure is a highly valid method for establishing the guilt or innocence of an individual who may or may not have committed a crime. In the March 1979 issue of the Polygraph Law Reporter there is an account by Dr. Raskin of his brilliant participation in a murder trial involving a White person and three American Indians. His polygraphy clearly established the guilt of the White person, who was subsequently convicted even though one juror along the way did not feel it was a crime to kill an Indian. And, of course, many persons of diverse colors do not feel that it is a crime to take the property or money of others.

I will not review, at this time therefore, the extensive validity data in the area of criminal investigation. I will only impart a piece of advice: if you are accused of a crime of which you are innocent, insist on being polygraphed. If you are guilty, avoid it like the plague.

There is, however, a difference of opinion as to the validity of the procedure for identifying the theft-prone, who are not assessed for a specific past crime, but for their potential for future crime, based upon admissions of defalcations for which, frequently, they were never apprehended. Dr. Raskin has already indicated his belief that the polygraph procedure is not valid for employee selection. Ms. Atcheson will say, if she follows her outline, that there are no studies of the accuracy of the polygraph for employee selection.

Are they, and others of their opinion, correct?

First, let us consider what is meant by the validity of polygraph screening for employment.

The aphorism we teach our students in testing courses is that "the validity of a procedure or test is an answer to the question, Does the test measure what it purports to measure?" Unfortunately, this circularity is generally totally unenlightening.

It is more useful to consider validity as some degree of correspondence between a state of nature and a measurement process. And it is most useful to distinguish between concurrent or diagnostic validity and predictive validity. Most of my colleagues in psychology, I might add, do not seem yet, after seven decades, to understand the difference, my educative efforts to the contrary notwithstanding.

As an illustration, if, on repeated observation, you have a blood pressure of 190/95, you have hypertension. That is diagnostic. It is definitional. A predictive inference is that there is a good chance you will pop a valve or ruin your kidneys or both. But even untreated, many hypertensives eventually kick the bucket by being run over, or shot by their lovers, or by pneumonia or an airplane crash, or whatever. Predictive validity will always be lower than concurrent diagnostic validity. Of course, in employment selection psychologists very frequently misuse the concurrent paradigm as a substitute for predictive validity, and mess things up.

How does this apply to the polygraph? The polygraph is, in the employment assessment mode, a diagnostic tool. You ask the applicant if he has stolen in the past, and if he says that he has, your diagnosis is, he is dishonest: a time-is-now diagnosis. Now, I submit, as a diagnosis it is as good as a Wasserman to determine whether you have syphilis. Unless, of course, you entertain the bizarre hypothesis that applicants make up false theft histories to please the examiner.

Given the diagnosis, of course, there is the inferential leap to prediction: a past of admitted theft suggests a future of more of the same. The recidivism statistics, which our cousins the sociologists pore over, abundantly prove the validity of the inference.

Now, in the employment context Mr. Barefoot and Dr. Raskin agree on one minor point: employment applicants are rejected for admissions, not primarily on the basis of chart showings of deception. But this observation conceals, rather than clarifies, the role of the polygraph. A typical scenario is as follows: Pretest question - "Jim, have you ever taken as much as \$100 at one time from an employer?" Answer: "No." Polygraph - same question, same answer, and a deception tracing. Post polygraph interviewer Same question, and the comment that the polygraph suggested deception. Jim's response, "Well, yeah, I guess I forgot that, about a year ago, I was to take a couple of hundred bucks to the bank, but I spent it on the way."

Admissions in the polygraph context do, in my judgment, establish diagnostic validity. Whether the use of the polygraph is invasive of privacy, however, cannot be evaluated in the abstract. I will address this question later.

The predictive validity of the polygraph in employment selection has not been pursued experimentally - in part because, as in criminal investigations what is sought is a diagnosis based on past history. However, there are now a few predictive validity studies of the paper-and-pencil tests of honesty which show that individuals diagnosed as currently dishonest are more likely to commit future defalcations than those not so diagnosed.

Another approach to validation is by way of study of shrinkage data. Some years ago, a reasonably good study of shrinkage in Chicago department stores was undertaken. It was found that the average loss due to shrinkage (mostly employee theft) was about equal in dollar amount to pre-tax profits. But one store-chain which uses a paper-and-pencil test screen with all applicants, and the polygraph with many, has a shrinkage percent which is only a portion of that other companies' experience.

We are now working with an oil company which maintains extensive data on employee losses (discrepancies between pump records and cash balances) and on robbery losses. Per station per employee the former is four to five times the latter. An on-going study has been designed to assess the effect of applicant screening for theft-proneness on this situation.

I will not review again the many laboratory and field studies of the validity of the polygraph in crime and simulated crime (Raskin et al., 1977).

Raskin's excellent summary clearly makes the case for an accuracy-i.e., correspondence rate with reality - of "approximately 90 percent." Since that accuracy includes many cases based on the polygrams absent confessions, and since the typical employment decision is based on admissions, it seems to be that the accuracy in employment selection must be even higher. Barland's (1977) little study of the polygraph use in employment selection found that most of those rejected were rejected for admissions. In fact, out of 400 cases, only 1 was not hired on the basis of chart interpretation absent admissions.

The issue is not, can the polygraph procedure identify those who have committed thefts, but, if an applicant admits to significant thefts, should that be taken into account in the decision to hire him? Barland found that, in fact, employers frequently ignore polygraph-related findings. Of 77 confirmed deceptives, 45 were hired and only 25, about a third, who made admissions, were not hired. Of 78 unconfirmed deceptives, 51 were hired anyway and only fourteen, about a fifth, who had made admissions were not hired.

#### Attitudes of Examinees

Many studies have been undertaken of the attitudes of various groups toward the validity, reliability, legality and ethicality of use of the polygraph for criminal investigation and/or employment selection. Respondent groups have included psychologists, sociologists, attorneys, polygraph examiners, criminologists, police personnel, "informed" and "uninformed" laymen, and psychology students (Ash, 1975; Cureton, 1953; Gerow, 1977; Gerow & Schrogam, 1976; McCormick, 1926; Walfle, 1941). As might be expected, the reputation of the polygraph procedure in both criminal investigation and employment screening varies widely from group to group: among social scientists its use for employment screening is endorsed by 20 to 30 percent; among examiners (including examiners who are psychologists\_ by up to 80 percent.

Although it is widely believed and reported that examinees hold substantial negative attitudes toward the polygraph as a preemployment device, however, only two studies have been located in which they were queried - and one of them is mine (Ash, 1975; Putnam, 1978).

My study included 241 applicants for diverse positions. These applicants were given a brief questionnaire after the polygraph examination had been completed. About half the examinees were told the results of their exam before filling out the questionnaire. The remainder were not told.

Overall, the polygraph examination was accepted and approved by the very large majority of all examinees: 86.3 percent thought the test was fair, 91.3 percent were not offended, 83.0 percent did not feel their privacy was invaded, 96.3 percent were willing to take the test to get a job, 87.6 percent were willing to take it routinely to keep a job, and 96.7 percent were willing to take it to find a theft at their company. The questionnaire included a section soliciting comments. The most frequent negative comments were: doubts as to the test's accuracy (13.3 percent); anxiety about taking the test itself (13.7 percent); complaints about some questions (8.6 percent); and invasion of one's privacy (30.0 percent).

Putnam (1978) queried 85 police applicants. Of these, 92.9 percent replied "No" to the question, "Were you in any way embarrassed, humiliated, or degraded by any part of the ... process?"; all the examinees felt that there had been no invasion of their privacy, and 97.6 percent said they believed they would feel more secure and comfortable in their work environment knowing that polygraph is used to assist in personnel evaluation.

In my experience over the past decade and a half, with students who have gone through the polygraph process to obtain employment and with employment applicants processed through a large polygraph firm, the incidence of negative reactions is very small indeed. What little data exists supports this view. There is no credible data to the contrary.

One other point needs to be made with respect to the "invasion of privacy" issue. It is not unique to the polygraph, and, indeed, is raised more sharply by the items in any half-dozen other measurement devices such as the MMPI, the CPI, the PBI, and by the covert inferential process of personality assessment implied by such devices as the TAT and the Rorschach. Yet all of these are used in the employment process. I will return later to this point. Here I note only that the asking of overt questions about one's previous theft behavior may be considered invasive of privacy, but surely questions about bed-wetting, relations with one's parents, religious beliefs, private thoughts on a myriad of items is at least equally invasive, and, at least to the examinee, far less relevant.

#### Alternatives in Theft-Proneness Assessment

I turn now to alternatives to the polygraph. For the question is not whether to test for theft-proneness, but how. It is a naive misrepresentation of the real world to assume that, if the polygraph vanished in employment selection, applicants need not be concerned about scrutiny as to their past theft behavior or their future probability of committing theft. It is even more naive to assume that the alternatives are equally or more valid, reliable, or ethical. Many of them involve covert inferential procedures which deny the applicant the possibility of even knowing what the subject of the inquiry is - namely, his dishonesty.

Let us consider the alternatives.

Closest to the polygraph itself is a highly-structured interview procedure which focusses upon applicant demeanor and behavior while responding to questions like those used in polygraph interviews, but absent the polygraph. It is, in fact, a form of the classical criminal interrogation procedure. It assesses not only what you say, but how you say it. Unless interviews are banned in employee selection, it is beyond the reach of legislation.

The second alternative, rapidly making headway in the measurement field, is the theft-proneness attitude inventory, a paper-and-pencil device generally validated against a predictive or concurrent theft-proneness criterion, and transparently measuring theft-related attitudes ("Does everyone steal a little?", "Have you ever taken any money from an employer?")

"Have you ever been tempted to steal?") The prototype of this approach is the Reid Report (Ash, 1970, 1971, 1974; Reid, 1971). Its imitators include such devices as the TA Survey (Cormack & Strand, 1970), the Stanton Pre-employment Survey (Klump, 1974), and the Personnel Security Inventory (London House, 1975). These instruments are overt measures of theft-related attitudes - applicants are not deceived into believing that the test is measuring some vague personality characteristics.

The third alternative to the assessment of probably future dishonesty is scorable bio-data. The classic work in this field has been that of the sociologist S. and E. Glueck (Glueck & Glueck, 1968). Other more recent developments include work by Rosenbaum (1976) and Shealy (undated). It would be no great trick to develop a theft-proneness key for such packaged bio-data blanks as the PBI, the RBH Personal History, or the LIMRA Aptitude Index. They may even exist already.

The most widely-used alternative, however, has been the standard personality test. Practically everyone published, it almost seems, has been or is being used to assess honesty and integrity, indirectly by way of constructs such as sociopathy, deviance, amorality, irresponsibility, and so on infinitism. The head of the parade, of course, is the Minnesota Multiphasic Personality Inventory (MMPI), (e.g., Hathaway and Monachesi, 1953), but in the line of march is the CPI, and particularly an innocuously titled offshoot called the Personnel Reaction Blank (Gough, 1965; Gough & Peterson, 1952), reputedly used widely in the retail trades. Also represented are the I-E-S Test, the Activity Vector Analysis (Clarke & Hasler, 1967), the Rorschach (e.g., Inchamura, 1966; Mukherjee, 1965), and even the Porteus Mazes (Porteus, 1968). These tests are, of course, "respectable" in the psychological profession. They are disguised approaches to the assessment of delinquency and dishonesty. Unfortunately, their validity in the long run seems to be negligible (Schuessler & Cressey, 1950).

The fact of the matter is that the costs of employee shrinkage are so great that, unless all personality testing and interviewing is banned, some sort of applicant and employee screening will be employed. Given present trends, the most direct and fact valid measures will be supplanted by less direct, less valid, more error-prone measures, but measures further out from the reach of regulation. The alternative is to follow Zeitlin's (1971) proposal to the New York Port Authority - since you cannot control theft by toll collectors, announce a policy permitting a skim of X dollars per week. Only overages will be prosecuted. Some have responded to all this by saying: Tighten security and manage better. As to the first, parabolic mirrors, TV scanners, radioactive price tags, security guards, and the whole rest of the security paraphernalia is simply a minor challenge to the taker. What you can invent, I can circumvent.

The slogan, Manage better, is, in my opinion, simply a cop-out, and I spent twenty years in industrial management. It is like putting the burden on the dead pedestrian for having been in the way when the speeding car hit him. One illustration: how do you "manage better" in a canteen company when you send one person out in a truck to replenish vending machines and bring back cash? You can't. If he is dishonest, he will skim.

To pull the foregoing observations together: the polygraph procedure is one way and, I believe, a good way, of detecting and screening out the theft-prone. But it is not the only way. The polygraph cannot be evaluated out of context, by itself, without carefully considering the alternatives. And the alternatives may be much less valid, reliable, ethical, and useful.

#### Concluding Remarks

I have argued to this point the following:

First, polygraph-based interviews of employment applicants are reasonably reliable both in the test-retest sense and the examiner-to-examiner sense.

Second, that the validity question, while complex, generally tends to the conclusion that such interviews can identify the theft-prone.

Third, that the polygraph interview must be evaluated within the context of alternative screening procedures, not merely by itself.

Fourth, that when the alternatives are considered, they are not only not better: they are less valid, less reliable, and less ethical.

But, if these four conclusions are to some acceptable degree credible, how can one explain the animus against the polygraph?

The following is entirely speculative, and ad hominem. I offer it anyway.

First, for psychologists the polygraph examiner is not a member of the guild. Lykken (1974) complained that most examiners were not psychologists. Ms. Atcheson will say that "there is little professional awareness of polygraph use in employment by psychologists, or business school faculties, even those teaching industrial relations ..." Few of our professional colleagues have heeded George Miller's admonition to "give away psychology." It is ironic in this context that the psychological guild fights to survive against the on-slaughts of the medical guild. And then turns around to limit lesser competitors, such as marriage counselors, psychiatric social workers, social therapists, and lie detection examiners.

Second, in the U.S. today the received traditional value structure has been sorely shaken: homosexuality was a psychiatric disability, gay is an alternate life style; "living in sin" was a secretive anxiety, "living together" is almost the social norm.

But theft, oo-la-la, is the ultimate obscenity, the communist challenge to the Protestant Ethic. The fact that one out of three or four employees, given the opportunity, will take what they do not own or earn, must be denied. The way to denial is to hide the takers and pay the costs of shrinkage.



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*Polygraph Tests in Preemployment Screening -*

*Should They Be Controlled By Law?*

*Marcia Atcheson*

Back in the early 1970's, that redoubtable conservative and staunch defender of individual privacy, Senator Sam Ervin, took a look at polygraphs and called them "20th Century Witchcraft." He introduced a bill in 1972 to ban their use in employment. Similar legislation has been introduced in recent years by Senator Birch Bayh in the Senate and Congressmen Ed Koch, Stewart McKinney of Connecticut, and Don Edwards of California. The question about polygraphs that must be addressed from the legislator's point of view is this: given the legal protections against "lie detection" afforded persons suspected of a crime, should there be some protections against "lie detection" for the person who is simply looking for a job?

In the criminal area, the general rule is that evidence of the results of a polygraph exam are not admissible at trial. The exception in some state jurisdictions is that if both defendant and prosecutor stipulate to the results prior to the defendant's taking the test, the judge may allow the evidence to come in for jury consideration. This rule means that the defendant may make an essentially voluntary choice on whether or not to take a test - and if there is no agreement about using the results, there is small price to pay if he fails it. With the would-be employee, however, if he refuses to take the test, in all likelihood he will not be considered for the job; if he takes it and fails, he is almost sure not to get the job. The power of the "lie detector" for the job applicant is nearly total.

The general basis for restrictions on polygraph evidence in criminal cases is that they have an unacceptable degree of accuracy. All of the panelists here today are convinced of the accuracy of polygraphs - Dr. Raskin has carefully confined his acceptance of accuracy rating to the criminal investigation - but there are those in your profession, as I am sure you are

aware, who question on scientific grounds the validity of the instrument as a "lie detection" device. Their doubts are borne out by such news events as two weeks ago - Talmadge. In any case, in view of the rationale for evidentiary restrictions, the question for legislators is heightened: Should the criminal suspect be protected by law, and the employee or job applicant not?

It has been said that the enormous growth of private security in the country in recent years represents a "second criminal justice system." So far as the use of polygraphs is concerned, it is a criminal justice system essential without law.

In Senator Bayh's Subcommittee on the Constitution we have had four days of hearings on the proposed legislation thus far. Our attempt has been to make the hearings as balanced as possible on both sides of the issue. Let me quickly tell you some of the factual information given us.

Approximately 20% of the large businesses in the country use polygraphs in one way or another. The greatest incidence of use is found in the retail industry - about 50%. Of course, that means that 50% of the retail industry does not use them. The evidence is that employees who will be handling money and merchandise are most often tested, and that it is the lowest levels of employees who are most likely to be given the tests. Lie detection exams are very rare for management people. There is no data on frequency of use by smaller businesses, but all indications are that smaller operations are more likely to use the exams than larger, more sophisticated ones.

What is the response of states to use of lie detection in employment? The latest count shows 19 states with statutes which attempt to prohibit polygraphs. Their effectiveness is mixed - in some states it is common practice simply to do your testing across the state line. How about licensing? A like number of states now license. The standards vary, though almost all statutes have grandfather clauses. One result is indisputable. Licensing is followed by increased use since it is commonly perceived that the profession is "legitimate," and sanctioned by the state. Licensing therefore is not the answer if you are concerned by the legitimacy of the practice in terms of its accuracy or its privacy implications.

Let me spend the balance of my time pointing out what I would consider to have been the highlights of these hearings on a proposed federal law for I think they have relevance to your evaluation of the use of these machines. There is much that's not known in this area.

The first, the seriousness of the problem of employee theft which presumably has given rise to the use of lie detection in preemployment screening. There is no doubt the problem is huge - estimates before the Subcommittee varied from \$5 billion to \$100 billion a year. That's a large ballpark. It became apparent that there is a noticeable lack of hard data backing these figures. Most sources borrow from other sources. One of the often quoted authorities is the Department of Commerce. The Department, when pressed for its data admits it is guessing. Individual business admit they are

guessing - it is difficult to account for inventory shrinkage as opposed to theft, etc. One of the best "guess estimates" is probably that of the American Management Association which speculates that employee theft accounts for between \$5-\$10 billion out of a total of \$29-\$42 billion for all crimes within business - shoplifting, securities fraud, embezzlement, kickbacks, etc. You will commonly hear the total \$40 billion figure attributed to employee pilferage alone, however, by some interested in convincing you of the need to do something. So I caution you, beware of the dollar figures - the problem of employee theft is large, enormous, but no one knows how large, and it is by no means the only problem business faces in loss because of dishonest activity.

Second, as you have heard mentioned earlier, there are no studies available of the accuracy and reliability of polygraphs made in the employment setting - only in criminal or laboratory settings. I submit to you that these are entirely different contexts, in terms of judging the validity of the machine. As I have said before, the Subcommittee has heard conflicting testimony on the overall accuracy of polygraphs - all studies done in criminal or laboratory settings - but I am confident in saying that a \$25 polygraph in a 20-minute preemployment screening test is to a polygraph in a full fledged criminal investigation as a visit to the company nurse is to a checkup at the hospital. I have heard no one claim that the accuracy of a polygraph goes up when used commercially - the question is how much it goes down. Dr. Raskin has outlined the qualitative differences in the two types of tests - criminal and preemployment screening. There are the discrepancies in the precision of questions which can be asked, the conditional probability factor, the differences in time and preparation which are involved, the fact that the preemployment test purports to be predictive, all of these differences meaning that the commercial screening test is a stepchild of the criminal investigative exam.

However, the question of accuracy is really not the point in the employment context. Representatives of the polygraph industry testified that in preemployment screening, the test itself plays a very small part in reaching their recommendations whether to hire or not to hire. J. Kirk Barefoot, past president of the American Polygraph Association, told the Subcommittee that about 90% of the information on which he based his recommendation came from what the subject told him in pre-test interviews, not from the test itself. An obvious question is, why are all these admissions made before the test is even given? It is my understanding from examiners that belief in the infallibility of the test is extremely important. It is also often explained in the literature that the stress level must be high - something of real value is hanging in the balance, in other words - in order for the test to work well. All of this sounds very much like the philosophy of polygraphs as expressed by President Nixon when he was attempting to find out the source of administration leaks during the time of Watergate: "Polygraph them all. I don't know anything about polygraphs and I don't know how accurate they are, but I know they'll scare the hell out of people." If you talk to people who have had to take the tests, they will confirm the procedures described by examiners, and the importance of pre-test and post-test interview. Commonly, the examiner will inform the subject that the test is showing problems in certain areas, and that he the examiner will have to know more from the subject, in order to "clear" him. It is here, from the job

applicant's point of view that things may get hairy. To satisfy the examiner, he must find a reason to account for the shaky areas showing up on the chart. Sometimes, in fact, he admits past thefts. Sometimes he is led by questions or his own compulsion to explain his "deceptive" responses into talking about personal information which is not directly relevant to the job he wants. And it is on these admissions that the polygraph examiners make their decisions which they pass on to employers or their personnel managers. The accuracy of "the machine" therefore is not considered significant by examiners doing preemployment screening.

Representatives of industries most commonly using polygraphs, convenience store, drug stores, testified that the usual practice is for the employers to accept the recommendations of the polygraph examiners. After all, they are paying for them, and in a vast majority of cases, are paying for them in lieu of more extensive interviews or any reference checks. In short, the lie detector is considered cost effective; a quick, inexpensive and easy way to make decisions on employees. In the situations where there are indeed more explorations into the qualifications of the applicant, the indications are very clear that a failed test is extremely difficult if not impossible for the job seeker to overcome. A refusal to take the test is almost a sure refusal of the job as a matter of company policy.

Another highlight of the hearings, and one in which I would hope many of you become interested - although there are personnel managers and management experts who are becoming convinced that the use of lie detection is of dubious value and may even prove to be counter-productive in controlling theft - there have been no studies done on the deterrent value of the polygraph testing, nor of personnel attitude changes which may be attributed to its use. Could it even be that polygraph screening acts to weed out many desirable employees? There is certainly evidence that more conscientious people are more likely to fail the exams. Even the long-term dollar effect of polygraphing is still largely conjectural.

Most firms, of course, have concluded not to turn to lie detection, many for policy reasons, viewing polygraph testing as an untenable invasion of privacy into the lives of their employees. Retailers like J.C. Penney, Sears, and Korvettes are among them, choosing to handle their employee pilferage problems in other ways. It is interesting that in its policy paper on privacy in the employment setting of last December the Business Roundtable took a stand in opposition to polygraph use on employees, advising businessmen to "ban the use of truth verification devices in the employment process."

Certainly, there are many in the business community who feel that there are better ways to combat internal theft. For example, representatives from American Management Association's Project on Crimes Against Business testified that the primary guards to heavy internal loss lie in better systems controls, inventory and accounting procedures, personnel practices, not in the "cops and robbers" approach of which polygraphs are often a major part. Unfortunately, however, gaining further education in management techniques is often not readily available to many small businesses, and they may be most receptive to a polygraph service as the answer to their problems.

Should there be federal legislation to control lie detection in pre-employment screening? The public seems to think so. A national opinion research survey of attitudes on privacy done by the Louis Harris organization for Sentry Insurance published this year reported that 65% of employees, and an amazing 55% of business employers thought that asking a job applicant to take a lie detector test should be forbidden by law. There is an understandable reluctance to attempt to legislate problems such as this but, in this case there's a social cost involved. The polygraph after all is not an ordinary scientific or psychological test. It is unique - it purports to test "honesty," not stress, or physiological response alone, but honesty, moral character, not abilities or personality. It is claimed to be able "to verify the truth" with a capital T. And its operating assumptions run counter to several of our basic principles of justice, principles such as the presumption of innocence and the right against self-incrimination. In the polygraph testing situation, it is presumed that the applicant has committed or will commit what Dr. Ash terms "defalcations." He must prove he is not guilty by passing the test, a test which has far from proved itself to be infallible. In our criminal justice system the law protects these principles. In the so-called "second criminal justice system" the principles also exist. It may be time for the law.

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*Polygraph Examinations For Preemployment Screening:*

*A Personnel Administrator's Viewpoint*

*Edgar D. Gates  
Vice-President  
American Maize-Products Co.*

The objective of the recruiting and employment process is to secure the highest quality of affordable personnel to meet all relevant criteria of position requirements. Further, it is assumed that through their skills, knowledge, and performance, each employee will return a net profit to their company in excess of total compensation they are paid.

Management attempts to select individuals who will be compatible to peer groups and who have habit patterns that will be in keeping with policies, practices and general mores of the company.

Many people lie. Many people steal. Some people who have been caught and convicted of crimes, conceal this information as well as they can, when they come to the employment interview period. Some people falsify job applications and give incorrect information in interviews. For some people, the most dramatic performance in their otherwise ordinary life comes when they go "on stage" at the job interview. Under such circumstances, the substance of imparted information may differ greatly from what is later discovered to be the truth. Even the most powerful and prolific critics of preemployment polygraph testing, grudgingly, acknowledge that employee theft

is a national problem and that the employer's company has the right to try to protect itself against this. With many of the retail and wholesale businesses operating at a net profit which is near or less than 1% of sales, theft, or collusion in theft, can bring about business failure. A presidential commission on law enforcement and administration of justice once said that employee theft and embezzlement in business are large in dollar volume, even though the numbers are small in police statistics. The majority of white collar crime probably goes undetected.

About twenty-five years ago, I was being taught to operate the polygraph in a preemployment examination procedure. I was amazed to find how many applicants with long term satisfactory employment with major companies would admit to undetected systematic theft. This admission was usually made with no observable applicant guilt or remorse in the interview preceding the polygraph examination.

Many companies have great opportunity for loss or inventory shrinkage if an employee chooses to steal. Most businesses can live with some minor theft, such as the occasional long distance phone call, or the taking home of limited quantities of office supplies. Of course, the majority of job applicants and employees are honest people. The company, however, must look out for that small percentage who are not. In order to safeguard both the company's assets and the security and reputation of its other employees, it is probably a favor to keep some people away from temptation for their own good. A simple example may be the hiring of an individual to remove cash from a large number of vending machines. Typically in this kind of business, the interview process and the background screening of the applicant is, of necessity, less than professional. Some people faced with the temptation of handling large amounts of money in a relatively unsupervised environment would succumb to taking some of the money. In a more sophisticated business situation such as that represented by a bank, the screening process could be expected to be more sophisticated. Further, many people would tend to eliminate themselves from consideration as a job applicant because they would expect considerable screening and scrutiny.

It has been said that as many as 30% of job applicants who apply for sensitive positions should not be placed in positions of trust. For these reasons, plus others, a large number of companies use preemployment polygraph screening in those locations where it is permitted. It is quick, takes less than an hour, provides a telephone report to the employer the same day, and is followed by a written report. The applicant volunteers to take the test and signs an authorization and release for this purpose. Very few applicants refuse to take the test. Few complain about it afterwards, and little difficulty has been experienced from those who were not hired as a result of test findings. Cost runs from \$25.00 to \$40.00, depending on the geographic location. My former employer, the Graybar Electric Company, operates 175 branches in each U.S. State and gives preemployment polygraph tests in all locations, except the approximate 15 states and several cities which have laws prohibiting the use of polygraph. Tests are given to all males and females who must be bonded because their job presents opportunity for dishonesty.



Criticisms of preemployment polygraphing of which I am aware, from the media, and union publications in particular, have dealt with matters which they describe as "intimidation", "invasion of privacy", "class discrimination", and at least a "major indignity". It has been said that the use of preemployment polygraphing implies guilt until one proves innocence. I suspect there is some truth to the latter allegation if you come to my door, and ask to enter, the burden or proof is upon you as to whether I invite you in. Most police departments recommend such caution. If then you want to work 8 hours a day each week in my house, I really want to know as much as I can about your honesty and relevant character and past behavior.

Companies which use the preemployment polygraph feel that no invasion of privacy is involved. Some voluntary relinquishing of personal rights and privacy are inherent in all employment, and the analogy has frequently been made that it's not much different in principle to airport security checks.

And quantitative assessment of the polygraph's effectiveness in employment requires consideration of a number of variables. For ten years at Graybar the percentage of applicants rejected because of unfavorable job-related information elicited by the polygraph examiner, ranged from 10 to 30% of those examined. Differences in rejection rates were attributable to such factors as:

1. Differences between geographic locations including north versus south and large metro versus suburban areas.
2. Extent of unemployment and consequent quality of applicants at a given location.
3. Nature of the advertised open position, i.e., "career warehouseman" versus "management trainee".
4. Skill of the company interviewer to reject marginal applicants before sending them for the polygraph exam.
5. Statistical "runs of good or poor luck" which had no identified cause.

This same company used the Reid Report, a paper and pencil test of honesty in all locations where polygraph is prohibited. The Reid Report is also used by choice in a number of locations where either test is an option. Research shows the Reid Report to be highly effective when compared to polygraph exams and it costs less to use. College graduates seem to resent the paper and pencil test more than they do polygraph, but the reported negative reaction in both cases is not more than 5% of those tested. Over the last eighteen months the Reid Test was administered in this company to 2151 applicants. 67% were recommended for employment. 30% were not recommended, and 27% were given marginally qualified recommendations. Graybar instituted the program of preemployment polygraph screening and the use of the Reid Report in order to reduce what had become a significant amount of inventory loss. After instituting more careful preemployment screening procedures,

including the use of the polygraph, shrinkage in inventory and assets became an insignificant percentage. We believe a larger percentage, particularly of college graduates, "pass" the polygraph than they do the Reid Test. This is in part because the Reid Test evaluates attitudes of permissiveness toward dishonesty and any need to steal, while the polygraph generally does not. In other words, a person who has never committed a dishonest act, but who believes that what other employees do in regard to company property is exclusively their own business, might pass the polygraph exam and fail the Reid Test. Finally, there are many open questions in preemployment polygraph examinations for research and discussion: There are philosophical assumptions about the nature of man and the role of free enterprise; there are predictive assumptions about the likelihood of dishonest behavior with money or property being repeated; there are value judgements concerning the use of illegal drugs and the effect on job performance; and there are all of the ever present criteria problems which we as psychologists labor to identify and refine.

Thank goodness the majority of job applicants "pass". Personnel selection is difficult enough these days, with low unemployment, and all of the present and planned government interventions in the process of human events and the procedures of operating a business.

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Truth, Whether in or out of fashion, is the measure of knowledge, and the business of the understanding; whatsoever is beside that, however authorized by consent, or recommended by rarity, is nothing but ignorance, or something worse.

- Locke

## *Polygraphy:*

### *Some Comments on the State of the Art*

*Frank Horvath, Ph.D.*

It has been fifteen years or so since I first became involved in polygraphy. At that time the field was relative small; the American Polygraph Association (APA) was a fledgling organization; the number of formal polygraph training schools could be counted on one hand; and legislative concern about the field, both for and against, was much less widespread than it is today. Clearly, the past fifteen years have been a period of great growth in our field. That growth has been favorably influenced, to some extent, by the APA, by renewed interest in research in the field, and, I might add, by the concerns expressed by our critics in the mid-1960's. Yet, in spite of the fact that our field and the APA are now as strong as they have ever been, the growth in polygraphy has not necessarily been in the right areas; nor, has it necessarily led to desirable results. I believe it is time to take stock. What I would like to do in this paper is to discuss some of the concerns I have about our field, some of what appear to me to be problems in need of some clear thinking and concerted action.

Before I get to the heart of my observations, it is fair that I first point out that undoubtedly some of my concerns are prompted by the fact that for the past several years I have done much research and writing about the field than I have done actual polygraph testing. Although I would acknowledge that this may have led to an "ivory-tower" bias, my activities in the field, and in particular my work as a member and chairman of the licensing board in Michigan, reinforce my conviction that the concerns I have are both real and important. My work with the Michigan board has given me considerable insight into how others view our field and how both experienced and neophyte examiners behave, feel, and think--or sometimes do not think--about what they do.

#### Good Examiners and Poor Examiners

Quite a few years ago I remarked to a group of examiners that probably the single most unfortunate characteristic of the polygraph technique is that it works. I meant at that time that I believed that the technique really does work; it works, in fact, too well. It is, in my opinion, a very powerful technique--powerful in that even when many of the assumptions on which it is based are violated, the technique can, I suspect, be expected

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This is a slightly revised version of a paper presented to the American Polygraph Association, San Diego, California, August 1979. Dr. Horvath is an Associate Professor, School of Criminal Justice, Michigan State University, East Lansing, Michigan 48824. Requests for reprints should be addressed to the author.

to do what we say it can. It is that power, however, that is unfortunate. Now, if I may, let me explain why.

In our field, as in most others, there are some who are good, some who are mediocre and some who are just plain lousy at what they do. But, because the polygraph technique is so powerful, it is often hard for the layman, and sometimes even for the more sophisticated observer, to distinguish between the poor (careless, incompetent) and the good (skillful, competent) examiner. I would guess, for instance, that about 60 to 70 percent of the time, an examiner who has only a minimal understanding of the technique, or an examiner who violates many of the assumptions of the technique, will get physiological responses (charts) that are sufficient to indicate a subject's truthfulness or deceitfulness. In other words, in those cases, the difference between the good and the poor examiner is rather subtle: it is not an obvious difference. But, in the remaining 30 to 40 percent of the cases, the poor examiner, either because he doesn't know how or because he doesn't care, gets untrustworthy, unreadable charts; he flies by the seat of his pants and his decisions are guesswork that cannot be supported by the data. Thus, because many of the poor examiner's charts are either unreadable or untrustworthy or both, his subjects tend more often than not to be mishandled, accused, badgered and otherwise abused. The good examiner, on the other hand, generally gets stable, clear charts, charts that are, in most cases, trustworthy and competent to support a decision. But, that things are clearer and life is easier for the good examiner doesn't mean that everybody, including his clients, know about it. Why not? Because in the majority of cases, both good and poor examiners will tent to make correct judgments sheerly on the power of the technique. Even in those instances where the difference between the good and poor examiner really counts, seldom are enough errors actually discovered to suggest that the poor examiner is not doing his job. Moreover, the subjects of the poor examiner seldom complain about their mistreatment; they assume that all subjects of a polygraph examination are treated the same way.

What eventually happens with most poor examiners is that they become less and less reliant on the polygraph technique and more and more reliant on their intuition and hunches; they fail to see the distinction between interrogation designed to secure a confession or admission and polygraphy. To the poor examiner, the polygraph and the technique and all the knowledge we have accumulated are nothing more than psychological stage props. Thus, for many reasons, those examiners come to believe that the polygraph technique does not really work, at least not in the same sense that I know it works. Their attitude about the technique is perhaps best typified by a comment another examiner recently made to me. We were discussing technique, and his point was this: "The important thing is if you get a confession or admission, the polygraph works." In other words, to this man, interrogation and polygraphy were the same thing. Nothing could be further from the truth. Make no mistake about it: interrogation and polygraphy are not synonymous. They are, and should always be treated, as two separate and distinct arts. It is the failure to do so that, in my opinion, leads to many of the problems poor examiners have. The conspicuous joining of interrogation, especially that designed to obtain an admission, and polygraphy leads to a reversal in the priority of the goals that examiners should have. The first and foremost goal should be to use the polygraph and the techniques available to determine

whether or not a subject is telling the truth or was involved in an offense. The second goal is to seek a confession or admission from those, and only those, who are not truthful. The two goals should never be reversed in priority in either the attitude or the behavior of the examiner; unfortunately, they often are.

If I may, let me clarify something that is probably worrying some of you. I am not against interrogation or interrogators. In fact, every good polygraph examiner I have known has also been a good interrogator. But certainly not all good interrogators I have seen were, are, or could be good polygraph examiners. Moreover, without interrogation and confessions, most polygraphists would probably be out of business. My point is merely that too many examiners, both neophytes and experienced ones, fail to see any difference between what must be done during an interrogation and what must be done during a good, properly conducted polygraph examination. In fact, I would go so far as to say that the historical fact that the polygraph setting leads to confessions more often than could be otherwise obtained has held back the development of the technique. Why? Because most examiners have sought resolution of - for lack of a better term - "chart-based" problems in interrogation and confessions. As long as they were able to get confessions they seldom tried to develop a new or different testing procedure to help resolve the problem of getting clearer or better quality charts.

The lack of a clear understanding of what the polygraph technique is about is not uncommon today. Judging from what I have observed, a substantial portion of examiners, from many polygraph schools, feel that the charts, the physiological data, are unimportant as long as they can say, "Well, this person confessed," or, "This person said he might have done it." In some, perhaps many, cases, the problem with these examiners is akin to the answer to the question: "What's the difference between ignorance and apathy?" The answer: "I don't know and I don't care." For example, too many of the new examiners I have talked to lately - and I confess this seems to be particularly true of private examiners - have shown me polygraph charts that were clearly indefensible; in some cases questions were spaced at no more than 5 to 7 second intervals. In others, definite decisions were made on charts where there were no responses to either control or relevant questions - a problem usually resulting from the examiner's not making sure questions are formulated properly. In one case, I recall seeing a set of charts from what the examiner said was a periodic examination. There were some 10 or 12 relevant questions asked in each of two tests; each question was asked about 5 seconds after the preceding one and each question actually dealt with a different, unrelated, specific issue. There are numerous, other chart-based deficiencies I have observed. There is, however, no need to detail these. The point is that each and every examination ought to be made to result in the best charts obtainable at that time. There is no excuse for deliberate deficiencies in conducting examinations and collecting charts. I would like to emphasize at this time that my comments and observations are not biased by the testing procedure I prefer. That is, my concerns are about matters that are basic to all polygraph testing, whether variations of the relevant/irrelevant technique or of the control-question technique.

#### The Training of Polygraph Examiners

Everybody knows that our educational system is not doing what we want.

Students are graduating from high school without being able to read; college students generally appear to be deficient in the most basic skills. It might even be suggested, heaven forbid, that there are Ph.D.'s who are lacking! The basic problems evident in our educational system carry over to what goes on in our polygraph training schools, and I would be remiss if I neglected to mention those schools as a source of some problems in this field.

We now have about 15 to 20 polygraph training schools accredited by the APA, and there are several others not accredited. It seems that a new school is being opened almost every time a new issue of the APA Newsletter comes out. Judging from my observations, I'd say there is a wide disparity between some of our training schools in respect to what is being taught, what is being learned, and what the graduates of each of these schools are doing in practice. I have seen graduates of certain schools, for instance, who clearly did not understand and could not articulate the basis for the testing procedure they used and that they supposedly were trained in. They could not explain their own procedure adequately. Again, I want to emphasize that I am not concerned here with which particular variation of the R/I or control-question technique is under consideration. What I am saying is that irrespective of the particular variation in question, some graduates cannot explain, or even describe adequately, their own variation. It is evident to me that our training schools must remedy this situation. Whether the problem lies with the schools or with individual examiners, surely all graduates ought to be able to explain at least their own testing procedure.

Since I am now on the topic of polygraph training schools, there are a number of other comments that need to be made. Although I am aware that all training schools teach some of the history of this field, I find that many graduates actually have a very poor grasp of historical developments in polygraphy. What I have heard about history from some newly graduated examiners, for instance, is astoundingly inaccurate and revealing of the scant attention paid to historical concerns. Did you know, for example, that William Frye was one of the first examiners to testify in court, and that John Reid's contribution to this field was to invent and to use the GSR in polygraph testing? The ignorance of history here is indeed unfortunate and dismaying, since what written history there is in the field is hardly too extensive to master. It would be a fairly easy task for every trainee and examiner to study all of the major articles and books that describe the development of this field; it would be similarly easy and, in my opinion, useful for every polygraph school to require at least a good basic knowledge of historical developments, if for no reason than to put current technique changes into perspective.

Besides lacking a knowledge of history, some of the graduates of some schools seem also to be deficient in basic psychology and physiology as they apply to our field. It is not my position that one need be either a college-trained psychologist or physiologist to excel in this field. But it will no longer do to be ignorant of basic knowledge in those fields either. Let me give you an example of what I'm talking about. At one time I asked a neophyte examiner to explain from a psychological viewpoint why the polygraph

technique worked. His answer was simple, "When a person tells a lie, his psychological mind makes it show up on the polygraph." In another case, I asked an examiner to describe the nervous system as it might relate to polygraph testing. I was amazed to learn that the human nervous system is made up of three parts: "The mind, the peripheral system, and the Atomic Nervous System. The latter most directly affects our field. It is composed of protons and neutrons that send the right electron to our muscles and fingertips."

Obviously, I have related some of the most glaring examples to make a point. But these such extreme cases do not seem to me to be all that uncommon. There is no question in my mind that we need to strengthen the knowledge required of the persons attending our polygraph schools and to decrease the wide disparity between schools with respect to what graduates are required to learn.

More generally there are some other points I want to make about the training of polygraph examiners. At present, there are only two major techniques in general use in our field today--the relevant-irrelevant and the control-question technique. Within each of these, there are some generally recognized variations, such as the Reid, Arther, and Backster approaches to control-question testing. In my opinion, the time has come when it is no longer enough for any polygraph training school to teach one, and only one, variation of the two major techniques. We must get away from the parochial thinking and ego-satisfying process that have resulted in each school's teaching a different variation of a technique and completely disregarding other approaches. All polygraph students must be made aware of, and study in depth, each of the major variations of the techniques. They ought to know what the advantages and disadvantages are of each variation; they ought to be aware of the concepts and terms basic to all variations and those peculiar to each variation. In other words, there is now a basic body of knowledge about polygraph testing that transcends variations on technique, and there is enough known about each variation to justify a good grasp of each by all polygraph students. Unless we ensure that graduates of polygraph schools can be flexible enough to adjust their testing to the situation, rather than the other way around, we are merely turning out technicians, not thinking polygraph examiners.

My call for a more liberal, flexible approach to polygraph training clearly flies in the face of some traditional thinking in this field. For instance, there are some who would state flatly that a certain testing approach is the best, that it is always better than another -- for example, that control-question testing is always better than relevant/irrelevant testing. The tendency to think like that, or to believe that trainees ought to be taught only one best way is, to be candid, clearly wrong-headed. Not only is it wrong practically and immediately -- one should use the testing approach that best fits the situation -- but it is also wrong in that it leads to little advance in the field. Examiners who are stuck on one, and only one, approach do not learn, experiment, or grow, and this is to the detriment of the field.

Many examiners tend to believe that control-question testing is the ultimate approach - the most sophisticated, advanced, and useful procedure that exists or will ever exist. These people have been trained in a way not unlike the way you train fleas. If you put fleas in a jar and cover it, the fleas will quickly learn they can't jump out. Then, if you remove the cover, the fleas will jump so high, but no higher - they will be unable to escape. Examiners who believe that control-question testing or one variation of it is the ultimate technique or that it is always the only way to conduct polygraph examinations are trained fleas. Real examiners should be trained to think about what they are doing and why they are doing it, and our training schools ought not to be in the business of training fleas.

### Standardization of Terminology

One of the most important consequences that would seem to follow from a broadened perspective in our training schools is the establishment of some uniform communication. I obviously don't mean standardization in the sense that all schools teach a single technique. What I mean is the development of a uniform, consensual language in the field. A communication system in which the concepts we use in this field would have the same meaning for all students in all training schools. We need such uniform terminology, for instance, for the various types of questions we use, such as guilt-complex, irrelevant and known-truth questions; and for tests we use such as the so-called "yes" test, the "mixed question" test, and so forth. It is also the case that a uniform system of marking charts needs developing, particularly for recording such things as subject artifacts, instrument adjustments, and other phenomenon that might affect the physiological data as they are recorded. The longer it takes us to develop such consensual systems of terminology, the harder it will become for examiners to communicate effectively with each other, and the greater the need will become for such systems.

### Examiners' Decisions

If I may, I would like now to leave the subject of training and make a few other more general observations about the field. Almost always, polygraph examiners render decisions that are dichotomous: truthful or deceptive; no deception indicated (NDI) or deception indicated (DI) and so forth. Occasionally, of course, there may be a judgment of "inconclusive" or "incomplete" rendered in addition to the other two. It seems to me that this dichotomous or tripartite decision making ought to be re-evaluated, at least for some purposes. For instance, many, if not most, of the accepted forensic sciences rely on a range of decisions that, in my view at least, makes them more acceptable and useful. In voice identification, as an example, it is accepted practice to report one of the following decisions, depending on the type, quality, and amount of available data:

- Positive identification
- Probable identification
- No decision
- Probable elimination
- Positive elimination



A similar scheme for reporting decisions in our field would be rather easy to develop, and I think would be likely to enhance the usefulness and the perceived usefulness of our field. But, traditions die hard. Nevertheless, such a change would seem to me a change for the better, for several reasons. First, research in this field has shown a strong positive relationship between an examiners' confidence in his judgment about physiological data and the accuracy of those judgments: the more confident he is, the more apt he is to be correct. In other words, as most of you would probably agree, our difficult or problem charts are usually the ones on which errors are made. When we have such cases the usual approach is to be conservative, to report the subject truthful. This in spite of the fact that there may be valid reason to do otherwise, or at least to qualify our judgment somewhat.

Second, it is clear to me that in practice, it is more common than most of us would acknowledge that we tend to make definite decisions about both truthfulness and deception at times when we really should not, even when the charts may not be of the difficult variety. We do so for many reasons. Even though I have no hard data to support it, it would be my guess that that practice probably leads to more errors than we generally recognize: the unfortunate aspect of such errors is that they are not really "polygraph errors," but merely errors in examiner judgment.

Finally, I see a third favorable consequence of a more flexible, wider-range decision scheme. Such a scheme would probably lead most examiners to evaluate more carefully the data that supports their judgement; they would be less likely to make serious errors and more likely to be able to defend their judgment.

### The Nature of Polygraphy

Another issue that concerns us - should I say me? - is the tendency of polygraph examiners to convey to the public and interested observers that the polygraph technique is something more than it really is. The practice of polygraphy has evolved by trial and error over the years. We do not have an adequate theoretical foundation for many of the scientific questions about polygraphy. Polygraphy in its present state of development is an empirical art. We should not put ourselves in the position of implying that it is more than that. Similarly, it is also my position that we are considerably overstating the case when we convey to the outside world that all that counts in the practice of polygraphy is the charts obtained. In other words, we ought to say explicitly that a well-trained, competent examiner is important.

What the examiner does and how he does it clearly have an affect on the charts that are obtained and on how they are interpreted. In our efforts to convince others of our worth, we must be extremely cautious about implying that all that is necessary is some magic formula for interpreting charts. Without a trained examiner to determine what questions are to be asked, how the questions will be phrased, how the testing will progress, and a myriad of other decisions, a polygraph chart is worthless.

The charts, the recorded physiological data, are not independent on what the examiner does, even though in many instances the technique is

powerful enough to overcome certain violations of assumptions. In short, what I'm saying is that we ought to be explicit and firm in the conviction that the examiner is important; we ought to resist saying, by implication or otherwise, that all we are about is getting and magically evaluating polygraph data.

#### Formalizing Follow-up Procedures

It has become clear to me that many examiners are extremely deficient in their efforts to record in writing all of the essential information developed during and after a polygraph examination. In every case, all information important to the conduct of the examination and to the evaluation of the charts ought to be recorded and retained. Moreover, every examiner ought to maintain some sort of a systematic follow-up in order to determine and to record what the outcome was. This, of course, is particularly true in specific issue cases and especially in those instances where there is a possibility of arrest, trial, or other formal proceeding.

This final recommendation probably appears to be self-evident and overly obvious. My guess is, however, that if the records and cases of each examiner were closely checked, it would probably be found that some sort of verification is possible in 10 or 20 percent of the cases that were not previously verified. It is that sort of verification that is especially important to know about. It would provide a limited but very useful data base for estimating (by relatively independent criteria) the effectiveness of various polygraph procedures.

I realize, of course, that I have painted a picture today with a very broad brush. Nevertheless, I think each of the issues I have brought up is important and in desperate need of being acted upon. We have today, for instance, far too many examiners who in spite of their completion of a training school do not belong in this field. We have much too little coordination of our training schools, and we have too many training schools that are long on graduating students and short on training. And, we have far too many examiners who do far too little when they conduct examinations.

It seems fair, of course, to expect me to offer some solution to the major issues I have raised. We professors, however, are generally pretty good at asking questions; we're not quite so good at providing correct answers. Thus, I cannot at this time offer an easy, or correct, or even an acceptable solution to all of the problems I have touched on. But I can mention one thing I am quite certain of. None of the real problems in this field are going to be resolved by the legislative process, by licensing statutes. Mandated standards for licensure only cut down on the number of the obviously unqualified entering the field, and such standards don't really do a very good job of that: licensing statutes cannot make professional examiners out of those who think and act in unprofessional ways. The problems in this field must be resolved from within; they must, in my opinion, be dealt with quickly and forcefully. That is our individual and collective responsibility.

[Manuscript received January 10, 1980; final revision received January 28, 1980.]

*A Case in Which the Polygraph Was the Sole Evidence For Conviction*

*Junichi Fukumoto\**

Since the 1930's in Japan lie detection tests have been studied and developed by the Japanese police. The polygraph examination is now used in about 5,000-6,000 cases every year making Japan one of the major countries which use the polygraph technique. However, it is clear that there are some differences in the way the polygraph is used in Japan when compared to its use in the United States, as shown in Table 1.

Table 1

	U.S.A.	Japan
Sphere of Utilization	1. criminal investigation 2. security maintenance 3. personnel screening including preemployment test 4. by police authorities, federal government facilities, private companies	1. criminal investigation 2. by police authorities
Test method	CQT (Control question test)	POT (Peak of Tension) or CQT with POT

Thus, in Japan, the polygraph test is used in matters directly concerned with criminal activity. The ultimate purpose of the test is considered to be the adaptation of results by the courts as admissible evidence. In order to obtain such admissibility, the underlying theory and scientific basis of the polygraph test must be established.

The legal profession tends to apply polygraph results as evidence, although this method was often ignored by the courts. Thus, there was no

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conviction based on polygraph results alone. In this paper a case is presented which involved the author and which resulted in a significant judgment for the polygraph test. Until the juridical in that case, the defendant denied his crime of the larceny of a vehicle. Nevertheless, the court accepted the polygraph result as objective evidence and pronounced a finding of guilty upon the defendant.

Briefly, the facts in this case were as follows: On the night of June 1, 1977, a large wrecker which had been parked in front of Yasukawa Company, Fukuyama City, Hiroshima Prefecture which is in the Western part of Japan, was stolen. According to a search by the police authorities, it was found out that a scrap metal-dealer of Yamaguchi (the next prefecture to Hiroshima) got the wrecker from the suspect at the price of 170000 yen, a few days after it was stolen. Although the signature on the check issued by the scrap metal-dealer which was cashed at a banking agency was fictitious, some fingerprints which had been left on the wrecker were those of Yoshimatsu Seki (Sex: Male, Age: 32, Profession: Coolie) in the criminal list. Immediately, he was wanted by the police for larceny and desperate efforts were made in the search for him. Finally, on June 25, 1977, he was found and arrested at Fukuoka City which is over 1000 miles from Fukuyama City.

Upon investigation, Seki claimed he was innocent, that he merely was asked to sell the wrecker by a strange man who was 45 or 46 years old. Since it was impossible for the police staff to collect any more material evidence, it was decided to use the polygraph test as the best way to find whether the suspect was an offender or not. The suspect agreed to take the test.

If the suspect is an offender, we can assume that he will respond to the critical question in a POT (Peak of Tension Test) on account of recognition of a criminal matter. Accordingly, the examiner perused the initial report of the police, the police report from the scene of the crime and the victim's written statement to obtain suitable test questions. The examiner drew up a list of peak of tension questions including the following critical items:

- I. The geography around the scene of offense (near to the turf).
- II. The distinction of the parking place (stone-wall fence).
- III. The method of entry into the area (destroyed a lattice door knob).
- IV. Disposition of the key (left it in the ignition key hole).
- V. The place where the number plate was taken off (at a closed drive-in).

On June 28, 1977, the polygraph test was administered. The suspect's physiological responses to the critical questions were stronger than those to the non-critical questions. The examiner made a written statement on the basis of the polygraph result and sent it to the police authorities concerned. Then, the police authorities consigned the suspect with the written statement to the Public Procurator's Office, and he was prosecuted for larceny to Yamaguchi District Court.

On October 17, 1977, the examiner was summoned to the court, and given a hearing in which the following areas were covered:

- (1) The examiner's special field of study,
- (2) His academic background, and
- (3) His experience with the polygraph test.

The defense requested the examiner to make clear the following:

- (1) The reasons for the application of the POT test,
- (2) The principle and rationale of the test, and
- (3) The effect of a response made by an innocent person acquainted with the criminal matter.

The judge also requested the examiner to give a full detail of the following:

- (1) A criterion of chart interpretation,
- (2) The effect of nervousness, and
- (3) The reliability and validity of the polygraph result.

As a result of that hearing, on February 13, 1978, in Yamaguchi District Court, Judge Yoshida concluded that the polygraph result was admissible as evidence under Paragraph 4, Article 321 of the Criminal Procedure Code:

"The document prepared by an expert witness which describes his conclusions and process under which he has formulated his opinion may be used as evidence, if he who has prepared it appears on the date for public trial as a witness and verifies the document as having been genuinely prepared."

The defense pleaded that the defendant merely was asked to sell a wrecker by a stranger in front of the "Nangoku" Drive-in, Sanyo Town, Yamaguchi Prefecture on June 2, 1977. The defendant thus claimed that he was innocent of the larceny. Through the testimony and the written report of the polygraph examiner, Junichi Fukumoto, the court concluded that the defendant knew well the geography, the scene of the crime, the way to steal into the area, the state of the key, and the place where the license plate was removed. In addition, the court found that the defendant had not previously been instructed or given suggestions about those items by the police or the examiner.

The judge found the defendant guilty of larceny and sentenced him to 20 months imprisonment. The defendant did not appeal the decision, so the case was closed.

There is reason to believe that the denial of guilt by suspects increases as the evidence against them decreases. The polygraph test has proven its value to cope with those circumstances. But the polygraph has not yet been classified as being one of the most accurate of the various identification tests. Therefore, we should exert ourselves to adopt the most effective questioning method and to objectify the interpretation of the polygraph charts in order to gain greater acceptance of the polygraph technique by the judiciary. [Manuscript received May 9, 1979. Accepted for publication January 11, 1980.]

## *Hypothetical Controls*

*James Wygant*

In commercial polygraph testing it frequently is difficult for an examiner to obtain adequate control questions. Many employers take it upon themselves, even before consulting any examiner, to promise employees that there will be no questions in the test pre-dating a certain time (usually the time when the employee signs a waiver or consent form). Once that promise has been made, many employees insist that it be honored by the examiner, regardless of any explanations of need for control questions. The problem is further complicated in situations in which tests are conducted on a periodic basis, bringing the examiner together with the same test subject perhaps several times each year. Soon all customary controls have been exhausted.

The traditional theory of control questions suggests that they should deal with prior experience. It is generally agreed that the most significant aspect of a control question is its inducement to a test subject to make an absolute denial when he either is knowingly lying or is concerned about whether he is answering completely truthful. Even though it is traditional to refer to past acts, it does not seem that controls need to do that if they can by other means propel the test subject into a probable lie. If we are not permitted to deal with the past, that leaves only two other possibilities - the present and the future.

I have used hypothetical controls, referring to the future, in commercial testing for some time with consistently satisfactory results. Two questions which have seemed particularly suitable for commercial testing have been:

- 1) In the future, would you steal something from (name of employer) if you had the chance?
- 2) Would you lie to even one of these questions if you thought you could get away with it? (or: if your job depended on it?)

It is important to note that these two questions actually have two components each. First is the hypothetical proposition, the "would you" part of the question. Second is a specified condition, the "if you" part. Having tried to use a question which contained only the hypothetical part, I found that it either did not function at all or produced only minimal response. The conditional portion of the question seems to be essential. It seems to give the question more "reality" and less abstraction, emphasizing the importance of the answer while generating more uncertainty.

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A subject being asked only "Would you ever steal something from the Ajax Company?" can answer "no" without much concern because he is essentially answering with regard to his present circumstances and intentions, of which he can be relatively sure. The addition of the phrase "if you had the chance" forces him to consider some indefinite time in the future, which deprives him of the same certainty.

Customarily in preemployment or periodic examinations I have placed question no. 1 just before the first relevant question; and question no. 2 in the second from last position, the last question in my preemployment and periodic tests being "Have you done anything today in an attempt to beat this test?"

I attempt to conduct preemployment and periodic tests as much like peak of tension tests as possible. During pre-test discussion the test subject is given a copy of the questions and advised that they will be presented in the test in the same order as they appear on the paper. Frequently the subject will be told that the number of each question will also be given in the test because deceptive subjects tend to remember the number of any question to which they plan to lie. (While this is not necessarily true, the suggestion can have a reinforcing effect). Questions are discussed in descending sequence, as they will be presented in the test, except that attention is drawn to the two controls, which are discussed together and described as slightly different from the other questions. They are identified as slightly different from the other questions. They are identified as hypothetical and they are justified as necessary to determine the applicant or employee's intentions with regard to this test and to future employment, in contrast to other questions asking about past behavior.

If the subject is re-tested on a periodic basis, he or she is advised that past answers are no indication of the truthfulness of any answer given during the present test. Surprisingly, in periodic testing the two hypothetical questions given above will continue to produce response on test after test.

A truthful answer to these two questions (which would cause them to cease functioning as controls) would be "I don't know," unless an examiner has truly discovered some test subject with the mystical ability to see into the future. Fortunately, few subjects will make much effort to answer "I don't know" instead of "no." In order to project the image of an honest employee, most subjects appear anxious to leave no doubt about their future intentions.

As with any other control, the value derived from using hypothetical controls will correspond to how adequately they are presented to the test subject by the examiner. The examiner who simply recites the question once in pre-test, obtains the subject's "no" answer and then moves on should not expect good results. It is important to encourage the subject's self-doubt about his or her answer. When the subject says "no" the examiner should enhance that answer with something like, "Are you sure?" A few additional

## *Hypothetical controls*

words similar to the following are helpful: "I know this question and the other one are a little different from the others because they ask you what you're going to do in the future and the others ask you about the past, just remember that there's no question in this test that you can't answer completely truthful, if you really want to."

It does rarely happen that a test subject will answer "yes" to one or both of these two questions. Keeping in mind that the only truthful answer would be "I don't know", the answer "yes" is as much of a lie as "no" because it, too, claims certainty where there can't be any. I have permitted subjects to answer "yes" to these questions in the test after stressing to them I did not care what the answer was, only that every answer to every question must be completely truthful. Even if a subject is lying to a relevant question and also answering "yes" to "Would you lie to even one of these questions if you thought you could get away with it?" there is no reasonable basis for assuming that the reaction to a speculative control would be greater than to the relevant, which refers to a specific act or conduct.

Using basically the same justification that I have brought to hypothetical controls, Gordon Barland<sup>1</sup> has successfully used a present-time control. Following his instructions, I have obtained satisfactory results. The question in this instance is "Do you consider yourself to be of above average honesty?" The subject is told that this question is important in helping to establish his overall honesty and integrity, which are important considerations in employment. A test subject's first response to the question is often "no, just average." But when asked for a self-rating on a scale of 1 to 100 for telling the truth, not stealing, not cheating, etc., most subjects pick a rating around 70 or 80 (I got an 80 from a young man who had already admitted a burglary, a robbery and several other serious thefts). It is pointed out to the subject that this is a higher than average rating and that he should be answering "yes" to the question unless there's something he's not telling. After obtaining the "yes" answer there is the usual caution that every question in the test needs to be answered completely truthful.

In instances in which any relevant question produces a response after two charts that is equal to or greater than both controls, my own customary procedure is to advise the subject that there is deception indicated on a couple of questions and to ask if the subject knows what questions they are. Frequently the subject will identify the troublesome relevant and make an admission. If no question is identified, the subject is then advised of apparent problems in answering both the relevant question which produced a reaction and whichever control produced the greater reaction (even if response on that control is substantially below that of the relevant). The purpose is to avoid having the subject form a set on only a relevant question, so that if there is an admission it is still possible to run additional charts (to determine if anything else is being withheld) with the expectation that the controls will have been equally stimulated with the relevants. In other words, a subject is never told he is showing deception to a particular

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<sup>1</sup>Personal communication, September 1979.



relevant question without also being told that he is showing deception to a control.

These questions are not meant to be a panacea and are certainly not meant to replace traditional controls, where those can be used. They are meant only to meet specific needs that arise particularly in commercial testing. They are an alternative to trying to run a test with no controls or with controls that do not function. Used properly, they work for the same reason that traditional controls work. They compel the test subject to give an absolute answer to something he can not be absolutely sure of. In effect, they make the test subject lie. As a new concept, this procedure should be used with caution; however, adequate attention to both question construction and question introduction should provide a workable remedy to certain unique problems related to controls.

[Manuscript received September 23, 1979. Accepted for publication December 15, 1979.]

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The finest and noblest ground on which  
people can live is truth; the real with the  
real; a ground on which nothing is assumed.

- Emerson.

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## *A Validity Study of the Psychological Stress Evaluator*

*Brian E. Lynch and Donald R. Henry  
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The Psychological Stress Evaluator (PSE) was assessed for its ability to display and detect arousal in the spoken word. Forty-three university summer students were asked to read aloud 10 words composed of random proportions of taboo and neutral words. PSE recordings of these words were then given to 2 trained and 10 untrained analysts for identification of stress patterns. Results indicated that, although the students rated the taboo words significantly more arousing than the neutral, the accuracy of identification of such words was no greater than chance for all analysts, regardless of training. It was concluded that the PSE may not be as effective as its manufacturers claim. Additional research appears warranted.

The Dektor Corporation of Springfield, Virginia has marketed an instrument called the Psychological Stress Evaluator (PSE) which is claimed to measure stress, arousal, or physiological change associated with the voice, without the need of attached sensors. Traditionally, physiological measurement has used attached sensors with the result that a certain percentage of the measured arousal is artificially induced. If one is attempting to measure the degree of arousal or physiological change associated with a specific stimulus, then measurement without sensors would eliminate the possibility of sensor-induced arousal.

The PSE employs tape-recorded speech for the purpose of voice analysis. Briefly, the system involves feeding recorded vocalizations into the PSE to produce a visually observable medium. This medium or wave form is carefully analyzed in an attempt to identify frequency components of the recorded utterances that indicate physiological manifestations of psychological stress. More specifically, the PSE is intended to record the frequency components of uttered speech in such a way that purported infrasonic variations become indicators of the degree of stress. The Dektor Corporation suggests that these infrasonic variations are muscle microtremors occurring at 8-12 Hz (Lippold, 1971), and that the resultant patterns can be analyzed for stress using various modes (electronic filtering) and tape speeds.

PSE voice analysis has been researched in various ways. Barland (Note 1), Kradz (Note 2), Kubis (1974), and Vetter (1973) have used the PSE in the

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<sup>1</sup>Dektor Counterintelligence & Security, Inc., 5508 Port Royal Rd., Springfield, Virginia, U.S.A.

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detection of deception, using mock and real crime situations. Borgen and Goodman (Note 3), Brenner (Note 4), Reeves (1976), Smith (Note 5), Wiggins, McCranie, and Bailey (1975), and Worth and Lewis (1975) have used the PSE in various experimental situations, ranging from psychotherapeutic effectiveness to stage fright. Podlesny and Raskin (1977) state that "at this point there appears to be no scientific evidence that PSE analysis yields accuracies as high as those obtained with standard polygraph procedures, and little evidence that results exceed chance levels" (p. 796).

Much of the research presently available on the PSE has lacked external truth criteria for validation requirement and also aid in the analysis. Emotionally powered words have been used in various physiological investigations as reliable laboratory inducers of mild stress (Stelmack & Leckett, 1974). The purpose of the present study was (a) to investigate the validity and inter-judge agreement of the PSE by assessing the rate of detection of arousal in spoken words; and (b) to see if naive analysts could analyze stress by matching to sample.

### Method

#### Subjects

The sample consisted of 43 university summer students ranging in age from 18 to 50, with a mean age of 26.1 years. There were 21 males and 22 females, representing a cross-section of socio-economic levels in a bilingual university environment. Because of the design utilized, all students constituted the experimental group without the necessity of a control group.

#### Apparatus

The stimuli consisted of 10 neutral words (at, by, cup, home, on, or, over, run, sky, the) and 10 taboo words (cock, cunt, fag, frig, fuck, prick, puke, screw, shit, tit; cf. Stelmack & Leckett, 1974), printed on a 7.5 x 12.5 cm cards with 20-pt Helvetica medium (capitalized) Letraset lettering. An additional neutral word (pen) was added as an initiating "damper" stimulus. Voice recording was taken on a Uher 4000 report I-C tape recorder using a Uher dynamic microphone M 136 and Scotch AV-177 low-noise tape. The tape recording was subsequently played into the Psychological Stress Evaluator (PSE-101) at speeds of either 4.7 cm/sec or 2/4 cm/sec. and filtered through Mode III.

#### Procedure

Before the experiment, all students completed the Eysenck Personality Inventory (EPI). Each student was then given a stack of 10 randomly arranged neutral and taboo word cards, plus the initiating neutral words. The random order was accomplished by blindly drawing each set of 10 cards from a box containing all 20 cards. Each student was asked to recite the words into the tape recorder after the experimenter had left the room. When finished, each student was asked to rate the 10 words on a 7-point rating scale, ranging from very pleasant to very disgusting. All recorded word lists were then processed on the PSE and distributed to 2 trained analysts

and 10 untrained analysts for stress analysis. All raters used a rating chart composed of voice patterns identified by the Dektor Corporation (Note 6) as indicative of stress. None of the raters was aware of the type of words, or the proportion of neutral to taboo words. They were instructed only to compare the 430 word patterns and the rating charts to see if any of the patterns were similar.

### Results

Table 1 presents the decisions made by each of the analysts on the 430 voice patterns, of which 216 were taboo words and 214 were neutral words. There were no statistically significant differences between the analysts on accuracy of rating ( $t(11) = .62$ ,  $p$  greater than .05). Both trained and untrained analysts were unable to discern differences in voice patterns between taboo and neutral words. That is to say, they were unable to sort the voice-stress patterns consistently, at a greater than chance level, into those that belonged with taboo words and those that belonged with neutral words.

In addition, there was no relationship between the analysts' pattern identifications and their resultant accuracies ( $r = -.01$ , biserial coefficient). Thus the total number of stress pattern identifications was not a predictor of accuracy outcome. The mean EPI results were within normal limits for university students ( $M = 11.2$ ,  $N = 10.4$ ,  $L = 3.3$ ). There were no significant correlations between word ratings and any of the EPI scales. There was a statistically significant difference between the student's rating of taboo words and neutral words ( $t(42) = 5.78$ ,  $p$  less than .001).

TABLE 1  
Breakdown of percentages in stress pattern identification

Analyst	Taboo words		Neutral words		Stress and neutral
	"Stress" (%) (True-Positive)	"No stress" (%) (False-Negative)	"Stress" (%) (False-Positive)	"No stress" (%) (True-Negative)	Correctly identified (%)
1. T <sup>a</sup>	41	59	51	49	45
2. T	67	33	78	22	45
3. UT <sup>b</sup>	15	85	15	85	50
4. UT	92	8	92	8	50
5. UT	64	36	57	43	54
6. UT	69	31	67	33	51
7. UT	75	25	86	14	44
8. UT	77	23	69	31	54
9. UT	84	16	87	13	49
10. UT	98	2	96	4	51
11. UT	87	13	88	12	50
12. UT	1	99	0	100	50
TOTAL	64	36	65	35	49 $t = .62$ ns

<sup>a</sup>T = trained.

<sup>b</sup>UT = untrained.

## Discussion

These results indicate that pattern identification of voice stress resulting from the utterance of taboo and neutral words was a chance occurrence. The analysts, regardless of training, performed at approximately chance levels in terms of accuracy of identification. Therefore, accuracy of pattern identification was not a function of extent of training in pattern identification. Since both trained and untrained analysts followed no consistent trend in identifying words, it must be concluded that pattern identification in this study was accomplished by random guessing. That is, the analysts were in no way consistent in their choice of patterns and, therefore, in their resultant accuracy.

The lack of significant difference between the actual accuracy rate and the expected accuracy rate may reflect, in part, a state of low level arousal when subjects uttered taboo words. Although the students rated the taboo words as significantly more disturbing than the neutral, the taboo words may still not have been sufficiently arousing to be picked up by the PSE. Since earlier studies have shown taboo words to be arousing, this explanation does not seem compelling. However, the inventors of the PSE (Note 7) suggest that it functions within limits of arousal which have not yet been defined. Thus, a certain level of arousal must be present in an individual in order for it to be picked up and displayed by the PSE. If this is the case, usage of such equipment in applied situations would require some external criterion measure of "sufficient arousal" before anything could be said about the voice pattern. With reference to the present study, if the uttered words were not registering on the PSE, then this would preclude any chance of correct identification by the stress analysts.

Many questions as to pattern identification, training effect, and minimum-maximum stress levels necessary with the PSE, are still unanswered. It is well known that the PSE is being used by police and private industry daily as a procedure for detecting deception. If, because of threshold activation limits, it cannot detect stress states equally on a continuum from no stress to maximum stress, then when and when not to use it without some other criterion measure of arousal is an unanswered question. If, as its inventors claim, the PSE has been effective in stress identification, it is probable that the strong placebo effect of such an instrument has been the chief factor behind any significant accuracy results.

A situation is needed which very clearly causes physiological arousal, and does not rely simply upon an individual's self report of arousal. Since polygraphic measure have been used as indicators of various physiological parameters (Grossman, 1967), it seems feasible to use them as criteria of physiological arousal. A future study might investigate the PSE in comparison with other physiological measures, to establish if it is dependent on some minimal level of stress in order to be effective.

## Reference Notes

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## *Abstracts*

### Behavioral Symptoms

Bella M. DePaulo and Robert Rosenthal, "Telling Lies," Journal of Personality and Social Psychology 37 (10)(1979): 1713-1722.

Twenty men and twenty women were videotaped while describing someone they liked, someone they disliked, someone they were ambivalent about, someone they were indifferent about, someone they liked as though they disliked him or her, and someone they disliked as though they liked him or her.

Accuracy at detecting that some deception had occurred was far greater than accuracy at detecting the true underlying affect, and people who were good at detecting that deception was occurring were not particularly skilled at reading the speakers' underlying affects.

However, people whose deception attempts were more easily detected by others also had their underlying affects read more easily. Speakers whose lies were seen more readily by men also had their lies seen more readily by women, and observers better able to see the underlying affects of women were better able to see the underlying affects of men. Skill at lying successfully was unrelated to skill at catching others in their lies.

A histrionic strategy (hamming) was very effective in deceiving others, and this strategy was employed more by more Machiavellian people, who also tended to get caught less often in their lies. Methodological considerations and systematic programs for future research are discussed. (author abstract) [For reprints write to Bella M. DePaulo, Dept. of Psychology, Gilmer Hall, University of Virginia, Charlottesville, Virginia 22901.]

### The Examiner and the Investigator

"The Polygraph in Criminal Investigations," Training Key #286, published by the Bureau of Operations and Research, International Association of Chiefs of Police, 1979, 6pp.

This is one of a long series of excellent Training Keys prepared and published by the International Association of Chiefs of Police for roll-call training and other types of training where the purpose is to inform or instruct, but not teach in depth. The general impression of this Key is correct with respect to the proper role of the polygraph examination in criminal investigations. A policeman would benefit from reading this or receiving training based on this publication.

Unfortunately, it is marred by technical errors in describing physiological activity. Also, the number of states which accept stipulated polygraph evidence is now 26 (not 16 as stated) and there is no mention of Federal court admissibility, or admissibility over objection in New Mexico and Massachusetts. The reader would believe that admissibility is exceedingly rare, and only under stipulation. The bibliography lists only the textbook by Reid and Inbau. There is not a word about examiner qualifications, training, or the licenses now required in 24 states.

The strength of the Key is the emphasis on the need for cooperation between the investigator and the examiner, the need to furnish the examiner with all investigative facts, and the good illustrations of an instrument and polygraph chart segments.

## *Instructions to Authors*

1. Polygraph publishes articles in the area of detection of deception, including polygraph techniques, voice analysis, psychological techniques and paper-and-pencil assessments. The journal is interested in experimental studies, theoretical papers, critical reviews of the literature, and software developments such as interview techniques, and test formats. Book reviews and interchanges among readers will also be considered, subject to space availability. Occasional reprinted articles are published, depending upon the importance of the original paper and its accessibility by the readership of Polygraph.
2. Manuscripts, books for review, and inquiries concerning material to be published should be forwarded to Gordon H. Barland, Ph.D., Editor, Polygraph, 3625 Eastwood Drive, Salt Lake City, Utah 84109.
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