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volume 5	June 1976	Number 2
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PUBLISHED QUARTERLY

Polygraph 1976, 05(2) AMERICAN POLYGRAPH ASSOCIATION, 1976 P.O. Box 74, Linthicum Heights, Maryland 21090

DETECTION OF DECEPTION: A REVIEW OF FIELD AND LABORATORY PROCEDURES AND RESEARCH

By

Frank Horvath*

Essentially the literature dealing with lie detection can be identified as that written by field practitioners and that written by laboratory researchers. Literature in the former category usually consists of descriptions of procedures, instrumentation and some research bearing on the efficacy of these items. On the other hand, reports of laboratory researchers most often are concerned with determining how well and under what conditions lie detection is possible; that is, what precise physiological and psychological mechanisms contribute most to the detection of deception. Because both goals and methods of these two approaches differ, the literatures will be dealt with separately, considering first procedural differences. The relatively detailed discussion of field procedures will not only provide a more thorough base for assessment of laboratory procedures, but will also clarify points to be made in discussion of the validity and reliability of lie detection. But, first, a historical review of lie detection is in order.

Historical Evaluation

There is no need to discuss in depth the early history of lie detection procedures and the development of the polygraph instrument, as there are already available excellent accounts dealing with this topic.⁽¹⁾ The purpose of the following brief review of this area is simply to put this paper into perspective.

Historically, the most dramatic attempts at lie detection relied upon "ordeals" such as hot irons on the tongue of suspects to be protected by their innocence or burned by their guilt. Also described in the literature are relatively objective procedures, such as careful observation of a suspect's

*Assistant Professor, School of Criminal Justice, Michigan State University.

⁽¹⁾ See: P. Trovillo, "A History of Lie Detection," J.Crim. Law and Crim., 29 (1939), 848-881 and 30 (1939), 104-119; J. Larson, Lying and Its Detection (Chicago: Univ. Chicago Press, 1932, reprinted, Montclair, N.J.: Patterson Smith, 1969); C. Lee, <u>The Instrumental Detection of Deception</u> (Springfield, Ill.: C. C. Thomas, 1953).

behavioral characteristics or changes in pulse rate when under interrogation. It was not until about 1895, however, when Cesare Lombroso, an Italian physiologist, and his student, Mosso, used the hydrosphygmograph and the "scientific cradle", that objective measurement of physiological changes became associated with the detection of deception.⁽²⁾

Following Lombroso and Mosso, other investigators took note of physiological changes associated with deception. In 1908 Munsterberg made reference to the effect of lying on breathing, cardiovascular activity, involuntary movements, and the galvanic skin response (GSR).⁽³⁾ In 1914, Benussi conducted a series of experiments in which he found a relationship between the inspiration-expiration ratio in breathing and deception.⁽⁴⁾ His findings were later confirmed by Burtt who added that systolic blood pressure was yet more indicative of deception than respiration.⁽⁵⁾ Marston's findings agreed with Burtt's that discontinuous measures of systolic blood pressure were superior to either respiration or GSR for detecting deception.⁽⁶⁾ Larson modified Marston's blood pressure test and developed an instrument and procedure for making continuous recordings of both blood pressure-pulse rate and respiration.⁽⁷⁾ Keeler, generally credited with developing the prototype of the polygraph instrument now used in most field settings, further refined Larson's apparatus to which he added a device for measuring electrodermal activity.⁽⁸⁾

(2) Trovillo, "A History of Lie Detection," op. cit., 858.

(3)_{H.} Munsterberg, <u>On The Witness Stand</u> (New York: Doubleday, 1908), 118-133.

⁽⁴⁾V. Benussi, "Die Atmungssymptome der Lüge" ("On the Effects of Lying on Changes in Respiration"), <u>Arch. für Die Gestamte Psychologie</u>, 31 (1914), 244-273, cited by Trovillo, "A History of Lie Detection," <u>op. cit.</u>, 870.

⁽⁵⁾H. Burtt, "The Inspiration-Expiration Ratio During Truth and Falsehood," J. Exp. Psych., 4 (1921), 1-23; see also, H. Burtt, "Further Technique For Inspiration-Expiration Ratios," J. Exp. Psych., 4 (1931), 106-110.

⁽⁶⁾W. Marston, "Systolic Blood Pressure Symptoms of Deception," <u>J.</u> <u>Exp. Psych.</u>, 2 (1917), 117-163.

(7) J. Larson, "Modification of The Marston Deception Test," J. Amer. Inst. Crim. Law and Crim., 12 (1921), 390-399.

(8)_{L. Keeler}, "A Method For Detecting Deception," <u>Amer. J. Pol. Sci.</u>, 1 (1930), 38-52.

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The discussion up to this point should not be taken as an indication that respiration, cardiovascular activity, and GSR are the only physiological processes which have been associated with deception. Limited success at detecting deception has also been accomplished by measurement of other physiological activity, such as: hand tremors, $^{(9)}$ electroencephalic activity, $^{(10)}$ pupil dilation, $^{(11)}$ oculomotor activity, $^{(12)}$ voice modulation, $^{(13)}$ oxygenation of the vascular system, $^{(14)}$ and covert muscular movements. $^{(15)}$ But what is now fairly well agreed upon by field examiners is that any attempt at detecting deception must be made with an instrument that records both cardiovascular and respiratory activity. $^{(16)}$ It is in fact illegal in some states for a detection of deception examiner to use an instrument not capable of recording these two parameters, although others, particularly electrodermal activity are also commonly recorded in conjunction with them. $^{(17)}$

(9) A Luria, "The Union of the Motor Method and the Investigation of the Affective Reaction," State Inst. of Exp. Psych. (Moscos, 1928); "Die Methode der Abbildenden Motorik und ihre Anwendung an die Affekt-Psychologie, Psychol-Forschung, Band 12, 1929; Examination and Psychical Reactions (1930); <u>The Nature of Human Conflicts</u>, Horsley Gannt (Trans. and Ed.), 1932, cited by Trovillo, "A History of Lie Detection," <u>op. cit.</u>, 114, note 124.

(10)_C. Oberman, "The Effect on the Berger Rhythm of Mild Affective States," J. Abn. and Soc. Psych., 34 (1939), 84-95.

(11)_{F.} Berrien and G. Huntington, "An Exploratory Study of Pupillary Responses During Deception," J. Exp. Psych., 32 (1943), 443-449.

(12)_{F.} Berrien, "Ocular Stability in Deception," J. App. Psych., 26 (1942), 55-63; F. Berrien, "Possibilities in The Use of The Opthalmograph as a Supplement to Existing Indices of Deception," <u>Psych. Bulletin</u>, 37 (1940), 507, D. Ellson, R. Davis, I. Saltzman and C. Burke, <u>A Report of Research on Detection</u> of Deception (Tech. Report prepared for Office of Naval Research, Contract N6onr-18011, Indiana Univ., 1952).

⁽¹³⁾M. Alpert, R. Kurtzberg, and A. Friedhoff, "Transient Voice Changes Associated with Emotional Stimuli," <u>Arch. Gen. Psych.</u>, 8 (1963), 362-365; P. Fay and W. Middleton, "The Ability to Judge Truth-Telling or Lying From the Voice Transmitted Over a Public Address System," <u>J. Gen. Psych.</u>, 24 (1941), 211-215.

(14)_{H.} Dana, "It is Time to Improve the Polygraph: A Progress Report on Polygraph Research and Development," <u>Academy Lectures on Lie Detection</u>, II., V. Leonard (Ed.), (Springfield, Ill.: C. C. Thomas, 1957), 84-90; H. Dana and C. Barnett, "The Emotional Stress Meter," <u>Academy Lectures on Lie Detection</u> (Springfield, Ill.: C. C. Thomas, 1957), 73-83; R. Thackray and M. Orne, "A Comparison of Physiological Indices in Detection of Deception," <u>Psychophysiology</u>, 4 (1968), 329-339.

(15) J. Reid, "Simulated Blood Pressure Responses in Lie Detector Tests and a Method for Their Detection," J. Crim. Law and Crim., 36 (1945), 201-214.

Field Lie Detection: Procedures

There are two major field lie detection procedures in use today, the relevant-irrelevant (R-I) and the control question (CQ) techniques. In this section a discussion of these techniques will be made in some detail, to aid in an understanding of the literature concerning the validity and reliability of lie detection.

Relevant-Irrelevant Technique

It is clear from the literature on field lie detection that many of the early practitioners considered the primary benefit of polygraphic testing to be that it enhanced their own ability to obtain confessions of guilt or admissions of lying from criminal suspects. (18) It is not surprising then that polygraphic testing and "interrogation" (intensive or accusatory questioning designed to secure a confession) were often considered identical, and perhaps inseparable, processes; that is, the two processes were blended or combined in such a way that the psychological effect of the polygraphic instrument and the consequent physiological recordings could be maximized to secure confessions of guilt. The complete blending of interrogation and polygraphic testing characterizes the R-I technique. (19)

<u>Pre-Test Interview</u>.-- Simply stated, the R-I technique is relatively unstructured, consisting of an interview, or perhaps intensive questioning, followed by or combined with polygraphic testing. During the interview the

(16)_{N. Ansley (Ed.), "Inquiry Regarding Dektor PSE-1," <u>American Polygraph</u> <u>Association Newsletter</u>, Number 3 (March, 1972), 18.}

(17)C. Romig, "The Status of Polygraph Legislation of the Fifty States," Part III, <u>Police</u>, 16 (1971), 58.

(18) See: F. Inbau, Lie Detection and Criminal Interrogation (Baltimore: Williams and Wilkins, 1942), 54.

⁽¹⁹⁾The R-I Technique is considered outmoded by some leading examiners: See: C. Backster, "Lie Detection Comes of Age," <u>Law and Order</u> (undated, unpaginated reprint supplied by author); C. Backster, "Method of Strengthening our Polygraph Technique," <u>Police</u>, 6 (1962), 61-68.

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examiner discusses with the subject background information relative to the investigation at hand and exploits any hesitancy or uncertainly in the subject's answers to questions, he also observes the subject's behavior in order to locate "sensitive areas" which may be useful in the testing. The examiner also explains the purpose of the testing and the nature of the polygraphic instrument, implying that it is futile for the subject to harbor any thoughts of "beating" the test. It is also the examiner's purpose during the interview to establish rapport with the subject and to become familiar with his language and personal history in order to assure that the test questions, which may or may not be reviewed prior to testing, will be effectively worded.

The length of the interview is determined by the examiner according to his impression of the subject's emotional accessibility. A high-strung subject generally requires a lengthier interview in order to prepare him for testing; a relatively passive subject must be "aroused", and so forth.

<u>Polygraphic testing</u>. -- Polygraphic testing in the R-I Technique generally consists of asking a series of questions relevant to the crime and interspersed between irrelevant, or non-critical questions; other types of questions such as those exposing a guilt complex may be asked at the discretion of the examiner. The precise nature, wording, and ordering of the test questions is determined by the examiner as testing progresses, as is the length of any one test. Generally, however, generalized questions precede specific questions, an order believed helpful because it recapitulates the steps in commission of an offense.

The length of any given test, the asking of the relevant and irrelevant questions at least once in a series, is determined by the examiner and is dependent primarily upon the subject's ability to withstand the effects of the apparatus used for recording cardiovascular activity. Within any given polygraphic examination, two R-I tests may be conducted before a determination of deception (or truthfulness) is made, although proponents of the method feel that in most cases such a determination can be made following one test.

Proponents of the R-I technique assume that truthful people will not differentially react to relevant and irrelevant questions, while people lying will. In other words, determinations of truth-telling and lying depend upon perceptible differences in physiological response to the stimulus of non-critical and critical items. Moreover, during any given test or between any two tests such differential reactions constitute cause for intensive questioning of the subject

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by the examiner. Proponents of this technique believe that interrogation for the purpose of securing a confession or admission of lying at any time during the pre-test interview or the testing is justified, if, in the examiner's judgment it seems warranted.

Within the R-I tests, of course, there is usually no actual "control" against which responses to the relevant questions can be compared, at least no control similar to that advocated by proponents of the CQ technique. The lack of such a control is believed to make the R-I technique an interrogation capitalizing on the psychological effect of the polygraphic instrument and recordings; R-I tests, then, for reasons to be further explained here are usually considered by proponents of the CQ technique inadequate for making decisions regarding a person's truthfulness or deception based upon the polygraphic recordings exclusively.⁽²⁰⁾

Control-Question Technique

Many leading polygraphic examiners today distinguish between interrogation and polygraphic testing. The major impetus of this change in approach was the "control question" as developed by John E. Reid in 1947. ⁽²¹⁾ Since Reid's first publication on this topic he and other practitioners have so refined the use of control questions and the procedure used for giving polygraphic tests that it is now believed that polygraphic testing and interrogation must be considered separately. That is, most proponents of the CQ technique believe that polygraphic testing provides a substantially accurate means of determining a person's truthfulness or deception independent of interrogation; in fact, interrogation before or during the testing proper is believed detrimental to testing. ⁽²²⁾

The C-Q technique consists of two distinct components: the pre-test interview and polygraphic testing. Although some examiners maintain that post-test interrogation is a third component, (23) such a component seems out of line with the notion that interrogation and polygraphic testing are separate phenomena.

(21) J. Reid, "A Revised Questioning Technique in Lie Detection Tests," J. <u>Crim. Law and Crim.</u>, 37 (1947), 542-547.

(22) J. Reid and F. Inbau, <u>Truth and Deception</u>: <u>The Polygraph</u> ("Lie Detector") <u>Technique</u> (Baltimore: Williams and Wilkins, 1966), 177.

⁽²⁰⁾ The discussion concerning the R-I Technique was condensed from: L. Harrelson, <u>Keeler Polygraph Institute Training Guide</u> (Chicago: Keeler Polygraph Institute, 1964).

<u>Pre-Test Interview.--</u> The pre-test interview as used by proponents of the CQ technique occurs prior to testing, when the examiner discusses with the subject the purpose of the examination, the nature of the polygraphic instrument, and, in general, seeks to prepare the subject for the testing. Unlike the interview used in the R-I technique, however, there is no intensive questioning on the issue at hand. Moreover, during the interview the examiner makes it a point to review with the subject the exact test questions which will be asked, and the subject himself participates in the formulation of these questions. Such participation is considered essential to the functioning of the testing procedure, particularly with respect to the control questions.

There are, of course, variations among examiners in the way a pre-test interview is conducted. Some examiners conduct a lengthy interview and acquire detailed background information, <u>e.g.</u>, medical history, etc. while others do not. Some use specialized interview techniques to become familiar with behavioral characteristics which may be helpful in making a diagnosis of truthfulness or deception. Some examiners spend a considerable amount of time explaining the nature of the polygraphic instrument, the way in which autonomic responses are used to detect deception, and the futility of trying to beat the test. More detailed information concerning variations in the pre-test interview can be found in Reid and Inbau, ⁽²⁴⁾ Horvath, ⁽²⁵⁾ or Barland and Raskin. ⁽²⁶⁾

<u>Polygraphic testing</u>.-- While there are differences between pre-test interviews in the R-I and CQ procedures, the essential difference between them lies in the nature of the questions asked during polygraphic testing and the manner in which response data are evaluated. During the CQ testing, three basic types of questions are asked: irrelevant, relevant, and control questions, although, as in the R-I technique, other question types may also be used.⁽²⁷⁾

(24) Reid and Inbau, <u>Truth and Deception</u>: <u>The Polygraph</u> ("Lie Detector") <u>Technique</u>, <u>op. cit.</u>, 1-16.

(25) F. Horvath, "Verbal and Nonverbal Clues to Truth and Deception During Polygraph Examinations," J. Pol. Sci. and Adm., 1 (1973), 138-152.

(26) Barland and Raskin, "The Use of Electrodermal Activity in the Detection of Deception," <u>op. cit.</u>, 5-8.

(27) Reid and Inbau, <u>Truth and Deception: The Polygraph</u> ("Lie Detector") Technique, <u>op. cit.</u>, 18; R. Arther, "The Guilt Complex Question", <u>J. Polygraph</u> <u>Studies</u>, 4 (1969), 1-4.

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^{(23)&}lt;sub>G.</sub> Barland and D. Raskin, "The Use of Electrodermal Activity in the Detection of Deception," In: W. Prokasy and D. Raskin (Eds.), <u>Electrodermal</u> Activity in Psychological <u>Research</u> (New York: Academic Press, 1973).

Irrelevant questions are those used for establishing "normal" or truth-telling patterns: they will deal with such matters as: "Do they call you Joe?" and, "Are you over 21 years of age?" Relevant questions are those which pertain to the matter under investigation, such as "Did you shoot John Doe?" and. "Did you fire the shots that killed John Doe?" Control questions are those growing out of interaction between the examiner and the subject; in general they deal with matters similar to, but of presumed lesser significance than, the offense being investigated. While the interaction between the subject and the examiner determines the exact nature of these questions, an example in a burglary-investigation mught be: "Did you ever steal anything?" or, "Except for what you have already told me about, did you ever steal anything else?" The examiner seeks to frame these questions in such a way that the subject will answer "no" but will, in all probability, be lying or at least will have some doubt or concern about the truthfulness or accuracy of his answer. After the formulation of all test questions and at the completion of the pre-test interview, polygraphic testing is conducted.

In the polygraphic testing, the examiner asks the subject the previously reviewed irrelevant, relevant and control questions in a series of polygraphic tests. Each test generally consists of about ten or eleven questions, four irrelevant, two control, and four or five relevant questions, and will usually last about three minutes. All questions are asked once during one test, and at about twenty-second intervals. A complete examination consists of the repetition of several of these tests. It is generally agreed that for an examiner to ascertain with any degree of accuracy the deception or truthfulness of the subject's answer to a relevant test question, that question should be asked at least once on each of two separate tests; sometimes, four or five separate tests may be conducted before a determination of deception is made.⁽²⁸⁾

It might be helpful at this point to describe the testing sequence used by many of the proponents of the CQ procedure. Generally, immediately following the pre-test interview, the examiner conducts the first CQ test of 10 or 11 questions, previously reviewed. After this first test, a card (or "numbers") test, or some variation of such a test, is administered. The nature of the card test being fully explained elsewhere, ⁽²⁹⁾ its ostensible purpose

(28) Reid and Inbau, <u>Truth and Deception</u>: <u>The Polygraph</u> ("<u>Lie Detector</u>") <u>Technique</u>, <u>op</u>. <u>cit</u>., 26-33. (29) Ibid., 27-28. is to demonstrate to the subject the efficacy of the lie detector; actually, it is more properly considered one of the many stimulation tactics used by examiners employing the CQ procedure. Such tactics will be discussed later.

Following the card test the examiner leaves the examination room for a short period, before doing so usually requesting the subject to think carefully about the test questions while he is out of the room. Upon his return, he asks the subject if there are any questions which concern him more than others, or if there are any which the subject feels should be re-worded. If not, the examiner then tells the subject that another test will be conducted using the same questions asked in the first test, and in the same order; in other words, the third test is a replicate of the first.

Upon completion of this third test, the examiner briefly reviews the accrued polygraphic recordings and decides if further testing is necessary. It is usually claimed that in some instances, response data contained in the first two control question tests are sufficient to indicate the subject's truthfulness or deception.⁽³⁰⁾ In the majority of instances, however, further testing is indicated and conducted via one or more of the specialized tests discussed below.

<u>Specialized tests.-- 1</u>) Mixed Question Test. In most instances of additional testing the first test will be a "mixed question test." In this test the subject is asked the questions of the first two control question tests but in a different order. The ordering of the questions is flexible, usually based upon the examiner's knowledge of the response data observed in the prior tests.⁽³¹⁾

2) Silent Answer Test. A specialized test which some examiners have recently incorporated as the fourth test in the series (usually in the position where the mixed question test is placed) has been termed the "silent answer test". Its usefulness has been adequately described elsewhere.⁽³²⁾

3) The "yes" or Affirmation Test. The "yes" or affirmation test is one in which the subject is instructed by the examiner to answer "yes" to all of the test questions (which, of course, are the same questions already asked on previous tests), including the relevant questions to which he had answered "no" before. The purpose of the "yes" test is to ascertain whether or not the

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⁽³⁰⁾ <u>Ibid.</u>, 30-37. (31) <u>Ibid.</u>, 30-32. (32) <u>F. Horvath and J. Reid, "The Polygraph Silent Answer Test," <u>J. Crim.</u> <u>Law, Crim.</u>, <u>and Pol. Sci.</u>, 63 (1972), 285-293.</u>

subject is engaging in deliberate attempts to distort his polygraphic recordings. Ordinarily the tracings (response data) obtained during the "yes" test are not interpreted in the same manner or for the same purpose as they are in the tests mentioned previously. The purpose and method of interpretation of the "yes test" is thoroughly discussed in Reid and Inbau.⁽³³⁾

Stimulation procedures. -- Proponents of the CQ procedure have developed various tactics to clarify response data; that is, these tactics are used not only to augment responsiveness to testing but, more importantly, to direct the subject's attention (or psychological set) to those test questions which constitute the greatest threat to his well-being; presumably, for persons telling the truth these tactics augment responses to control questions; for those lying, to relevant questions. Such tactics may take the form of specialized tests, e.g., the "card test", "silent answer test", etc., or, may consist of various forms of examiner-subject interaction. Regardless of which form they take, however, these tactics are considered to be much less direct than ordinary interrogational devices. For instance, when compared to direct questioning, implications by either verbal or nonverbal communication, concerning the subject's polygraphic records are considered to be much more effective and less apt to adversely affect polygraphic recordings, i.e., cause a person to respond beyond the normal to relevant test questions when he is telling the truth to them. Perhaps an example would clarify this point.

Assume that an examiner has conducted a series of three tests with a subject (CQ-Test One, a card test, and CQ Test Three -- a repetition of Test One) and feels that the responses are too ambiguous to permit accurate appraisal of the subject's truthfulness in answer to the relevant questions -- the responses to the control questions cannot be clearly differentiated from those to the relevant questions. In such an instance, the examiner may feel that a mixed-question test is warranted. Before conducting such a test he may ask the subject if any particular test questions concern him more than the others; while doing so he implies that the testing is not "clear" at this point. Further he may tell the subject that he would like to conduct another test but that before he does so, he wants to be certain that the subject clearly understands all of the test questions so far asked and is certain that he has

(33) Reid and Inbau, <u>Truth and Deception</u>: <u>The Polygraph</u> ("Lie <u>Detector</u>") <u>Technique</u>, <u>op.cit.</u>, 32.

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answered all of them truthfully. The examiner may then carefully re-read all of the test questions, requesting answers as he does so. He then asks the subject something like: "Are you certain that you understand all of these questions?" "Is there any answer you have given that may not be the complete truth?" When the subject acknowledges he has answered the questions truthfully and that he understands all of them, the examiner explains how the next test is to be conducted, <u>i.e.</u>, the same questions will be asked in a different order than they were asked on prior tests, and then proceeds with the testing.

The various tactics used by examiners to "stimulate" subjects are too numerous to detail here. It should be noted, however, that the tactics are rather indirect in nature; they are not accusatory and do not usually make reference to particular test questions, and most importantly, they presumably make a significant contribution to the functioning of the CQ procedure.⁽³⁴⁾

While the general testing procedure outlined above is representative of that used by many field examiners employing the CQ procedure, there are other specialized tests and other variations of the procedures. Some of these variations concern the number of individual tests which will be conducted during an examination, the organization of the tests, the order of questions within tests, and the procedure followed by the examiner during the break between tests. For a more thorough discussion of these variations see Reid and Inbau, $\binom{36}{37}$ or Backster.

Regardless of the various administrations of the CQ test, its proponents argue that control questions imbedded within the series provide a better tool for assessment of a person's truthfulness or deception to relevant issues than

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⁽³⁴⁾ J. Reid, "Stimulation Technique Outline," undated, unpublished manuscript supplied by J. E. Reid and Associates, Chicago; C. Klump, "Principles of Controlled Stimulation" (paper presented at American Academy of Polygraph Examiners, Eighth Annual Seminar, Washington, D.C., Sept., 1961).

⁽³⁵⁾ Reid and Inbau, <u>Truth and Deception</u>: <u>The Polygraph</u> ("Lie <u>Detector</u>") <u>Technique</u>, <u>op</u>. <u>cit</u>., 10-36.

⁽³⁶⁾ Barland and Raskin, "The Use of Electrodermal Activity in the Detection of Deception," op. cit., 13-17.

⁽³⁷⁾C. Backster, <u>Standardized Polygraph Notepack</u> and <u>Technique</u> <u>Guide</u> (New York: Backster Research Foundation, 1969).

does the R-I procedure. The variations do not imply unstructured procedure, however, each variation being controlled by its particular rules for conducting examinations. Presumably, once informed of each others' rules, examiners using the different procedures of examination can evaluate each other's results. Peak of Tension Testing

A type of testing occasionally encountered in field settings is the peak of tension (POT) test. Although the principle behind this test is often relied on by proponents of both the R-I and CQ procedures, especially in the ordering of questions in the test series, the POT is not a standard part of either of these procedures.

Arther has termed the two general forms of the POT tests, the "searching" test and the "known-solution" test.⁽³⁸⁾ The searching POT consists in the asking of a series of similar questions, usually, with specific focus, such as to locate a murder weapon, etc. For example, a subject tested by control question type testing may give the examiner reason to think that he is in fact implicated in a certain murder and further has hidden or discarded the murder weapon. Under these circumstances the searching POT test would include a series of questions such as: "Do you know if the gun used to kill John Jones is <u>under water?</u>", "Do you know if the gun used to kill John Jones is <u>under water</u>?", etc., such questions being asked throughout a number of individual tests until the examiner feels he has determined the location of the murder weapon. (39)

On the other hand, the known solution POT test, while similar to the searching test consisting of a series of about seven questions presupposes that the examiner is aware of particular details of a crime of which the subject denies any knowledge. For example, the examiner may know that in a certain burglary two hundred dollars in quarters has been stolen. The subject is then asked a series of questions such as: "Do you know if dimes were stolen in X burglary?", "Do you know if nickels were stolen in X burglary?", etc., the critical question, in this case the one about the quarters, usually placed in the fourth position in the series.

(38) R. Arther, "Peak of Tension: Basic Information," J. Polygraph Studies, 1 (Jan.-Feb., 1967), 4.

(39) See: Reid and Inbau, <u>Truth and Deception: The Polygraph</u> ("Lie Detector") <u>Technique</u>, <u>op. cit.</u>, 37-40; R. Arther, "Peak of Tension: Examination Procedures," J. Polygraph <u>Studies</u>, 5 (July-Aug., 1970), 1-4.

Regardless of the type of POT test employed, interpretation of the polygraphic records thus obtained is standard. It is assumed that if a subject is in fact familiar with the critical item in the series, the polygraphic recordings (especially the "cardio" and GSR tracings) will appear to "peak" at the critical item or will show a reaction of the greatest magnitude at the critical item. Further ramifications of the POT test and its interpretation, as well as necessary precautions in its use are recorded in the literature. (40) For the purposes of this paper it should be noted that in the POT test examiners rely heavily on reactions in electrodermal activity as indications of deception. (41)

Contrary to some writings, $^{(42)}$ the POT test is not a lie detection technique in the sense that the control-question and relevant-irrelevant procedures are techniques. Rather, the POT is merely a specialized type of polygraphic test normally used only after testing by either the control-question or relevant-irrelevant procedures; the POT test is used to determine if a given person has "guilty knowledge" of specific details of a particular offense. $^{(43)}$ Hence, its use is limited to those types of offenses where such details are evident. On the other hand, the CQ and R-I procedures are diagnostic techniques not predicated on awareness of particular details of an offense. Generally, these CQ or R-I techniques can be administered in a variety of ways, the examiner having at his disposal the specialized "card test", "mixed question test", "yes test", "silent answer test", $^{(44)}$ and "yes-no test", $^{(45)}$ and others, all of which can be used within the framework of either the CQ or R-I technique.

(40)_{R.} Arther, "Peak of Tension: Dangers," <u>J. Polygraph Studies</u>, 2 (March-April, 1968), 1-4; Reid and Inbau, <u>Truth and Deception: The Polygraph</u> ("<u>Lie</u> <u>Detector</u>") <u>Technique</u>, <u>op</u>. <u>cit</u>., 37-40.

(41) Reid and Inbau, <u>Truth and Deception</u>: <u>The Polygraph</u> ("Lie Detector") <u>Technique</u>, op. cit., 219-225.

(42)_{M.} Orne, R. Thackray and D. Paskewitz, "On the Detection of Deception: A Model of the Study of the Physiological Effects of Psychological Stimuli," N. Greenfield and R. Sternbach (Eds.), <u>Handbook of Psychophysiology</u> (New York: Holt, Rinehart and Winston, 1972), 743-780.

(43) R. Arther, "Peak of Tension: Basic Information," op. cit., 4.

(44) See "The Validity of Lie Detection" section of this paper.

(45) R. Golden, "The Yes-No Technique" (paper presented at American Polygraph Association Seminar, August, 1969, Houston, Texas).

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Evaluation of Polygraphic Records

<u>Visual inspection technique</u>. -- Field examiners rarely, if ever, employ strictly objective measurements in interpreting the significance of response data, changes in cardiovascular, respiratory, or GSR tracings recorded polygraphically. Rather, visual inspection techniques, progressing from a general appraisal of all records (tests) down to particular analysis of reactions to particular test questions, are usually performed. Generally, changes - extent and duration of cardiovascular, respiratory, or GSR response - in any of the recorded parameters are evaluated according to specifiable criteria for each parameter as set forth in texts, ⁽⁴⁶⁾ or in training manuals. ⁽⁴⁷⁾ Such criteria, however, serve only as guidelines, since the "deception responses" of one person may not be those of another. In other words, field examiners do not claim that any particular response, or pattern of responses is pathognomic of lying, only that changes from the "normal" for any given person may indicate deception. ⁽⁴⁸⁾

Some writers have over generalized the evaluation of field derived polygraphic records to the point where any change from pre-stimulus levels is said to be indicative of deception. While it is true that polygraphic records indicate any changes from pre-stimulus levels, such changes must be considered both quantitatively and qualitatively, they cannot be summarily assumed indications of deception. Consider record evaluation in the control-question technique, for example. Simply stated, responses in the polygraphic parameters which occur more consistently over a series of tests and which are of a greater intensity to control questions than to relevant questions, indicate truthfulness to the relevant questions. Conversely, responses of a consistently greater intensity to the relevant question than to the control questions suggest deceptiveness regarding the relevant questions. The key points in this

(46) Reid and Inbau, <u>Truth and Deception</u>: <u>The Polygraph</u> ("Lie Detector") <u>Technique</u>, <u>op</u>. <u>cit.</u>, 41-50.

(47)C. Backster, <u>Tri-Zone</u> Polygraph (New York: Backster Research Foundation, 1969).

(48) See: C. N. Joseph, "Analysis of Compensatory Responses and Irregularities in Polygraph Chart Interpretation," <u>Academy Lectures on Lie Detection</u>, V. Leonard (Ed.) (Springfield, Ill.: C. C. Thomas, 1957), 93-99; P. Trovillo, "Deception Test Criteria," <u>J. Crim. Law, Crim. and Pol. Sci.</u>, 33 (1942), 338-358; J. Reid, "Interpretation of Truth and Deception in Polygraph Test Records," undated, unpublished manuscript supplied by author.

vastly over simplified description, are that any changes have little significance unless they occur consistently, and even then they are not significant until compared with other changes.

Numerical evaluation technique. -- One of the noteworthy variations in evaluation of polygraphic recordings is a numerical scoring system developed by Backster. a well-known field examiner.⁽⁴⁹⁾ In this system examiners assign a number ranging from -3 to +3 to reflect the perceived difference between responses to control and relevant question pairings for each of the physiological parameters recorded; the magnitude and direction of the numbers assigned to such comparisons forms the basis for decision-making. For example, the examiner pairs relevant and control questions and then observes whether or not a particular question in each pair provokes outstanding response. If the response is greater to the relevant question, a number from -1 to -3, depending upon the extent of the difference, is assigned. On the other hand, if the control-question response is greater, a number from +1 to +3 is assigned: if there is no difference between the paired responses, a 0 is assigned. Such a procedure is carried out separately for each control/relevant question pair for each physiological parameter of all the tests administered. The numbers assigned are then added; a positive total greater than 5 and a negative total less than 5 usually are established as cut off points to indicate truthfulness and deception, respectively. Total scores ranging between +5 and -5 are usually considered inconclusive.

There are some disadvantages apparent in the numerical scoring system: (1) It is possible that scoring data in such a way filters out recorded trends which might be useful in evaluation. (2) It assumes that response data are the only indices of deception. In actuality, deception is sometimes indicated not so much by specific response as by generally abnormal or erratic recordings. (3) It makes no provision for artifacts deliberately produced by some subjects.⁽⁵⁰⁾ Within its limits, however, the numberical scoring system appears to be highly reliable and an especially useful research tool.⁽⁵¹⁾

(49) Backster, Tri-Zone Polygraph, op. cit., 14.

(50) See: Reid and Inbau, <u>Truth and Deception: The Polygraph</u> ("Lie Detector") <u>Technique</u>, <u>op</u>. <u>cit</u>., for specific examples of these three phenomena, 53-124, 185-218.

⁽⁵¹⁾G. Barland, "The Reliability of Polygraph Chart Evaluations" (Paper presented at American Polygraph Association Seminar, Aug. 15, 1972, Chicago, Ill.)

Discussion and Summary of Field Procedures

It should be evident from this discussion of the major procedures used in the field, that it is extremely difficult to separate the polygraphic testing or the polygraphic records themselves from the procedure used in obtaining them. That is, the examiner-subject interaction before and during polygraphic testing is an integral part of the procedure; one must view field lie detection as a diagnostic technique whether or not R-I or CQ procedures are considered. The most prominent distinction between these procedures seems to be that if one were to place these two lie detection procedures on a subjective-objective continuum, proponents of the CQ procedure would place themselves more to the right, or towards the objective extreme, of the continuum. It is clear that they believe the use of control questions a necessary basis for objectivity, that the polygraphic recordings themselves are highly valid and reliable indicators of a person's truthfulness or deception.

Laboratory Lie Detection: Procedures

Laboratory studies of lie detection usually involve either a guilty-person or a guilty-information paradigm, the two not mutually exclusive.⁽⁵²⁾ Following the guilty-person paradigm, a mock crime is contrived; the task of the examiner is to employ lie detection apparatus to determine which of a given group of subjects committed the crime, which were accomplices, and which were free of any complicity. This testing is closely akin to the relevant-irrelevant tests used in field settings; control-question testing, somewhat similar to that used by field examiners, is recorded in only one laboratory study.⁽⁵³⁾ In the guilty-information paradigm the subject is instructed to lie about a card, number, or some other item he selects from a group of such items; the examiner's task is to determine which item was selected, hence, the process generally can be viewed as a peak-of-tension test.

One of the noteworthy variations of the two laboratory paradigms is termed the "guilty-knowledge technique", originally reported by Lykken.⁽⁵⁴⁾ Using

(52) Orne, <u>et al.</u>, "On the Detection of Deception: A Model for the Study of the Physiological Effects of Psychological Stimuli," <u>op. cit.</u>, 775.

(53)_G. Barland, "An Experimental Study of Field Techniques in Lie Detection" (unpublished M.A. Thesis, University of Utah, 1972).

(54) D. Lykken, "The GSR in The Detection of Guilt," J. Appl. Psych., 43 (1959), 385-388.

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this technique, subjects are assigned to groups who may have committed one or more, or no mock crimes; critical items are interspersed among irrelevant, or non-critical items. It is presumed that those guilty of the crimes, aware of certain information about them, will give augmented physiological responses to test items pertaining to such information. And, therefore, in a series of such tests (or questioning) guilty persons could be expected to respond to the critical items more often than would innocent person's hence, some estimate of whether a person is "guilty" or "innocent" is possible.

The guilty-knowledge technique appears to be a variation of the knownsolution POT test used by field examiners. Lykken, however, argues otherwise, believing that it is a "very different thing to use the polygraph to determine whether the subject can identify the significant alternative, than to use autonomic arousal or "tension" as evidence that the subject is lying.⁽⁵⁵⁾

Typically, laboratory studies use college students as subjects, employ only a measure of electrodermal activity as the physiological (dependent) variable, use laboratory personnel as examiners, and, most often analyze response data by some objective technique. These factors, of course, tend to insure rigorous statistical analysis and adequate control over data collection although the generalization of results is greatly restricted. Moreover, it is clear that laboratory research approaches lie detection in a manner quite different from that in the field; examiner-subject interaction seldom has a very dramatic impact.

The Validity of Lie Detection

Field Procedures

The validity of field lie detection procedures, i.e., the accuracy with which lie detection can discriminate between truthful and lying persons, has been a constant source of debate between field practitioners, laboratory researchers and others concerned with this problem and its social implications.⁽⁵⁶⁾

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⁽⁵⁵⁾ D. Lykken, <u>Psychology</u> and <u>The Lie Detector Industry</u> (Minneapolis: Department of Psychiatry, Univ. of Minnesota, Report No. PR-74-1, January 25, 1974), 14.

⁽⁵⁶⁾ See, for example: U.S. Congress, House, Subcommittee of the Committee on Government Operations, <u>Use of Polygraphs as "Lie Detectors" by the Federal</u> <u>Government</u>, Hearings, 88th Congress, 2nd. Sess., and 89th Congress, 1st Sess., Parts 1-6 (Washington, D.C.: U.S. Government Printing Office, 1964-1966.)

Because there are already available excellent discussions of this topic, ⁽⁵⁷⁾ the presentation here will be relatively brief, only the most prominent research results and related problems discussed.

As noted previously, many of the early lie detection practitioners used procedures and instrumentation which by today's standards appear unsophisticated. In spite of this deficiency, however, there are numerous reports of impressive validity. Bennussi, for instance, claimed that he was able to successfully detect liars by evaluating the respiration inspiration-expiration ratio; the ratio was greater before truth-telling than after, and greater after lying than before.⁽⁵⁸⁾ Marston claimed greater success with discontinuous systolic blood pressure as a test of deception, and reportedly could discriminate between truth-tellers and liars with an accuracy of 96 percent.⁽⁵⁹⁾ In contrast, Summers rejected the value of both respiration and blood pressure and relied on a measure of electrodermal activity. He claimed 98 percent success in discriminating between truth-tellers and liars in the laboratory and 100 percent success when dealing with actual criminal suspects.⁽⁶⁰⁾

Benussi, Marston, and Summers, of course, did not use a polygraph --but a single channel recorder. Larson and Keeler, using polygraphic recording equipment, claimed to have accurary rates varying between 90 and 100 percent.⁽⁶¹⁾ Inbau and Reid claimed an accuracy of 95.6 percent in their initial report on this topic.⁽⁶²⁾ Likewise, Arther, estimating from the results of a five year study, reported an accuracy of over 96 percent with a 3 percent margin of inconclusive determinations and a 1 percent margin of maximum error; he reported

(57) See: S. Abrams, "Polygraph Validity and Reliability: A Review," J. Forensic Sciences, 18 (1973), 313-326; Barland and Raskin, "The Use of Electrodermal Activity in the Detection of Deception," <u>op. cit.</u>, 1-62; J. Orlansky, An Assessment of Lie Detection Capability (Declassified Version), Tech. Rep. 62-16 (Arlington, VA: Inst. for Defense Analyses, Res. and Eng. Support Div., July 1964), 6-17; Orne, <u>et al.</u>, "On the Detection of Deception: A Model for the Study of the Physiological Effects on Psychological Stimuli," <u>op. cit.</u>, 743-780.

(58) Benussi, "On the Effects of Lying on Changes in Respiration," cited by Trovillo, "A History of Lie Detection," <u>op</u>. <u>cit</u>., 870.

(59) Marston, "Systolic Blood Pressure Symptoms of Deception," op. cit., 123.

(60) Cited by Trovillo, "A History of Lie Detection," op. cit., 108.

(61) Larson, Lying and Its Detection, op. cit., 405-416; Keeler, "A Method For Detecting Deception," op. cit., 38-52.

(62)_F. Inbau and J. Reid, <u>Lie Detection and Criminal Interrogation</u> (Baltimore: Williams and Wilkins, 1953), 110-113. that his known error was actually less than .0005.⁽⁶³⁾

In view of such favorable reports of the accuracy of lie detection in the field setting, it is logical to question how well such reports stand up in objective assessment. Inbau and Reid's early claim of 95.6% accuracy had been arrived at by adding instances in which examiners made judgments of lying (31.1%) or truth-telling (64.5%) in a number of cases. The remaining 4.4%of the judgments were inconclusive and the reported error was 0.0007%, which was later pointed out as being in arithmetical error to be corrected to 0.07%

The verification of the Inbau and Reid data rested on confessions made by the persons tested. However, only 486 out of 1334 (36.4%) persons who were judged to be liars actually confessed, and only 11.7% of the judgments made on the truth-tellers could be verified. Thus, Inbau and Reid defined accuracy as the percentage of cases in which the examiner made a determination of either lying or truth-telling irrespective of actual verification. This was an unusual interpretation of "accuracy" and has since been strongly criticized.⁽⁶⁵⁾ Many other field examiners have interpreted their accuracy in the same manner and are thus subject to the same criticism.

Field practitioners have also reported studies approaching the question of validity in a more acceptable manner. It is unfortunate that the majority of these studies are quite old and either did not employ polygraphic instrumentation⁽⁶⁶⁾ or did not use procedures commonly used today.⁽⁶⁷⁾ Moreover, many field reports of the accuracy of the polygraph rely on anecdotal evidence which, while interesting, is not an acceptable method of determining validity.

(63)R. Arther and R. Caputo, <u>Interrogation For Investigators</u> (New York: W. C. Copp, 1959), 214.

(64) Orlansky, An Assessment of Lie Detection Capability, op. cit., 13.

(65) Orlansky, <u>An Assessment of Lie Detection Capability</u>, op. cit., 11; R. Sternbach, L. Gustafson, and R. Colier, "Don't Truth the Lie Detector," <u>Harv. Bus. Rev.</u>, 40 (1962), 130.

(66) W. Summers, "Science Can Get the Confession," Fordham Law Rev., 8 (1939), 334-354; R. MacNitt, "In Defense of the Electrodermal Response and Cardiac Amplitude as Measures of Deception," J. Crim. Law and Crim., 33 (1942), 266-275.

(67) V. Lyon, "Deception Tests With Juvenile Delinquents," J. Gen. Psych., 48 (1936), 494-497.

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Larson, for instance, reported an investigation in which he gave polygraphic tests to a number of girls living together in a large hall in order to determine which of them was responsible for a series of thefts amounting to about \$600.00. He reportedly was able to "clear" all but one of the girls who subsequently confessed; thus, an accuracy of 100% was claimed. The problem with such an "accuracy", of course, is that the group of girls tested contained only one guilty person, the likelihood of being innocent or guilty was not 50%. Moreover, as Larson points out, the factual information available was sufficient to enable him to determine in advance of the testing that certain of the girls were more likely to have been "guilty" than others; such information could easily have influenced the polygraphic testing.

To date, only two scientifically acceptable studies of the validity of field lie detection have been reported. The first of these was conducted by Bersh; he drew a random sample of cases from a pool of criminal investigations carried out by the military services and submitted complete dossiers of all evidence in the cases, except for any reference to polygraphic examinations, to a panel of four military lawyers. All evidence was reviewed independently by the lawyers and determinations of guilt or innocence were made irrespective of legal technicalities; these determinations were then used as the criteria for comparison with the examiners' judgments. In those instances in which all four lawyers agreed on a subject's guilt or innocence, the judgments of the polygraphic examiners were in agreement with the lawyers 92.4% of the time. When a majority determination by the lawyers was used as the criterion of guilt or innocence, agreement with the polygraphic examiners' judgments was 74.6%; and, when unanimous and majority decisions were combined, an 87.5% agreement obtained. (69)

In a recent replication of the Bersh study, Barland assessed the accuracy of his own polygraph decisions by comparing them to two criteria: decisions made by a panel of five legal experts on the basis of all available evidence except for polygraph results, and the judicial outcome in situations where

(68) Larson, "Modification of The Marston Deception Test," op. cit., 395-396.

(69) P. Bersh, "A Validation Study of Polygraph Examiner Judgments," J. <u>Applied Psych.</u>, 53 (1969), 399-403.

the judiciary was not aware of polygraph results. In the first instance, Barland's polygraph decisions agreed with the direction of the panels' decisions in 37 of 47 cases, or 78.7%. Agreement between polygraph and panel criterion was simple majority agreement; where the panel criterion was agreement by four or more panel members, agreements between panel and polygraph decisions obtained in 26 of 30 such cases, or 86.7%. Generally, disagreements between panel and polygraph decisions occurred on suspects considered innocent by the panel. When Barland's decisions were compared to the independent judicial outcomes, agreements obtained in 26 of 29 such cases (89.7%); again, disagreements occurred on suspects acquited by judicial process.⁽⁷⁰⁾

While both the Bersh and Barland studies are of considerable interest they are not without serious limitations. Both studies, for example, dealt only with judgments made by military trained polygraphic examiners, it is questionable if those examiners are representative of all other examiners in terms of training, experience, or general ability. Most importantly, however, in both studies it is possible that examiners' judgments were influenced as much by their knowledge of factual information, subjects' behavior, and other non-polygraphic data as by the polygraphic recordings themselves. As Bersh points out: "No attempt was made to disentangle the influence of the polygraph examination and record from that of the extra-polygraph sources of information available to the examiner."⁽⁷¹⁾

In an attempt to disentangle the judgments made on the polygraphic recordings from those made on other information, Holmes submitted to a group of six experienced polygraphic examiners the recordings of 32 persons involved in criminal investigations. Twenty of the persons were known to have lied during their examination, twelve to have told the truth. The criteria used for such verification were corroborated confessions.

The examiners were initially asked to evaluate the polygraphic records and to identify which were those of truth-tellers and which of liars. Correct

⁽⁷⁰⁾G. Barland, "Detection of Deception in Criminal Suspects: A Field Validation Study," (Unpublished Ph.D. Dissertation, University of Utah, 1975).

⁽⁷¹⁾ Bersh, "A Validation Study of Polygraph Examiner Judgments," <u>op</u>. <u>cit.</u>, 400.

determinations were made, on the average, 75% of the time by the examiner evaluators. When Holmes gave the evaluators additional information about the subjects, such as their behavioral characteristics during the testing, investigators' reports and opinions, and witnesses' accounts of the offense, accuracy rates increased to 83% overall.⁽⁷²⁾ Holmes' results have been recently substantiated by Wicklander and Hunter who reported an average of 88.3% accuracy for judgments of evaluators on polygraphic records alone; when given auxilliary information, <u>e.g.</u>, complete case histories and subjects' behavioral characteristics, evaluators' accuracy increased to 92.5%.⁽⁷³⁾ However, for reasons which will be discussed subsequently, the Holmes, Wicklander and Hunter, and other studies using similar designs, are more appropriately viewed as dealing primarily with reliability, not validity.

While the validity of field lie detection procedures is a crucial concern, it is clear that as yet the evidence supporting extremely high accuracy in the field is only suggestive, not conclusive. The major reason for the lack of supporting evidence, of course, is that there is no completely adequate ground truth criterion with which examiners' judgments can be compared. The criteria which have been or can be used, such as confessions, independent evaluations of extrapolygraphic information, and the outcome of judicial proceedings, do not establish with certainty a person's actual truthfulness or deception.⁽⁷⁴⁾ And, since procedures used in giving polygraphic examinations are, in essence, diagnostic procedures, it is difficult to separate the influence of the examiner's interaction with the subject from the polygraphic recordings themselves; that is, the recordings are not necessarily independent of the examiner's attitudes, behavior, and information concerning the subject's involvement in the offense under investigation. For that reason, it has been

⁽⁷²⁾W. Holmes, "The Degree of Objectivity in Chart Interpretation," in: <u>Academy Lectures on Lie Detection</u>, Vol. II, V. Leonard (Ed.), (Springfield, <u>Illinois: C. C. Thomas, 1958), 62-70.</u>

(73)_{D.} Wicklander and F. Hunter, "The Influence of Auxiliary Sources of Information in Polygraph Diagnoses," <u>J. Pol. Sci. and Adm</u>., 3 (1975), 405-409.

(74)_{For a discussion of the problems associated with the use of confessions as a ground truth criterion see: H. Dearman and B. Smith, "Unconscious Motivation and the Polygraph Test," <u>Amer. J. Psych., 119</u> (1963), 1017-1021; R. Ferguson, <u>The Scientific Informer</u> (Springfield, Illinois: C. C. Thomas, 1971).}

argued that the proper approach to validity is to compare the validity of the various aspects of the polygraphic technique separately and collectively to other methods of determining truthfulness or deception.⁽⁷⁵⁾ Such an approach is not yet evident in the reported literature although Barland's recent research approximates that methodology.⁽⁷⁶⁾

Laboratory Procedures

Because laboratory researchers typically use electrodermal activity to indicate deception, the discussion here will be restricted to the validity of this phenomenon. It is well established that during the early 1900's electrodermal activity was known to be associated with "psychic phenomena" such as lying.⁽⁷⁷⁾ However, attempts at detecting deception with electrodermal activity probably did not receive full impetus until the 1930's. At that time many investigators reported substantial success with the method. Ruckmick, using the guilty-information paradigm reported a 66% detection rate with numbered cards, and using the same paradigm with a series of three letter words, achieved 78% correct judgments. Moreover, he found that if the scores of an inexperienced evaluator were eliminated, an 83% accuracy was achieved for the three letter words.⁽⁷⁸⁾ Geldreich, also using the guilty-information paradigm with decks of cards, claimed that by "fatigue adapting" a group of subjects to non-critical cards he could improve detection rates from 74% for a non-adapted group to 100% for an adapted group.⁽⁷⁹⁾

(75)_{M.} Orne, "Implications of Laboratory Research For the Detection of Deception," <u>Polygraph</u> 2 (1973), 169-199.

(76) Barland, "Detection of Deception In Criminal Suspects," op. cit.

(77) See: C. Landis, "Electrical Phenomenon of the Skin," <u>Psych. Bull.</u>, 26 (1929), 64-119; J. Larson, "The CardioPneumo Psychogram and Its Uses in the Study of Emotions, with Practical Applications," <u>J. Exp. Psych.</u>, 5 (1922), 323-328; C. Landis and H. DeWick, "The Electrical Phenomenon of the Skin (Psychogalvanic Reflex), <u>Psych. Bull.</u>, 26 (1929), 64-119; F. Peterson and C. Jung, "Psycho-Physical Investigations With the Galvanometer and Pneumograph in Normal and Insane Individuals," <u>Brain</u>, 30 (1907), 153-218.

(78)C. Ruckmick, "The Truth About the Lie Detector," J. App. Psych., 22 (1938), 50-58.

(79) E. Geldreich, "Studies of the Galvanic Skin Response as a Deception Indicator," <u>Trans. Kans. Acad. Sci.</u>, 44 (1941), 346-351.

Fatigue adapting, Geldreich concluded, shunted extraneous stimuli to non-critical items, although there is no indication that he also controlled for differential response capabilities between groups prior to his experiment.

Summers, in what is perhaps the earliest attempt to utilize the guiltyperson paradigm, claimed to have improved the galvanometer and the technique used for scoring responses. With his Fordham Pathometer he reported that he was able to correctly detect "guilty", "innocent" and "accomplices" in mock crimes 98% of the time.⁽⁸⁰⁾ He apparently attributed his failure to achieve 100% accuracy to "laboratory conditions."⁽⁸¹⁾ However, MacNitt, commenting on the accuracy of electrodermal response in experimental cases, "mock crimes", and actual field conditions, reported that his interpretations were 99% accurate whereas, in guilty-information situations he was able to achieve only a 75% accuracy.⁽⁸²⁾ Hence, Summers' failure at perfection may not have been due to only laboratory conditions.

While the early reports of nearly perfect accuracy in detecting deception with electrodermal activity measures have not, in general, been confirmed in more scientifically acceptable experiments, recent investigations have shown that detection rates far beyond chance can be achieved. Ellson, Davis, Saltzman and Burke for instance, using the galvanic skin response (GSR) as an indicator, conducted a series of lie detection experiments. Initially, they were concerned with the accuracy of GSR responses in detecting guilty-information and the effect of repetition on accuracy. Their results indicated an 80% accuracy for mere detection of information; this figure dropped slightly to 70% in one repetition of the experiment. When they repeated their experiment to test for the effect of the subject's knowledge of successful

(80) Summers, "Science Can Get the Confession," op. cit., 334-354.

(81) Cited by: Trovillo, "A History of Lie Detection," op. cit., 108.

(82)_{MacNitt}, "In Defense of the Electrodermal Response and Cardiac Amplitude as Measures of Deception," <u>op. cit.</u>, 266-275.

lying on a first trial compared to a second trial, they found that by combining the results of their two experiments an accuracy of 79% was achieved against a chance expectancy of 17%.⁽⁸³⁾ Other studies have substantially confirmed the findings of Ellson <u>et al.</u>, in both the guilty-information⁽⁸⁴⁾ and guilty-person paradigm.⁽⁸⁵⁾

Using the guilty-knowledge technique and by establishing an arbitrary cutoff point for objective analysis of GSR reactions, Lykken was able to correctly classify subjects by group 89.9% of the time and to identify the guilty and the innocent 93.9% of the time.⁽⁸⁶⁾

In a follow-up study to assess the effects of faking the guilty-knowledge technique, Lykken achieved 100% correct classification of subjects who concealed items of personal information.⁽⁸⁷⁾ Studies by other investigators have also reported varying degrees of success using GSR in the guilty-know-ledge technique.⁽⁸⁸⁾

Comparison Of The Validity Of Field To Laboratory Lie Detection

There is general agreement that lie detection, whether in the field or laboratory, is a valid procedure. The question is whether or not it is as valid as field examiners claim. As yet, the evidence is not conclusive, and it may never be. But field practitioners often claim that given the conditions of their situation, lie detection in the field is more valid than it is in the laboratory. Several major reasons have been offered for the dissimilarity between laboratory findings and claims of field examiners.

(83) Ellson, David, Saltzman and Burke, <u>A Report of Research on Detection</u> of <u>Deception</u>, <u>op</u>. <u>cit</u>., ll.

(84) D. Van Buskirk and F. Marcuse, "The Nature of Errors in Experimental Lie Detection," J. Exp. Psych., 47 (1954), 187-190.

(85) Barland, "An Experimental Study of Field Techniques in Lie Detection," op. cit.; L. Gustafson and M. Orne, "The Effects of Task and Method of Stimulus Presentation on the Detection of Deception," J. App. Psych., 48 (1964), 383-387; J. Kubis, "Experimental and Statistical Factors in the Diagnosis of Conciously Suppressed Affective Experiences," J. Clin. Psych., 6 (1950), 12-16.

(86) Lykken, "The GSR in the Detection of Guilt," op. cit., 385-388.

(87) D. Lykken, "The Validity of the Guilty Knowledge Technique: The Effects of Faking," J. App. Psych., 44 (1960), 258-262.

(88) G. Ben Shakhar, I. Lieblich & S. Kugelmass, "Guilty-Knowledge Technique: Application of Signal Detection Measures," J. <u>App. Psych.</u>, 54 (1970), 409-413; P. Davidson, "Validity of the Guilty Knowledge Technique: The Effects of Motivation," J. <u>App. Psych.</u>, 52 (1968), 62-65.

Deception Indices

In spite of the typically high accuracy of electrodermal measures in the laboratory, examiners who work in field settings almost universally agree that for their purposes cardiovascular and respiratory measurements are far more effective.⁽⁸⁹⁾

Early accounts of the accuracy of lie detection using cardiovascular activity reported fairly high accuracy rates even in mock crimes.⁽⁹⁰⁾ Chappell and Matthew, claimed a correct discrimination rate of 87% between subjects telling the truth and lying about details of a mock crime.⁽⁹¹⁾ Marston reported a 94% correct classification of liars and truth-tellers.⁽⁹²⁾ Recent investigators have not reported results as outstanding as these; in fact, recent evidence seems to indicate that for laboratory purposes at least, cardiovascular activity is inferior to electrodermal measures.⁽⁹³⁾

In spite of the fact that early investigators disagreed on the relative values of either cardiovascular activity or respiration as indicators of

(89) Reid and Inbau, <u>Truth and Deception</u>: <u>The Polygraph</u> ("<u>Lie Detector</u>") <u>Technique</u>, <u>op. cit.</u>, 40.

(90) N. Chappell and N. Matthew, "Blood Pressure Changes in Deception," <u>Arch. Psych.</u>, 17 (1929), 1-39; C. Landis and R. Gullette, "Studies of Emotional Reactions," <u>J. Comp. Psych.</u>, 5 (1925), 221-253; C. Landis and L. Wiley, "Changes of Blood Pressure and Respiration During Deception." <u>J. Comp. Psych.</u>, 6 (1926), 1-19; W. Marston, "Systolic Blood Pressure Symptoms of Deception," <u>op. cit.</u>, 117-163.

(91) Chappell and Matthew, "Blood Pressure Changes in Deception," op. cit.
(92) W. Marston, "Psychological Possibilities in the Deception Test,"
J. Amer. Inst. of Crim. Law and Crim., 11 (1921), 551-570.

(93) J. Kubis, <u>Studies in Lie Detection</u>: <u>Computer Feasibility Considera-</u> tions, Tech. Report 62-305 (Arlington, Va.: Armed Services Technical Information Agency, June, 1962), prepared for Air Force Systems Command, contract No. AF 30 (602)-2270, Project No. 5534, Fordham University, 1962; S. Kugelmass, Effects of Three Levels of Realistic Stress on Differential Psychological Reactivities, Tech. Report 63-61 (report prepared for Air Force office of Scientific Research, European Office, Aerospace Research, U. S. Air Force, Hebrew University of Jerusalem, Israel, Aug. 1963); S. Kugelmass, I. Lieblich, A. Ben-Ishai, A. Opatowski and M. Kaplan, "Experimental Evaluation of Galvanic Skin Response and Blood Pressure Change Indices During Criminal Interrogation," J. Crim. Law, Crim., and Pol. Sci., 59 (1968), 632-635; S. Kugelmass, I. Lieblich, "Effects of Realistic Stress and Procedural Interference in Experimental Lie Detection," J. App. Psych., 50 (1966), 211-216; R. Thackray and M. Orne, "A Comparison of Physiological Indices in Detection of Deception," Psychophysiology, 4 (1968), 329-339; R. Violante and S. Ross, Research on Interrogation Procedures (Interim Report, prepared for U.S. Navy, Office of Naval Research, Contract Nonr. 4129 (00), Stanford Research Institute, Menlo Park, California, Nov. 1964).

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deception most of them did find that respiratory measures were fairly good indicators of deception.⁽⁹⁴⁾ This is a particularly interesting point since almost all recent investigations have found respiratory measurement to have little, if any, significance in the detection of deception in the laboratory, at least when compared to other physiological parameters.⁽⁹⁵⁾

Level of Subject Affect

One of the reasons that cardiovascular and respiratory activity may be less effective in indicating deception in the laboratory than in electrodermal activity, is that in such settings the level of affect is lower than in real-life. In order to investigate this possibility many laboratory investigators have employed stress and motivational devices such as, electric shock.⁽⁹⁶⁾ rewards,⁽⁹⁷⁾ loss of self esteem,⁽⁹⁸⁾ personally relevant material, (99) and awareness of the testing situation. (100) While many of these devices have apparently increased motivation to deceive, there is little evidence that the level of affect approaches that in real-life. Of course, it is also possible that no artificial device used in the laboratory can make the consequences of deception as real as those encountered in life. In other words, laboratory motivational devices are ipso facto rewards for successful deception; the subject loses nothing for failing to deceive. On the other hand. real-life subjects may lose something very consequential if they fail to deceive; the liar may be subject to criminal prosecution, lose a job, etc. Likewise, the truthful person in real-life fears the consequences of being erroneously found to be a "liar"; he is highly motivated not to deceive and to do all he can to succeed in "passing" his test.

(95) Loc. cit., Note #93.

(96) Lykken, "The GSR in The Detection of Guilt," op. cit.

(97) Davidson, "Validity of the Guilty Knowledge Technique: The Effects of Motivation," <u>op. cit.</u>, 62-65; Lykken, "The Validity of the Guilty Knowledge Technique: The Effects of Faking," <u>op. cit.</u>; Barland, "An Experimental Study of Field Techniques in Lie Detection," <u>op. cit.</u>

(98)_{L.} Gustafson and M. Orne, "Effects of Heightened Motivation on the Detection of Deception," <u>J. App. Psych.</u>, 47 (1963), 408-411.

⁽⁹⁴⁾ Benussi, "On the Effects of Lying on Changes in Respiration," op. cit.; Burtt, "The Inspiration-Expiration Ratio During Truth and Falsehood," op. cit., Burtt, "Further Technique for Inspiration-Expiration Ratios," op. cit.; C. Landis and R. Gullette, "Studies of Emotional Reactions," J. Comp. Psych., 5 (1925), 221-253; Larson, "Modification of the Marston Deception Test," op. cit.

Two studies which purported to assess the effects of real-life stress on laboratory lie detection were conducted by Kugelmass and Lieblich. (101) and Kugelmass, et al. (102) In the first of these studies, card tests given to police trainees who apparently considered their successful deception important to their future, were evaluated. Both GSR and heart rate were considered, but GSR was clearly more indicative of deception than heart rate. In the second study, card tests given to actual criminal suspects as part of their examination, were evaluated. Again GSR responses were clearly superior indicators of deception; heart rate responses were not significantly different from chance as deception indices. The results of these studies seem to indicate that GSR is superior to heart rate as an indicator of deception. However, it is questionable whether or not the level of affect during card tests, even though included as a part of a real-life examination, is the same as the level of affect which accompanies personal questioning concerning possible criminal involvement. In fact, because many field examiners report that GSR is highly effective during card tests in actual examinations⁽¹⁰³⁾ and vet relatively ineffective in tests preceeding and following the card test, it seems indicated that either a subject's level of affect varies with the type of questions asked, or that "arousal" or "attention" is more important to the success of GSR than is affect per se.

(99)_{R.} Thackray and M. Orne, "Effects of the Type of Stimulus Employed and the Level of Subject Awareness on the Detection of Deception," <u>J. App.</u> <u>Psych.</u>, 52, 3 (1968), 234-239.

(100)_{Ibid}.

(101) S. Kugelmass and I. Lieblich, "Effects of Realistic Stress and Procedural Interference in Experimental Lie Detection," J. App. Psych., 50, 3 (1966), 211-216.

(102) S. Kugelmass, I. Lieblich, A. Ben Ishai, A. Opatowski and M. Kaplan, "Experimental Evaluation of Galvanic Skin Response and Blood Pressure Change Indices During Criminal Interrogation," J. Crim. Law, Crim., and Pol. Sci., 59, (1968), 632-635.

(103)Reid and Inbau, <u>Truth and Deception</u>: <u>The Polygraph</u> ("<u>Lie Detector</u>") <u>Technique</u>, <u>op</u>. <u>cit</u>., 33.

Lie Detection Equipment

Another reason for the disparity between laboratory and field lie detection studies concerns the type of testing-apparatus employed. Laboratory apparatus, particularly electrodermal measuring devices, are usually highly sophisticated, while field equipment is relatively simple. However, in spite of the differences in equipment used, there is increasing evidence that this does not account for any substantial difference in results. Orne has found no significant difference between the two types of equipment with respect to results obtained and haboratory studies have employed field apparatus without noticeable differences in results; electrodermal activity, regardless of the type of equipment employed, maintained superiority in lie detection.⁽¹⁰⁴⁾ Use of Control Questions

Leading field examiners invariably employ some variation of the controlquestion technique in conducting lie detection tests. Simply stated, control questions are designed to channel the psychological set of truthful subjects away from relevant questions and towards the control questions. Lying subjects, on the other hand, are presumed to be psychologically set to the relevant questions. Hence, consistently greater physiological responses to control questions are considered indicative of truthfulness regarding relevant questions, while consistently greater responses to relevant questions are suggestive of lying. The use of control questions reportedly has significantly increased the ability of field examiners to discriminate between truthful and lying persons and at the same time has lowered the number of inconclusive tests. (105)

The fact that control questions are generally not used in laboratory studies may be one reason that laboratory studies find cardiovascular and respiratory activity less effective in detecting lies than is electrodermal activity. For example, control questions as used in field settings are generally "worked up" with the subject to insure that the question involves personally relevant material, and that the subject will either lie or have doubts about the accuracy of his answer to the question. ⁽¹⁰⁶⁾ In laboratory

^{(104)&}lt;sub>M.</sub> Orne, untitled manuscript (paper presented to American Polygraph Association, Silver Springs, Maryland, 1969); see also, Barland, "An Experimental Study of Field Techniques in Lie Detection," <u>op. cit.</u>; and Orne, "Implications of Laboratory Research for the Detection of Deception," <u>op. cit.</u> wherein he expresses the belief that field GSR electrodes can be improved to increase the effectiveness of this measure (in the field), 196.

studies then, control questions could conceivably heighten a person's interest or concern for the test and possibly would result in greater differential response. The fact that personally relevant material does increase response in laboratory studies has been consistently reported, ⁽¹⁰⁷⁾ and at least one laboratory study using control questions has found that both respiration and cardiovascular activity did significantly discriminate the "liars" from the "truth-tellers."

Summers⁽¹⁰⁹⁾ and Kubis,⁽¹¹⁰⁾ both claimed accuracy rates of over 95%. Significantly both of them employed "emotional standard" questions. "highly charged emotional issues selected from a study of the life history of the suspect."⁽¹¹¹⁾ While these "emotional standard" questions only remotely resemble control questions used today, it is clear from Summers' description that their function in the test was the same: to evoke reactions from a suspect which could be compared to reactions on relevant (crime related) questions. In other words, the use of control type questions provides a means of using each person as his own control. This is in contrast to some laboratory studies wherein there may be no real individual "control": reactions to questions are evaluated across individuals according to some arbitrarily assigned value; hence. all are judged truthful or lying according to the same criterion. Moreover, even in those laboratory studies which use individual "controls", the "control response" is that which occurs to irrelevant or non-critical items. That is, the questions which many laboratory researchers designate control questions are those kinds of questions which field practitioners label as

(105) Reid., "A Revised Questioning Technique in Lie Detection Tests," op. <u>cit.</u>, 547.

(106)G. Harman and J. Reid, "The Selection and Phrasing of Lie-Detector Test Control-Questions," J. Crim. Law, Crim. and Pol. Sci., 46 (1955), 578-582.

(107) J. Berkhout, D. Walter and W. Abey, "Autonomic Responses During a Replicable Interrogation," J. App. Psych., 54 (1970), 316-325; Thackray and Orne, "Effects of the Type of Stimulus Employed and the Level of Subject Awareness on the Detection of Deception," <u>op. cit.</u>, 234-239.

(108) Barland, "An Experimental Study of Field Techniques in Lie Detection," op. cit.

(109) Summers, "Science Can Get the Confession," op. cit.

(110) J. Kubis, "Electronic Detection of Deception," <u>Electronics</u>, 18 (April, 1945), 192-212.

(111) J. Kubis, "Experimental and Statistical Factors in the Diagnosis of Consciously Suppressed Affective Experiences," J. Clin. Psych., 6 (1950), 13.

irrelevant.⁽¹¹²⁾ In the most recent study which attempted to approximate the use of control questions as used by field practitioners, it is questionable if the controls were entirely adequate, primarily because they were not individually tailored to subjects.⁽¹¹³⁾

The Role of Lying

Lykken has proposed that field examiners are not really in the business of lie detection but rather guilt detection.⁽¹¹⁴⁾ If this is so then it seems that the act of lying per se would have little effect on field procedures. Recent evidence tends to support this hypothesis, at least for some persons.⁽¹¹⁵⁾ The use of a "silent answer test" wherein the person is instructed not to vocalize answers to questions and thus not really lie, has been shown to produce deception criteria equal to and at times superior to tests which require vocal answers. Unfortunately, the maintenance of deception responses in such a silent answer procedure does not hold true for all persons; nor is there at present any complete understanding of the psychological mechanisms involved in such a silent answer test.

Contradictory evidence concerning the role of lying can be found in laboratory studies. Kugelmass, Lieblich and Bergman reported that there were no significant differences in detection rates whether subjects answered "yes" or "no" to cards chosen from a deck. (116) On the other hand, Gustafson and Orne reported that subjects answering "no" to chosen cards were detected more often than subjects giving no verbal answer; subjects required to make a word association to each question were detected less frequently than subjects in the other two groups. (117)

(112)See: Lykken, Psychology and the Lie Detector Industry, op. cit., 24-26. (113)Barland, "An Experimental Study of Field Techniques in Lie Detection," op. cit., 40.

(114)Lykken, "The GSR in the Detection of Guilt," op. cit., 385; Lykken, "The Validity of The Guilty Knowledge Technique: The Effects of Faking," op. cit., 258.

(115) Horvath and Reid, "The Polygraph Silent Answer Test," op. cit.

(116)_{S. Kugelmass, I. Lieblich, Z. Bergman, "The Role of Lying in Psychophysiological Detection," <u>Psychophysiology</u>, 3 (1967), 312-315.}

(117)_{L.} Gustafson and M. Orne, "The Effects of Verbal Responses on the Laboratory Detection of Deception," <u>Psychophysiology</u>, 2 (1965), 10-13.

Scoring Response Data

In the final analysis, there is at least one other possible explanation for differences between laboratory and field lie detection: objectively scoring response data may "mask out" important information. Indeed, the complex procedures necessary for the objective scoring of both cardiovascular and respiratory activity have been one reason that laboratory investigators, even though recording such activity, have not evaluated it.⁽¹¹⁸⁾ Moreover, from the evidence gathered by Kubis it is evident that visual inspection of electrodermal response data by experienced personnel is equal or perhaps superior to objective techniques, and that visual inspection of cardiovascular, respiratory, and electrodermal activity as a unit can lead to high accuracyrates independent of interaction between the subject and examiner.⁽¹¹⁹⁾ This is consistent with the results of studies using field obtained polygraphic records.⁽¹²⁰⁾

The Reliability of Lie Detection

The reliability of polygraphic procedures has received considerably less attention than its validity. And, of course, this is quite natural since reliability refers only to the degree of consistency of judgments between polygraphic examiners or examinations irrespective of the "correctness" of the judgments. For example, Dearman and Smith reported an instance of an individual being given independent polygraphic examinations by several different examiners, all of whom claimed that the individual had not told the truth in answering the question, "Did you steal any money from the bank or its customers?" In other words, in this instance the reliability of the examiners' judgments was perfect. However, Dearman and Smith pointed out that in their judgment, based

(118) S. Kugelmass, Effects of Three Levels of Realistic Stress on Differential Physiological Reactivities, Tech. Report, 63-61 (report prepared for Air Force Office of Scientific Research, European Office, Aerospace Research, U.S. Air Force, Hebrew University of Jerusalem, Israel, Aug., 1963).

(119) Kubis, <u>Studies in Lie Detection</u>: <u>Computer Feasibility Considerations</u>, <u>op. cit</u>.

(120) See: Holmes, "The Degree of Objectivity in Chart Interpretation," op. cit.; Horvath and Reid, "The Reliability of Polygraph Examiners Diagnosis of Truth and Deception," op. cit.; Hunter and Ash, "The Accuracy and Consistency of Polygraph Examiner's Diagnosis," op. cit.; S. Hathaway and C. Hanscom, "The Statistical Evaluation of Polygraph Records," <u>Academy Lectures on Lie Detection</u>, II, V. Leonard (Ed.) (Springfield, Ill.: C.C. Thomas, 1958), 118-136. on psychiatric evaluations, the individual in question had told the truth to the test question; in other words, while the reliability between the examiners was high, validity, according to Dearman and Smith's interpretation, was low.⁽¹²¹⁾ This example, of course, concerns the reliability of the complete polygraphic procedure; such reliability has not been adequately reported in the literature. The reported field reliability studies deal rather with the degree of agreement between evaluators when judging the same polygraphic recordings, or with the consistency of one evaluator's judgment of the same recording two or more times. It is these studies which will be discussed here; it should be noted that many of these studies deal very indirectly with the issue of validity, although such a consideration is not essential for reliability studies.

Laboratory Studies

The earliest of the reliability studies was reported by Rouke. Two groups of subjects, 80 delinquent and 90 non-delinquent boys, were tested in an "experimental situation designed to simulate closely the elements in the actual investigation of criminal cases." (122) The tests given used only a psychogalvanic (GSR) measure. There was, however, a very close correspondence (C, contingency coefficient, = .72) between the ratings (evaluations) of the same records (tests) by the same evaluator at different times, and two judges independently reviewing the records of the delinquent and non-delinquent boys agreed in their judgments 88% and 91% of the time, respectively.

The most thorough study of reliability to date was reported by Kubis who conducted an elaborate series of experiments on lie detection. While it is not necessary to detail them here, there are several points of interest. First, recordings were obtained by means of a polygraph; that is, respiration, electrodermal activity (GSR), and cardiovascular activity were recorded. Second, the examiner-evaluators used by Kubis were trained psychologists, all of whom were given a special "three-month training course in the theory and

(121) Dearman and Smith, "Unconscious Motivation and the Polygraph Test," op. <u>cit</u>.

(122) F. Rouke, "Evaluation of the Indices of Deception in the Psychogalvanic Technique" (unpublished Ph.D. dissertation, Fordham University, 1941), 80.

practice of 'lie detection'".⁽¹²³⁾ Third, Kubis was able to assess the reliability with which each of the physiological measurements was interpreted and was able to compare the reliability of examiners who interacted with subjects to that of evaluators who had not engaged in such interaction.

In Kubis' study each of the polygraphic recordings was evaluated by the examiner who had done the testing, and by two independent evaluators. While all evaluations were quite accurate the reliability of the judgments is of major interest here. Kubis found in one section of his experiment that there was an average 78% agreement between the judgments made by examiners and independent evaluators; judgments made by only independent evaluators agreed, on the average, 81% of the time. (124) Similar results, ranging from 72% to 87% were reported in another section of Kubis' experiment. (125)

It should be noted that the reliability reported by Kubis varied with the particular physiological parameter evaluated, GSR being judged more reliably than either respiration or cardiovascular recordings. Similar results have been reported by Barland who submitted experimentally derived polygraphic recordings to a group of independent evaluators, all trained polygraph examiners.⁽¹²⁶⁾

Kubis also reported that independent evaluators had "greater confidence in those decisions which were ultimately verified as correct than they did in those which were incorrect."⁽¹²⁷⁾ Moroney, using an experimental lie detection situation but recording only GSR, substantiated Kubis' results: the more confident evaluators were in their decisions, the more likely they were to be correct; that is, the more ambiguous the recordings, the greater the likelihood of error.⁽¹²⁸⁾

(123) Kubis, <u>Studies in Lie Detection</u>: <u>Computer Feasibility Considerations</u>, <u>op. cit.</u>, 28.

(124)_{Ibid}., 44. (125)_{Ibid}., 48.

(126)Barland, "The Reliability of Polygraph Chart Evaluations," op. cit. (127)Kubis, Studies in Lie Detection: Computer Feasibility Considerations, op. cit., 68.

(128) W. Moroney, "The Detection of Deception as a Function of PGR Methodology," (unpublished Ph.D. dissertation, St. Johns University, 1968, Ann Arbor, Mich.: University Microfilms, 1969, No. 69-7125).

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In a recent study Barland submitted the polygraphic recordings of 72 subjects involved in a hypothetical crime to a group of five independent evaluators, all experienced polygraphic examiners. Rather than having the evaluators make dichotomous or trichotomous (<u>i.e.</u>, "guilty", "innocent", or "inconclusive") judgments, he asked them to evaluate the recordings in accordance with the numerical scoring system developed by Backster. (129) Hence, a total numerical score was obtained for each subject's records (tests) from each of the evaluators. By considering evaluators in pairs, and including his own evaluations, correlations (Pearson product-moment) between all possible pairs of evaluators were computed; such correlations ranged from .78 to .95 with a mean of .86, indicating a very high reliability among the evaluators. Said another way, Barland found that out of 559 instances of two examiners arriving at a definite judgment of truth or deception, agreement occurred 534 times, or 95.5% of the time. (130)

Other investigators have also reported high reliability in the evaluations of physiological data gathered in experimental lie detection settings. Van Buskirk and Marcuse, for example, using standard field polygraphic equipment and the card test, had two evaluators judge the same 50 records at two different times one month apart. "The results indicated 84% agreement on cards and 94% agreement on records between these two judgments."⁽¹³¹⁾ Bitterman and Marcuse reported that their judgments concerning the classification of response data in cardiovascular tracings were highly reliable (C - .96 and .92); a third classification by an independent evaluator of the recordings demonstrated that the authors' classification was substantially reproducible.⁽¹³²⁾ And, in a study reported by Heckel, <u>et al</u>, a hypothetical crime was set up in such a way that three groups of five subjects each were led to believe that

(129) See page 121.

(130) Barland, "The Reliability of Polygraph Chart Evaluations," <u>op</u>. <u>cit.</u>, 5.

(131) Van Buskirk and Marcuse, "The Nature of Errors in Experimental Lie Detection," op. cit., 188.

(132)_M. Bitterman and F. Marcuse, "Cardiovascular Responses of Innocent Persons to Criminal Interrogation," <u>American J. Psych.</u>, 60 (1947), 407-412.
they were suspected of stealing money from the experimenter's wallet. One group consisted of "normal" males recruited from a local educational institution; the other two groups consisted of males under psychiatric care and diagnosed as either "non-delusional" (psychoneurotics) or "delusional" (psychotics). Although none of the subjects were, in fact, guilty of the theft, they were all given polygraphic tests by a skilled examiner; the purpose of giving such tests was to determine if physiological reactions to the testing differed between the groups, affecting the interpretation of recordings.

Following the administration of all polygraphic tests, the recordings were submitted to a group of four trained examiners asked to judge if the recordings indicated deception or no deception, or were inconclusive. Complete agreement on the control subjects prevailed between the four evaluators, and, in general, reliability decreased for the "psychiatric" subjects although "overall reliability of ratings was quite high."⁽¹³³⁾ This suggests that polygraphic recordings of persons indicating psychiatric maladjustment may be subject to erroneous judgments, <u>i.e.</u>, less valid, and that examiners' agreement on recordings obtained from such persons may be less than that on the recordings from "normal" persons.

It is important to note that all of the above studies dealt with data derived from experimental lie detection situations. It is generally agreed that such data are not necessarily related to those obtained in field situations. Therefore, we must turn to an analysis of field studies which have looked at the issue of reliability.

Field Studies

In an early study Horvath and Reid submitted the polygraphic records of forty subjects, 20 verified truthful and 20 verified deceptive, along with brief factual information of the investigations in which the subjects were involved, to a group of ten examiner/evaluators. The evaluators were asked to identify the truthful and deceptive subjects from analysis of their polygraphic records. In spite of the minimal information evaluators had about the investigations, they averaged 87.8% correct identifications, the more

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⁽¹³³⁾ R. Heckel, J. Brokaw, H. Salzberg and S. Wiggins, "Polygraphic Variations in Reactivity Between Delusional, Non-Delusional and Control Groups in a 'Crime' Situation," J. Crim. Law, Crim. and Pol. Sci., 53 (1962), 382.

experienced evaluators 91%, the less experienced, 79%. It is noteworthy that the evaluators were deliberately given polygraphic records believed to be difficult to interpret, that is, records not dramatically indicative of truth-telling or lying.⁽¹³⁴⁾

Using a basic design similar to that in the Horvath and Reid study, Hunter and Ash reported that a group of seven evaluators attained an average accuracy of 86% in identifying truthful and deceptive subjects from analysis of polygraphic records. Moreover, evaluators' judgments in that study were highly consistent across initial and subsequent evaluations of the same polygraphic records, about 85%.⁽¹³⁵⁾

In an interesting extension of the above two studies Slowik and Buckley required seven evaluators to analyze a group of 30 verified polygraphic records on four occasions. In the first, evaluators rendered judgments from analysis of response data in respiration, cardiovascular, and GSR activity. In the three subsequent analyses, response data in two of the three physiological measures were masked, evaluators making judgments only on the unmasked measure. The results of the first analysis indicated an average of 87.2% correct identifications of the truthful and deceptive subjects; results of subsequent analyses indicated that correct identifications were made slightly more often from analysis of respiration, 80.5%, than from either GSR, 80.0%, or cardiovascular activity, 77.1%. ⁽¹³⁶⁾ These latter results are not consistent with data reported by Barland who found that GSR responses were more reliable and valid indicators of deception in field lie detection than were cardiovascular or respiratory responses. ⁽¹³⁷⁾ Moreover, Edel and Jacoby

(134) F. Horvath and J. Reid, "The Reliability of Polygraph Examiner Diagnosis of Truth and Deception," J. Crim. Law, Crim., and Pol. Sci., 62, (1971), 276-281.

(135)_F. Hunter and P. Ash, "The Accuracy and Consistency of Polygraph Examiners! Diagnoses," J. Pol. Sci. and Adm., 1, (1973), 370-375.

(136) S. SLowik and J. Buckley, "Relative Accuracy of Polygraph Examiner Diagnosis of Respiration, Blood Pressure, and GSR Recordings," J. Pol. Sci. and Adm., 3, (1975), 305-309.

(137) Barland, "Detection of Deception in Criminal Suspects," <u>op</u>. <u>cit</u>., 32.

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have reported that when asked to identify, not interpret, significant responses, field examiners more reliably identify cardiovascular and respiratory responses (96%) than GSR responses (93%).⁽¹³⁸⁾

Recently, Horvath reported a study dealing with evaluator reliability in interpreting both verified and unverified polygraph records. Ten evaluators, all field trained polygraphic examiners working in law enforcement settings, analyzed 112 polygraph records, one-half of which were drawn from investigations verified by confessions, one-half, drawn from investigations not varified. In the former instance, evaluators' judgments, on average, agreed with the criterion measure, the known truthfulness/deception of the subjects established by confessions, 64.1% of the time. In the latter instance evaluators' judgments were compared to those made by the examiners who had actually tested the subjects; agreements between evaluators and examiners averaged about 62.1%. Moreover, Horvath reported that correct identifications were made more often on deceptive than truthful subjects and that the nature of the criminal investigation, that is whether a crime against a person or a property crime, significantly affected the percentage of correct agreements between evaluators and the criterion measures.⁽¹³⁹⁾

It is important to note that the studies discussed in this section do not provide completely acceptable evidence of the validity of field lie detection. One reason for this situation is that in those studies the polygraphic records evaluated were selected from cases where the deceptive person was identified. It can be argued, therefore, that in such cases the nonpolygraphic sources of information available to the examiner at the time of testing considerably aided him in conducting the examination; better factual information might have allowed him to formulate more appropriate test questions, affecting the response data on the records; or to vary his pre-test interview in a way that made it possible to obtain more suitable records than would have otherwise been obtained. More importantly, however, in those studies confessions made by polygraph subjects were used as the criterion against which evaluators'

(138) E. Edel and J. Jacoby, "Examiner Reliability in Polygraph Chart Analysis: Identification of Physiological Responses," J. Appl. Psych., 60, (1975), 632-634.

(139)_{F. Horvath}, "The Accuracy and Reliability of Police Polygraphic ("Lie Detector") Examiners' Judgments of Truth and Deception: The Effect of Selected Variables," (unpublished Ph.D. dissertation, Michigan State University, 1974). judgments were compared. Confessions are not independent of polygraphic examinations and thus their usefulness as a criterion measure for estimating validity is limited. In other words, the studies discussed in this section indicate primarily that there is a high degree of consistency in analysis of the physiological data obtained during polygraphic examinations; that independent evaluators can reliably identify those patterns of physiological changes believed to be associated with truthfulness and deception.

Summary

Most research on "lie detection" has been done in the laboratory. Unfortunately, such research, while important for understanding the mechanisms which underlie detection of deception, is not necessarily applicable to real life. For example, laboratory researchers almost without exception report that electrodermal activity is the most valid and reliable indicator of deception; most field practitioners, on the other hand, claim that for their purposes other physiological measures are more useful. Moreover, the procedures used in the field setting make lie detection there akin to a diagnostic technique whose efficacy is determined by the interaction of examiner and subject as well as by polygraphic recordings. In contrast, laboratory procedures are rarely affected by such interaction. Rather, polygraphic recordings alone, $\underline{e} \cdot \underline{g} \cdot$, physiological measurements made during a series of tests, which also differ in nature from those used in the field, constitute laboratory lie detection.

Because of the numerous and significant differences between laboratory and field procedures and goals, it is, in general, misleading to apply the results of laboratory research to the typical field situation. In spite of this difficulty, however, there is substantial agreement that lie detection is a relatively valid and reliable method of determining truthfulness and deception; that is, judgments based upon lie detection tests are correct too often to be considered coincidental, and the physiological responses thus measured and recorded provide a basis for substantial replication of judgments made on them.

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THE PHYSIOLOGIC BASES OF POLYGRAPH TRANSDUCERS*

By

Stanley Abrams, Ph.D.

The purpose of this paper is to provide a better understanding of the physiologic bases of the various measures employed in polygraphy. The frequently described functioning of the autonomic nervous system (ANS) will be excluded, with the exception of specific areas that have been neglected in other publications. Inevitably, there will be some disagreements with portions of this paper, and that is appropriate, considering that there is much in physiology that is still unknown and therefore debatable.

While many polygraphists are unaware of what is occurring physiologically when a subject demonstrates a deceptive response, they are not alone in this. After considerable discussion with physicians, cardiologists, physiologists, and psychophysiologists, it becomes quite apparent that they too have difficulty in explaining the operation of the polygraph instrumentation and the physiologic foundation for the responses that are obtained. While this is in part due to the complexity of the field, it is also because of the lack of knowledge of the cardio transducer in particular. In spite of this, the techniques utilized in polygraphy are " ... remarkably sensitive and responsive measures in a variety of emotional states ... The physiologic measures allegedly are more objective, more sensitive, easier to measure, and clearer in meaning than other more directly psychological measures and observations."(1)

Circulatory System

In researching the physiology of the cardio, it becomes apparent that the responses attained from this measure were the most difficult to explain. Considering this, a brief description of the circulatory system seems warranted. Figure I shows a diagram of this system. Beginning with the right side of the heart, the deoxygenated venous blood enters the right atrium by way of the vena cava. The "used" blood from the upper portion of the body arrives from the superior vena cava and the blood from the lower part of the body is transported through the inferior vena cava. Both the right and left atria contract at the same time, forcing the blood into their respective ventricles. Both ventricles contract together slightly after the atrial contraction and the blood from the right ventricle is discharged into the pulmonary artery to be carried to the lungs. It is here that external respiration takes place in the exchange of carbon dioxide for oxygen. The now oxygenated blood passes through the pulmonary veins to enter the left atrium. At the atrial contraction, the blood is forced into the left ventricle from which during the ventricular contraction, the blood is expelled through the aortic valve into the aorta. The blood that spurts through the valve at the time of the contraction is termed the "stroke volume" and is related to

Appreciation is expressed to the Lafayette Instrument Company for the use of their instrument for research purposes and to Dr. Gordon Barland for his considerable efforts in reviewing this paper.





The lined areas contain venous blood; the unlined areas contain arterial blood

- RA Right atrium
- RV Right ventricle
- LA Left atrium
- LV Left ventricle

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the volume of blood rather than the strength of the contraction. The blood pressure, in contrast to this, is dependent upon the strength of the contraction and its relationship to the resistance the blood meets in the blood vessels.

The spurt of blood entering the aorta causes the distention of the arterial wall, and at the diastole (heart at rest), the wall recoils, forcing the blood forward toward the area of least resistance. This action also sends some of the blood backward, causing it to close the aortic valve. The forward movement of the blood, after rebounding off the valve, increases the pressure in the aorta causing the upswing in the cardio tracings which forms the dicrotic notch. This is diagrammed in Figure II. The dilation and then recoil of the blood vessel at the heart's contraction is passed along the arteries much like the effect of plucking a violin string. This vibrating action is termed the "pulse wave" and it is in computing the number of these waves that a pulse rate is obtained. It should be recognized that the pulse wave travels considerably faster than the blood itself.



Figure II. Dicrotic Notch

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The oxygenated blood continues through the major arteries to the arterioles where the greatest resistance to flow occurs. The rings of smooth muscle in the walls of the arterioles are under the control of the SNS, and through neural and chemical mechanisms these muscles can constrict these walls, causing a local increase in blood pressure. It is here, then, rather than in the major arteries that changes in blood pressure are caused and blood supplies are redistributed within the body. The dilation of the main arteries in the skeletal muscles during SNS arousal tends to plan only a minor role in altering blood pressure.

From the arterioles, the blood enters the capillaries where internal respiration takes place. The oxygenated blood is received along with nutriments, hormones, and water, and exchanged for carbon dioxide and other waste materials. The now deoxygenated blood flows through the venules and then the veins, ending its cycle back at the right atrium.

Blood Pressure

The systolic and diastolic blood pressure are measures of separate functions and as such they can operate independently. A change in ANS functioning may affect both the systolic and diastolic pressures or only one of these responses. Systolic pressure is indicative of the amount of work the left ventricle must do in overcoming the resistance of the blood vessels, while the diastolic pressure indicates the state of these vessels.

Most psychophysiologists have emphasized the validity of the systolic blood pressure as an indicator of fear. Marston (2) reported that the diastolic blood pressure was too highly influenced by pain and the concentration associated with intellectual activity to utilize as a lie detection approach. In corroboration of this, Backster (3) concluded from his review of verified polygraph charts that tracings obtained in the diastolic phase tended to be too erratic to interpret accurately. It is felt, however, that additional research is required, particularly since the advent of the amplified cardio which conceivably could result in a different pattern of response.

Correlation Among SNS Responses

Blood pressure is determined by the strength of the ventricular contraction and the resistance met in the blood vessels. Generally, blood pressure and heart rate are inversely related, but there are many exceptions to this (4); for example, both blood pressure and the heart beat increase during exercise, and both decrease with intake of nicotine. It is clear, therefore, that in spite of some presently held opinions, a reduced heart rate per se cannot be interpreted as a sign of deception.

A consistent finding in psychophysiologic research is that there is a low correlation found among the various measures of autonomic functioning. This is in contrast to the usual view of sympathetic arousal in which a description is given of the bronchi, of the lungs, arteries in the skeletal muscles, and pupils of the eyes all dilating, while constriction occurs in other regions of the organism. There is no all-or-none response associated with SNS dominance as is typically portrayed (5,6). Instead, some subjects will demonstrate a change in blood pressure but not in respiration, other individuals

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will react to threat with an increased heart beat rate, while in still others a threat results in a slowed heart beat. Moreover, an individual will tend to show a fairly consistent pattern of response, so one can assume that if he were a good responder in the cardio realm and poor in the GSR, this would be repeated in future polygraph examinations. If, however, the stimulus and the subject's reaction were altered, a different pattern of response would be expected. For example, if the stimulus were in the environment one would expect pupillary dilation, but if the stimulus were internal, such as concentration on an intellectual process, the tendency would be toward constriction of the pupils. SNS arousal could best be described. then, as fragmented. Individual physiologic responses appear to serve the organism by operating differently according to the stimulus, the needs of the individual, and to the response the subject must make(5). This clearly explains why the pattern obtained in a "stim test" is not necessarily the same as the one demonstrated in an actual criminal investigation. This explanation also provides further understanding of the differences in both the patterns of response and the validity findings when field research is compared with laboratory mock crime paradigms.

Cardio

As previously indicated in this paper, the cardio in unquestionably the least understood transducer employed in polygraphy. Many examiners assume it to be a measure of blood pressure, while physiologists speak of it in terms of blood volume. An attempt at clarifying this confusion is best approached through an examination of the blood pressure cuff and the changes brought about in the tracings through manipulating this sensor. It becomes readily apparent that a change in the tracings can be caused by any expansion in the arm size. This can be accomplished by either flexing the arm muscles or through bringing about an increased flow of blood to the arm. The opposite effect can be caused by the tightening of a tourniquet about the arm at a position above the cuff placement. This results in a diminished blood supply to the arm, thereby reducing the arm size. In response to this, the tracings show a dramatic narrowing of amplitude. While it is true that these procedures will influence blood pressure, the major reason for the changes that occur are related to volume. It can be assumed, therefore, that the cardio measures stroke volume and that the increase or decrease of the blood volume is reflected in the amplitude of the tracings.

Since the cardio is a measure of blood volume, it can then be described as a plethysmograph, and similar findings should be obtained with the finger plethysmograph. In the latter, a tracing is obtained that is very similar to the tracings in the cardio. While a measure of the stroke volume is obtained, it must be recognized that this is influenced by the state of the blood vessels. In consideration of this, patients with Raynaud's Disease (constriction of the blood vessels in the fingers and/or toes) were examined. Because of the lesser blood volume in the digits, the amplitude of the tracings was much narrower than in those subjects not afflicted with this disorder. When alcohol, which causes vasodilation, was ingested, blood volume increased and the amplitude showed considerable widening. These findings corroborated those of the cardio, indicating that both approaches are measures of blood volume and that changes in volume are reflected in the amplitude of the tracings.

The stroke volume will vary with each contraction of the heart, but so too will the strength of the contraction. The greater the strength of the contraction and the more resistance in the peripheral blood vessels (constriction of the arterioles), the higher the blood pressure will be. Since an increase in blood pressure causes a rise in the cardio tracings it can be assumed that the pressure of the blood against the arterial walls also plays a role in altering the cardio tracings. Thus, two separate variables interacting with one another determine the amplitude and rise and fall in the tracings. The alteration in pressure may take place during the systole, diastole, or both. In the cardio, a blood pressure increase is seen as a rise in the tracings, while in the photoplethysmograph, a drop in the tracings occur. A constriction of the peripheral blood vessels usually results in an increase in diastolic pressure. The pinching off of the cardio tracings in which the ceiling remains essentially stable while the base line raises is not necessarily indicative of peripheral construction. When an amplified and mechanical cardio are placed on opposing arms of the same individual, different reactions occur with sympathetic arousal. In the mechanical cardio, the pinched off motion frequently is seen, while in the amplified cardio, both the base and ceiling show a corresponding rise. These tracings are shown in Figure III. It is felt that the difference in responses is due to the greater occlusion of the blood vessels because of the greater pressure by the mechanical cardio on the arm. The result is the lessor cardio amplitude because of the restricted blood flow.

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MAN MM

Figure III.

Cardio tracing associated with blood pressure increase and blood volume reduction in mechanical cardio. Cardio tracing associated with blood pressure increase in tracing of amplified cardio.

The cardio only records a crude measure of pulse pressure changes and is in no way indicative of an absolute measure of systolic or diastolic blood pressure. In fact, it is inappropriate to describe the cardio tracing base line as diastolic and the ceiling as systolic. At most, it could be said this is what occurs during the systolic or diastolic phase. The characteristics of the tracings attained in the cardio are dependent in part upon the degree of pressure upon the arm. If the pressure is greater than the systolic pressure there is no blood flow past the blockage and no tracings can be attained. If the pressure is less than the diastolic, generally meaningful tracings will not be attained. The exception to this is the amplified cardio which amplifies the pulsations to the extent that responses can be recorded at less than diastolic pressure.

When blood pressure is taken for medical purposes, the cuff is inflated until the circulation is completely blocked. The pressure is then gradually reduced until the force of the ventricular contraction is sufficiently strong to force the first spurt of blood past the cuff barrier. Systolic pressure is recorded at the sound of the first pulsation as it is heard through the stethoscope. The greater the individual's systolic blood pressure, the higher the cuff must be inflated to impede the blood because of the strength of the ventricular contraction. The cuff pressure is reduced further until the pulsating sound is no longer audible. This point is generally considered to be diastolic blood pressure. In a normal adult male, blood pressure is in the are of 120/80 mm.Hg. The cardio, however, only detects pulse pressure and stroke volume at a small portion of the blood pressure cycle. If the cardio pressure is placed too high or too low, the dicrotic notch will not be recorded. Figure IV demonstrates a situation in which the cardio pressure is too great to pick up the dicrotic notch. In Figure V the cardio pressure is lowered, which in the cardio tracings would seem to raise the dicrotic notch. In actuality, the lowering of the pressure allows the cardio to measure this portion of the blood pressure cycle.



Cardio pressure too high, missing dicrotic notch

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Cardio pressure lowered, picking updicrotic notch

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Pneumograph

The measurement of respiration is clear and straightforward, but there are several areas that should be discussed. Polygraphists are well aware there are two different types of breathing that can be measured through the use of a double pneumo apparatus. Thoracic or costal respiration is attained by placing the pneumotube about the nipple area to measure breathing in the thoracic region. The thoracic cavity is formed by the ribs, sternum, and diaphragm. Through muscular control the walls are pushed outward, enlarging the cavity and allowing inspiration to take place through an increase in the circumference of the thorax.

In diaphragmatic or abdominal breathing, the pneumo tube is placed in the area of the upper abdomen. The diaphragm can be described as a dome-shaped muscular sheet lying between the thorax and abdomen and attached by its periphery to the chest wall. By muscular contraction the diaphragm is lowered and flattened, enlarging the longitudinal diameter of the chest. As the diaphragm descends it increases the pressure on the abdomen, forcing the abdominal way out (7). It is this change in the abdominal wall that is measured with the lower pneumo tube.

The usual amount of air inhaled and exhaled during a resting state is termed the "tidal volume." According to Backster(8), there is less than average tidal air intake during a threat situation because there is an inhibition of the diaphragm-inspiration muscular complex, resulting in a less than average expansion of the chest cavity. This in turn causes a sustained suppressed respiratory cycle during a deceptive response. Hyperventilation and the stairstep pattern, with an amplitude that is greater than the average respiratory cycle, are taught at the Backster School as relief reactions. While Penley(9), in his review of verified charts has reported that suppression is a valid indication of deception, most polygraphists accept hyperventilation and the stair-step pattern as indications of lying as well. This is in agreement with the views of physiologists who have stated that hyperventilation or suppression can be signs of SNS arousal. In this writer's study of verifier charts, while suppression was more frequently associated with deception, hyperventilation and the stair-step reaction were occasionally but rarely found in response to lying. The generalization that must be drawn from this is that each subject has his own unique way of responding and there are no universal physiologic signs of deception. It is therefore the role of the examiner to determine the subject's somewhat unique pattern of deceptive response.

Psychogalvanometer

The final transducer, the galvanometer, is the most easily interpreted and numerically scored. Perhaps this is one reason why it found such great favor in psychological experimentation. Until recently, the literature has strongly emphasized that the GSR is effective in detecting deception in laboratory situations, but not in actual criminal investigations(10). Barland(11), in a very well designed field study, reported that this approach had greater validity in lie detection than the measures of cardio or respiration.

While Backster has stressed the importance of the height of the GSR, he viewed the duration as being too confounded by the process of thinking. In

contrast, this writer's study of verified charts has shown that the duration of response is as valid an indicator of deception as the height. Employing thirty verified charts, a response was considered deceptive if, when compared to its corresponding control or relevant question, its height was twice as large or its duration twice as long. Using either one or the other, an equally high degree of accuracy was obtained. When this difference was present in both height and duration, accuracy was found to be ninety-nine per cent(12).

The physiologic bases of electrodermal activity still remain at a theoretical level, but it is clear that the sweat glands are involved. It is known that skin hydration serves a number of functions including changing the skin's flexibility, aiding in heat loss, altering surface friction, and increasing the skin's resistance to injury. This process not only assists the organism in defense, but also in locomotion and tactile discrimination. Lacey(1974) has indicated that the electrodermal reaction varies with the stimulus that precipitates the reaction and what action the subject takes. Active listening, for example, will produce a different response than threat or a grasping response. The hand that is being employed in the action will show a greater reaction than the one not in use and different parts of the hands will respond differently according to the response to be made.

These findings emphasize that there is no consistent and total ANS response. The reaction, whether it is in cardio, respiration, or GSR, varies with the stimulus, the individual, and his overall response.

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ANSWER KEY TO POLYGRAPH REVIEW ON POLYGRAPH FUNCTIONS AND MAINTENANCE

1. c 2. c 3. b 4. d 5. a 6. False 7. True 8. True 9. True 10. False * * * * * * LET US KNOW! MOVING? Name: Old Address: New Address: ZIP Are you a member of the APA? Yes No ____ The Secretary and Treasurer will be notified of your move.

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CORRECTIONAL PERSONNEL MAY BE POLYGRAPHED IN MARYLAND OPINION OF THE ATTORNEY GENERAL

By

Francis B. Burch Attorney General of Maryland Henry J. Frankel Assistant Attorney General

September 2, 1975

Colonel Robert J. Lally, Secretary Department of Public Safety and Correctional Services Suite 500, Executive Plaza One Hunt Valley, Maryland 21030

Dear Secretary Lally:

You have requested this office to render an opinion on the following question:

Does the Commissioner of Correction have the authority to require Correctional personnel to take a polygraph test as a part of an investigation in the institutions to determine the possible involvement of said personnel in suspected illegal or illicit activities?

We have determined that he does. The Commissioner of Correction is mandated by the Legislature to be in "sole and active charge of the Division of Correction, subject only to his responsibility to the Secretary of Public Safety and Correctional Services and to the Governor", (Article 27, Section 675, Annotated Code of Maryland). As such, he is authorized to adopt and promulgate reasonable rules and regulations, not inconsistent with law, for the discipline and conduct of officers and employees of the several institutions and agencies under his jurisdiction (Article 27, Section 676, Annotated Code of Maryland).

The Commissioner, pursuant to this authority, has adopted and promulgated "the Handbook of Information and Rules for Correctional Employees". In addition to these rules and regulations, the employees of the Division are required to abide by the rules and regulations established by the Commissioner of Personnel.

The question presented here is whether the requirement to take a polygraph test under the circumstance herein defined is reasonable and not inconsistent with law. The issue has been the subject of controversy throughout the country, but the predominant authority supports the employer's action, provided certain criteria are met. We should point out, at the outset of this opinion, that the Maryland Legislature, by the provisions of Article 100, Section 95, ACM, 1974 Cummulative Supplement, while proscribing the use of polygraph tests by private employers in this State, has specifically exempted the State Government and its agencies. In <u>Roux vs. New Orleans Police Department</u>, 223 So. 2d 905 (Louisiana, 1969), a case in which the U.S. Supreme Court denied certiorari (397, U.S. 1008), the issue before the Court of Appeals of Louisiana was whether the action of the Civil Service Commission in affirming a policeman's dismissal from the New Orleans Police Department was proper. The Court held that it was. The Police Department was investigating circumstances surrounding a homicide in which it was learned that the victim was acquainted with a number of police officers. The policemen were requested to submit to a polygraph test in order to verify statements which were made in the course of said investigation. The appellant refused, and was subsequently dismissed from the Department.

The appellant contended that (1) the appointing authority did not have the authority to order him or any employee to submit to a polygraph examination, and (2) if he was so authorized, such a requirement was unlawful and denied the officer due process of law guaranteed by the Federal and State constitutions.

The Court of Appeals held that the order to take a polygraph test was reasonable; and that Roux's refusal to submit to the test impeded and hindered an investigation into a violation of law which he was sworn to uphold and was an act of misconduct on his part as a result of which he need no longer be said to possess the high standards of conduct required by a policeman.

On the question of whether the order to submit to the test was reasonable, the Court cited the Civil Service Commission's opinion:

> "The circumstances of the case required an interview of and scrutiny of the activities of numerous officers, the urgency thereof being emphasized to ensure against departmental scandal as well as to investigate and quickly solve an apparent homicide. After appellant's suspension and continued refusal to obey an order, the thrust of the appointing authority's position shifted from concern over the use of the polygraph test as an investigatory aid to concern over the appellant's refusal to obey a direct order of a superior officer."

Roux also contended that he refused to take the test because it was not an accurate device and its results were not admissible as valid evidence in a court of law. The Court, in answer to this contention, referred to Fischera <u>vs. State Personnel Board</u>, 217 Cal. APP 2d 613, 32 CAL Reporter 159, (1963) and cited from that Opinion, in great length, as follows:

> "The polygraph is an extension of the age-old process of assessing the veracity of a witness, by scrutinizing his facial expression, rubescence, tremors, evasion of meeting the eye, and the like. It works through externals and is quite distinct from drug induced revelation, hypnosis, or and other form of narco-analysis. In the limited field of cases such as this one, and those of the prior cases cited

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above, we find no deprivation of constitutional or legal rights.

"It may be conceded that there is a considerable degree of fallibility with the polygraph (see Sholnick, Scientific Theory and Scientific Evidence: An analysis of Lie-Detection, 70 Yale L.J. 694). It is not considered to have enough reliability to justify the admission of expert testimony in the courts based on its results, and a person's willingness or unwillingness to take the test is without enough probative value to justify its admission. (People v. Carter, 48 Cal. 2d 737, 752, 312 P.2d 665.) It was recognized in the Frazee case, however, that it does not follow that the tests are completely without value. (170 Cal. App.2d at p. 335, 338 P.2d at pp. 944-945). The test might have proved useful in limiting and channeling the investigation in this case, in which three officers besides appellants were directed to take the tests, and acceded. It might have been an instrument of exculpation and vindication. on the one hand, or of more intensive investigation of the subjects of the test, on the other. We cannot, of course, tell what would have been the ruling of the State Personnel Board, or what our own ruling might have been, had the tests been taken and had produced results considered damaging by appellants' superiors. We do hold, however, that appellants were not entitled to withhold this means of investigation and at the same time retain their positions as officers of the California State Police."

Roux also contended that he was placed in a dilemma having to choose between taking and, perhaps, failing the test which might result in charges being brought against him, or refusing to take the test and be suspended or dismissed because of his refusal. The Court brushed this contention aside by referring to the evidence before the Commission which showed that he was, at no time, asked to waive immunity.

Finally, the Court of Appeals of Louisiana held "While appellant's refusal to obey the order is not evidence of guilt or of knowledge of the identity of the guilty party, he may not be permitted to refuse to take the polygraph test in view of his sworn duty to cooperate in the investigation of crime. Under all the circumstances in this matter, we find that the order was reasonable."

In <u>Seattle Police Officers Guild vs. City of Seattle</u>, 494 P2d 485 (Washington, 1972), the Supreme Court of Washington was presented with the issue of whether the Police Department's efforts to elicit, under threat of dismissal, answers from police officers to questions relating to the performance of their official duties violated the constitutional rights of a police officer against self-incrimination. The Court held that it did not.

The facts were as follows: in 1970, several Seattle police officers were implicated in a pay-off scheme. Public confidence in the integrity of the Department was shaken. The Police Chief initiated a departmental administrative investigation, and proposed to require those officers interrogated to answer questions put to them relating to their official conduct and to submit to a polygraph test all under threat of dismissal if they refused to cooperate. Departmental regulations required the cooperation of the officers in internal departmental investigations. The Police Chief asserted that the questions asked of the officers would be "specifically, directly, and narrowly related to the past performance of their official duties" and "at no time during the investigation of any investigation concerning misconduct will any officer be directed to waive immunity from selfincrimination"; and prior to directing any officer to answer questions or to submit to a polygraph test, he will be advised that information gained by reason of his answers cannot be used against him in a criminal proceeding.

Two questions were presented to the court:

- 1) May a police officer interrogated in the course of a departmental internal investigation of or inquiry into alleged police misconduct be lawfully disciplined or discharged for claiming his Fifth Amendment privilege against self-incrimination and refusing upon such grounds to answer questions pertaining to the performance of his official duties.
- 2) May a police officer, during such an investigation, be validly disciplined for refusing to submit to a polygraph test.

The Court, in addressing itself to the first question, exhaustively reviewed the pertinent decisions of the U.S. Supreme Court in <u>Garrity vs. New</u> <u>Jersey</u>, 385 U.S. 493 (1967); <u>Spevack vs. Klein</u>, 385 U.S. 511 (1967); <u>Gardner vs. Broderick</u>, 392, U.S. 273 (1968); <u>Uniformed Sanitation Men Assn.</u> <u>vs. Commissioner of Sanitation</u>, 392 U.S. 280 (1968), and ultimately adopted the view of Mr. Justice Harlan who stated, in his concurring opinion in <u>Gardner and Uniform Sanitation Men</u>, that there is "in these opinions a procedural formula whereby public officials may now be discharged for refusing to divulge to appropriate authorities information pertaining to faithful performance of their office".

In <u>Garrity</u> supra, the Supreme Court held that statements obtained in the course of a disciplinary investigation under threat of dismissal from office could not be used as evidence in subsequent criminal prosecutions. In <u>Spevack</u>, supra, the Court held that the Fifth Amendment privilege extended to lawyers, as well as laymen, and should not be diluted by imposing dishonor of disbarment as a penalty for asserting it. In <u>Gardner</u>, supra, the Court held that the requirement of a waiver of immunity by a New York City employee violated his Fifth Amendment privilege and vitiated his dismissal. However, in that case, the Supreme Court further declared that "if the appellant, a policeman, had refused to answer questions specifically, directly or narrowly related to the performance of his official duties without being required to waive his immunity with respect to the use of his answers or the fruits thereof in a criminal prosecution... the privilege against selfincrimination would not have been a bar to his dismissal". In the <u>Uniform</u> Sanitation case, supra, which was decided on the same day as <u>Gardner</u>, the Court said, "Petitioners as public employees are entitled, like other persons, to the benefit of the constitution, including the privilege against selfincrimination ... At the same time, petitioners being public employees subject themselves to dismissal if they refuse to account for their performance of their public trust, after proper proceedings, which does not involve an attempt to coerce them to relinquish their constitutional rights".

Chief Justice Hamilton, writing for the Supreme Court of Washington in <u>Seattle Police Officers Guild vs Seattle</u>, supra, declared, that the Court was convinced that where the questions asked of the police officers were "specifically, directly and narrowly related to the past performance of their official duties" and the officers were not required to waive any immunity that they might have as to the use of their testimony or the fruits thereof, in any subsequent prosecution; and they were advised that the information supplied through their answers could not be used against them in later criminal proceedings; and that their refusal to cooperate in the investigation could result in their dismissal, then the Fifth Amendment privilege against self-incrimination would not be a bar to the discharge of an officer or officers who refused to answer questions pertaining to the use or abuse of his official duties.

As to the second question raised in <u>Seattle Police vs. City of Seattle</u>, supra, that is, whether the Police Department may require, under penalty of dismissal for refusal, officers questioned during an internal departmental inquiry to submit to a polygraph test, the Court held that "if, in the exercise of prudent judgement, the investigating authority determines it reasonably necessary to utilize the polygraph examination as an investigatory tool to test the dependability of prior answers of suspected officers to questions specifically, narrowly and directly related to the performance of their official duties, then, such investigating authority may properly request such officers to submit to a polygraph test under pain of dismissal for refusal."

In <u>Clayton vs. New Orleans Police Department</u>, 236 So., 2d 548 (Louisiana 1970), the appellants were policemen who were dismissed from their positions for refusal to submit to a polygraph test in an intra-departmental investigation. At no time were they requested to waive immunity from prosecution even though they were advised that they were suspects, and they gave no such waiver. The dismissals were based on the conclusion that their refusals to take the test were in violation of the departmental rules and regulations which provided, in part, that the police officer should conduct himself in accordance with high degree of morality and act in a manner which would not reflect discredit upon himself or the Department; he should obey instructions from a superior source; and cooperate with other officers in the performance of their duties. The Court, citing Roux, supra, held that the dismissal was proper.

We now turn to the question presented by the Commissioner of Correction. The rules and regulations of the Department of Personnel, found in 06.01.00 of the Maryland Agency Rules, provide that an employee in the classified service may be permanently removed from his position only for cause, and delineates, under Section .47, Causes for Removal, among others, D. That the employee has violated any lawful official regulation or order or failed to obey any lawful and reasonable direction given by his superior officer when such violation or failure to obey amounts to insubordination or serious breach of discipline which may reasonably be expected to result in a lower morale in the organization or to result in loss or injury to the State or the public.

N. That the employee has been guilty of conduct such as to bring the classified service into public disrepute.

Furthermore, the "Handbook of Information and Rules for Correctional Employees" issued by the Commissioner of Corrections provides that all the employees of the Department must abide by the rules and regulations established by the Commissioner of Personnel and the Commissioner of Correction. The Handbook further provides additional rules relating to the conduct of the Correctional employees, among which is:

> 5. PERSONAL CONDUCT: employees, on and off duty, must conduct themselves in a manner which will maintain the respect of the public and the inmate body. Conduct which reflects unfavorably upon the Department by causing disgrace, embarrassment or criticism, will not be tolerated.

Correctional personnel occupy positions of public trust and as public employees they must account to the State for their actions because they perform them, in many instances, as agents of the State. Their responsibility to the State is to obey its laws and the rules of conduct it has generally laid down. As stated by the U.S. Supreme Court in <u>Gardner</u>, supra, the public employee "is a trustee of the public interest bearing the burden of great and total responsibility to his public employers." If it appears to the Commissioner that certain acts of transgression have been committed by his employees, and in the course of an intra-departmental investigation he determines that a polygraph test is a necessary and required tool to assist him in ascertaining the truth surrounding the circumstances, it is our opinion that he has the authority to require a correctional employee to submit to the taking of a test under threat of dismissal. However, a review of the cases cited herein mandates that certain criteria be established in order to insure proper procedural methods are employed. Such criteria are:

- 1. That the employee be advised that he is not required to waive immunity from criminal prosecution.
- 2. That the employee be advised that the information supplied through his answers would not be used against him in subsequent criminal proceedings.
- 3. That the employee's refusal to cooperate in the investigation (including the taking of the test) could result in his dismissal.

4. That the questions asked should be specifically, directly, and narrowly related to the past performance of the employee's official duties.

We believe if the Commissioner follows these criteria, then the Correctional employee may be required, under threat of dismissal, to take a polygraph test as part of an intra-department investigation to determine possible involvement of the employee in illegal or illicit activities.

* * * * * *

LIE DETECTION THROUGH VOICE ANALYSIS

By

Frederick C. Link*

"Have you read the articles on voice analysis in recent Playboy[⊥] and Penthouse² magazines?"

"Have you seen the movie 'The Trial of Billy Jack?'"

"Or, have you watched television presentations on 'What voice analysis shows really happened in the Kennedy assassination.""

If the answer to any one of these is "yes," you may well have been left with the impression that voice analysis is the cure-all for detection-ofdeception problems in law enforcement.

Lie detection through voice analysis has been glamorized by publicity in the popular media, and all this glitter has led many citizens to form an unrealistically high opinion of the present value of voice analysis. However, television, movies and popular magazines have not given unbiased, impartial presentations of the facts regarding the effectiveness of voice analysis for lie detection.

At the present time, no military law enforcement agency is using voice analysis for lie detection, although all of these agencies use the polygraph technique when it is appropriate. There are good reasons for this nonuse of voice analysis. While voice analysis may some day in the future be developed to the point where it is useful for military lie detection, that day has not yet arrived. In order to understand why this is so, let us look at some pertinent facts.

The Basis of Voice Analysis

Although human speech is the result of a very complicated process, several different aspects of the voice can be analyzed. The manufacturer of one voice analysis device (the Psychological stress Evaluator) relates that the single, integrated sound that we hear as human speech is composed of at least three different sounds blended together: the basic sound, formant sound, and the microtremor.

The basic sound is formed by air being forced over the vocal cords and is a signal generally between 100 and 300 hertz, (1 hertz, a frequency equal to one cycle a second). This frequency forms the base of the combined signals that constitute the voice.

*The author is a Chief Warrant Officer, Corps of Military Police, U.S. Army, and an instructor in polygraph technique in the Army Polygraph School at Fort McClellan, Ala. The article is reprinted from the <u>Military Police</u> <u>Law Enforcement Journal</u>, Spring, 1976, with permission of the journal and the author. The formant sounds are resonances (vibrations) created by the various cavities of the head, especially the mouth, which add a second amplitude-modulated sound to the voice.

Finally, the microtremor (an inaudible frequency modulation) is superimposed on the base and formant sounds.

The microtremor signal is normally in the range of 8 to 12 hertz and it is present in all normal speech. However, when a speaker begins to feel internal stress and those speech processes that are normally mediated by the autonomic nervous system are brought under conscious control, then the microtremors are suppressed and disappear from the voice. When this presence or absence of the microtremor is recorded and charted with suitable equipment, it is possible to determine from speech whether a speaker shows stress. Under suitable testing conditions, the presence of stress would be an indication of lying, and the absence of stress would show truthfulness.⁹

Another voice analysis device, the Mark II Voice Analyzer, is claimed to function by extracting and processing the tremulo effect from the voice, a process related to but not the same as that used in the Psychological Stress Evaluator.⁴

Voice analysis devices have been highly marketable and they have been popping up like mushrooms. Although these devices differ from each other in their exact modes of operation and in their finished designs, they are all essentially similar in that they extract and process some signal contained in speech. The devices offered by the manufacturers range in price from about \$3,500.00 up. Usually, these systems consist basically of a tape recorder; the analyzer itself, which gives a chart readout and, in at least one case, a numerical readout and the accessories such as microphones, telephone taps, and the like.

Does Voice Analysis Really Work in Lie Detection?

The manufacturers of these devices, of course, claim that they really work. In fact, they claim them to be better than the polygraph in accuracy, reliability, ease of use, comfort and dignity of the examinee, and in just about any other respect you can imagine. Additionally, the manufacturers of some of the devices have gotten nation-wide publicity by claiming to have analyzed and determined the truthfulness of the recorded statements of such contemporary figures as Lee Harvey Oswald, Edward Kennedy, and Patty Hearst.⁵ They further claim to have determined the truthfulness of the statements made by these persons. We will deal with these latter claims further on in this paper.

Military attitudes on voice analysis for lie detection are based on tests of some of these devices made by several military agencies and on validation research conducted by a civilian institution under contract to the Army. The Air Force tested a Psychological Stress Evaluator for lie detection and found it "not useful."⁶ The National Security Agency tested a Psychological Stress Evaluator and found it "insufficiently reliable."⁷ The Army obtained three Psychological Stress Evaluators and used them in a study of lie detection conducted by Dr. Joseph Kubis of Fordham University. Following this study, the Army dismantled two of the devices and transferred the third one to the Air Force for research in areas not related to the detection of deception.⁸

The Kubis study,⁹ completed in 1973, provides the primary justification for the Army's nonuse of voice analysis. It is also a very interesting and enlightening document on the relative effectiveness of the polygraph technique. voice-stress analysis, and investigator intuition. In essence, Dr. Kubis put a number of volunteers through a crime situation in which money was stolen from a purse. The volunteers were placed in groups of three in which one person stole the money, the second acted as a lookout, and the third person had no connection with the crime whatsoever. After the crime had been committed, all three persons were tested to attempt to determine what their individual roles in the crime had been. In the structure of a polygraph examination situation, the suspects were given a polygraph examination while at the same time their answers were tape-recorded. These tape recordings were subsequently analyzed with two different voice analysis devices to attempt to determine each suspect's role. Finally, the examination was watched by observers who attempted to tell if the suspects were lying or telling the truth just by looking at them and interpreting their actions.

Kubis' study concluded that the polygraph technique had high validity, observation of behavior was second most effective in determining who did what, and voice analysis came off a poor third in detecting deception in this experiment. In the words of Dr. Kubis: "Essentially, the findings indicated the clear inferiority of voice analysis in its present state of development, not only to the polygraph but also to judgments made on the basis of simply observing subjects' behavior."¹⁰ He further says: "The results failed to demonstrate that either of the voice-analysis techniques was effective in identifying the three basic roles of thief, lookout, and innocent suspect in the simulated theft. In contrast, the polygraph achieved an accuracy score of 76 percent, a value comparable to that obtained in previous studies using the simulated theft paradigm."¹¹ This validation effort provided the military community with a scientifically researched basis for rejecting voice analysis as a lie detection technique at this time.

Dr. Kubis does not conclude that voice analysis for lie detection is unworkable, only that presently available voice analysis equipment does not fill the bill. He attributes the failure of voice analysis in his experiment to "a matter of insensitivity or other inadequacy in the devices themselves in their present state of development."¹² Perhaps someday in the future, voice analysis will be developed to the point where it is usable for lie detection.

It should be noted that the manufacturers of the equipment and some of its users have criticized the Kubis study on technical grounds. These criticisms range from the claim that the tape recordings were of such poor quality they could not be analyzed to the claim that the requirements of the research contract were not met. Therefore, it is claimed that the results and conclusions of the Kubis study are invalid.¹³ This appears to be a somewhat extreme position and there is probably little valid reason to doubt the overall conclusions of the study. Nevertheless, a new validation study is being

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conducted by a group at the Michigan State University, but so far no findings have been announced.

Can Voice Analysis Determine If Public Figures Are Telling The Truth in Public Statements?

Probably the most effective publicity for voice analysis has come from the media that ran sensational stories about the analysis of public statements made by newsworthy persons. The publicity centered primarily about the questions of whether Lee Harvey Oswald shot President Kennedy, whether Oswald acted alone, and whether there was a conspiracy among various unnamed persons acting to shoot Kennedy. The leading article on this subject was written by a trained voice analyst. The article, entitled "Lee Harvey Oswald Was Innocent,"¹¹⁴ appeared in the April 1975 issue of "Penthouse" magazine. It contained a quite detailed account of how the author had determined Oswald's innocence, and many other details of the Kennedy assassination, through voice analysis. Naturally, as indicated by the title of the article, the most significant conclusion was that Oswald was most probably telling the truth when he denied shooting President Kennedy.

More recently, another prominent voice analyst was reported in the press¹⁵ to have analyzed the tapes made by Patty Hearst while she was under the domination of the Symbionese Liberation Army (SLA). This recognized authority on voice analysis concluded that Patty Hearst made all of her antisocial statements under duress. He said she was not telling the truth when she claimed to have voluntarily joined the SLA and to have voluntarily participated in the bank robberies and other illegal activities perpetrated by the SLA. He said she was innocent of any voluntary wrongdoing, and was doing only what she was forced to do. All of these conclusions were formed on the basis of this authority's analysis of the Hearst tapes.

On June 4 and 5, 1974, a subcommittee of the Committee on Government Operations of the House of Representatives of the United States held hearing on "The Use of Polygraphs and similar Devices by Federal Agencies." Various advocates of the voice analysis lie detection technique testified before this subcommittee. A position paper prepared by one manufacturer of voice analysis devices said:

Because the PSE uses the voice as a medium for stress measurement, the question has been raised concerning the ability to detect attempted deception of truthfulness from television or radio broadcasts. It is indeed a fact that the PSE can be used to determine the stress levels on the part of the speaker under these circumstances. However, as has been discussed previously, lie detection is an interpretative or analytical process which requires certain control elements to allow equating the stress indications to attempted deception, as opposed to any other stress cause. Without these controls, appropriate pre-test, properly structured examination, and post-test interview indications of stress remain just that. (sic) It would be interesting, indeed, if lie detection could be accomplished under such circumstances, but it cannot."¹⁶ The developer of another of the voice analyzers told the subcommittee:

"While the Mark II can provide data on the stress occurring in dialog, our experience to date shows that this is an exceedingly complex area. Patterns of stress reactions occur but, at present, we cannot be certain as to their meanings. Therefore, we do not believe that the Mark II or any other instrument currently available can analyze routine dialogs and determine deception based upon our present knowledge."¹⁷

He also stated that:

"... We just don't know enough to be able to truthfully say what the patterns of tension in dialog mean. And I am afraid anyone can find support for whatever interpretation he wishes to make from these patterns. This is very bad obviously."¹⁸

In an early paper on voice analysis validation, two researchers concluded:

"... For example, it has been suggested that someone might try to tape record a presidential news conference from the television coverage and determine if the president was lying. It would of course be possible to analyze the president's speech and one would also be able to detect the presence of psychological stress in it. But unless he volunteered to answer the questions from a structured interview, it would be impossible to determine if psychological stress derived from lying or other sources. Was the stress caused by a lie, an angry gesture from the crowd, an extraneous thought, or a gas pain? All could produce psychological stress."¹⁹

At these same hearings, the president of the voice analysis professional society, who is also a medical doctor, made this statement:

"Another charge that is made is that the Psychologic Stress Evaluator (PSE-1 or PSE-101) can and may be used in a clandestine fashion. It is true that tape recordings may be run in a clandestine fashion, in a face-to-face conversation, off the telephone, and off the television. However, without formal testing situations and structure, the only evaluation that you can achieve from these tests is that the individual you are talking to is stressing or they are not stressing. From this type of recording no type of truth evaluation could be undertaken. If a person is speaking with great emotion or conviction, the recording will show stress, as it should, mirroring that emotion or conviction."²⁰

Finally, the voice analyst who has now declared Patty Hearst to be innocent of all the offenses of which she is suspected reported to this Congressional subcommittee:

"The system, the PSE as a lie detector cannot be used without the knowledge of the individual because detection requires a very specific set of circumstances, which means a personal confrontation, the pretesting of you, the very rigid test of a section of test questions which must be reviewed prior to the test. . . You cannot conduct detection (of deception) tests surreptitiously. It is impossible with our equipment, to the best of our knowledge, or anyone else's equipment."²¹

These statements made to the Congress by the voice analysis group appear to conflict with the claims that have found their way into print in the popular press. In view of the inconsistent data coming from what are essentially the same sources, it seems difficult to decide if voice analysis of public statements works or not.

This brief overview of voice analysis has indicated that, while voice analysis appears to be scientifically based on involuntary psychophysiological phenomena, hard evidence that the voice analysis lie-detection technique is effective has not been introduced. It further seems that, at a minimum, much further testing and refinement will be required before voice analysis can be considered useful for military lie detection. Resolution of these problems does not seem to be enhanced by inconsistent statements made by the experts in voice analysis. Until a scientifically acceptable validity rate for voice analysis (that approaches the validity rate of the polygraph technique) is established and, until the boundaries are clearly established for what voice analysis can and cannot do, it does not seem reasonable that voice analysis for lie detection ought to be adopted by any of the military services.

Footnotes:

^LCraig Vetter, "The Lie Machine," <u>Playboy</u>, XX, 4 (April 1973), pp. 92-4, 102, 164, 166, 168, 170, 174.

²George O'Toole, "Lee Harvey Oswald Was Innocent," <u>Penthouse</u>, VI, 8 (April 1975), pp. 45-46, 124-127, 132.

³Hearings Before a Subcommittee of the Committee on Government Operations, House of Representatives, Ninety-third Congress, 2d Session, "The Use of Polygraphs and Similar Devices by Federal Agencies," Government Printing Office, Washington, D.C., 1974, p. 238.

⁴Advertising material for the Mark II Voice Analyzer, Law Enforcement Associates, Inc., 1975.

⁵Art Dworken, "Patty Hearst Not Guilty," National Enquirer, September 23, 1975, p. 5.

⁶Hearings, p. 429. ⁷<u>Ibid</u>., p. 429. ⁸<u>Ibid</u>., p. 428.

⁹Joseph F. Kubis, "Comparison of Voice Analysis and Polygraph as Lie Detection Procedures," Final Report Contract DAAD05-72-C-0217, U.S. Army Land Warfare Laboratory, Aberdeen Proving Ground, Maryland, August, 1973.

¹⁰<u>Ibid</u>., p. 31. ¹¹<u>Ibid</u>., p. iii. ¹²<u>Ibid</u>., p. iii. ¹³Hearings, pp. 301-310. ¹⁴O'Toole. ¹⁵Dworken. ¹⁶Hearings, p. 236. ¹⁷Hearings, p. 395. ¹⁸Hearings, p. 400. ¹⁹Hearings, pp. 292, 293. ²⁰Hearings, p. 332. ²¹Hearings, p. 350.

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A POLYGRAPH CONTROL QUESTION VALIDATION PROCEDURE

By

James Allan Matte

Introduction

As a Polygraphist employing the Backster Zone Comparison Technique¹ where reactions to relevant or crime questions are compared against those to the neighboring control or Probable Lie questions in determining truth or deception, I have always felt the need to validate the effectiveness of the Probably Lie in each examination, especially in cases where reactions are found only to the relevant questions. After all, we are assuming that the subject is lying to the control questions and that they are of sufficient concern to the innocent subject to dampen any concern he may have about the crime questions, even if they are somewhat threatening to him. Furthermore, since the probably lie question is designed to encompass behavior similar to that of the actual offense, it is apparent that in some offenses, control questions which can be developed may be rather narrow in scope and less probable as a lie than those more common, such as stealing.

If an examination produces charts which consistently show reaction to the relevant questions and a complete absence of reaction to the control questions² (also known as a "probably lie" or "known lie"³ in other polygraph techniques) it is generally assumed that these control questions were ideally formulated; therefore, the subject must be attempting deception to the relevant questions. However, what if the control questions were ineffective because the subject was not in his own mind lying to the control questions, or the lie was so trivial and the crime of which he has been accused of committing so grave, that the control question fails to capture the subject's psychological set? Is it possible that the innocent subject may consistently react to the relevant questions, which are somewhat threatening to him, and not react to the control question?

With this question in mind, I developed a procedure to verify the effectiveness of control questions with each subject prior to the actual examination. I offer this procedure as a possible answer to the dilemma cited above.

¹For a description of The Backster Zone Comparison Technique see "The Use of the Polygraph," Chapter 14, in Bailey, F. Lee & Rothblatt, Henry B. <u>Investigation and Preparation of Criminal Cases, Federal and State</u>. Rochester, New York: Lawyers Co-Operative Publishing Company, 1970.

²Reid, John E. & Inbau, Fred E. <u>Truth and Deception: The Polygraph</u> ("<u>Lie</u> <u>Detector</u>") <u>Technique</u>. Baltimore: Williams & Wilkins, 1966, pp. 19, 122, 127, 144 and 180.

³Arther, Richard O. "The Eight Known-Lie Question Principles," <u>Journal</u> of Polygraph <u>Science</u> 10 (3) (November-December 1975): 1-4.

*The author is a former Special Agent with OSI, USAF and CID, U.S. Army. He is a graduate of the Backster School of Lie Detection and a Member of the APA. Readers are invited to comment on Matte's Control Question Test (MCQT).

The Control Question Validation Test

- <u>SCOPE</u>: Used in specific type polygraph examinations employing the probable lie, known lie, or control question technique.
- <u>PURPOSE</u>: To provide the Polygraphist with a means of determining the effectiveness of the control questions to be used in the actual crime test. Further, to provide the Polygraphist with a truthful chart from the subject, dealing with issues of the same case intensity, as the actual crime, for comparison and assistance in the analysis of charts obtained in the actual crime test.

Definition of Terms:

Control Question: A polygraph test question designed to produce a reaction in the innocent subject; used in a polygraph examination for comparison with relevant or crime questions.

- Actual Crime Test: Polygraph testing regarding the specific issue(s) for which the subject was scheduled for an examination.
- Control Question Validation Test: Herein referred to as the CQV Test, polygraph testing regarding a fictitious⁴ crime of the same category and case intensity as the actual crime, designed to determine the effectiveness of the control questions to be used in the actual crime test.
- Stimulation Test: A test using numbers, numbered cards or money envelopes for the purpose of reassuring the innocent subject, stimulating the guilty subject, and determining minimum capability of response.

PROCEDURE:

Normally, the pre-test interview includes the gathering of personal data from the subject, an explanation of instrumentation, and then attentive listening to the subject's version of the incident for which he is being tested. It is at this point in the pre-test interview, when all information has been obtained from the subject, and the Polygraphist is ready to finalize the formulation of the relevant and control questions, that the CQV Test is introduced. At this time the Polygraphist informs the subject that a crime similar to the actual crime occurred in the same area and is also under investigation; the subject is a prime suspect for both. It must be noted that when formulating a fictitious crime it is necessary that it be of the same case category and intensity as the actual crime. In the case of a non-repeatable crime, such

⁴Page 32, <u>Truth and Deception</u>, John E. Reid and Fred E. Inbau, 1966, describes the use of a fictitious crime in a Guilt Complex Test for the overly responsive subject, usually administered after the third test; however, this test was not designed to verify the effectiveness of control questions and is administered only when subject gives pronounced, specific responses to both relevant and control questions in the actual crime test, or when behavior symptoms are inconsistent with recorded responses. It further does not provide the Polygraphist with a means of verifying and/or modifying the control questions prior to their use in the actual crime test.

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as the murder of one's wife, the Polygraphist's choice of fictitious crimes is more limited but nevertheless still feasible. For example, in such cases, the subject may be told that a few days prior to the death of his wife, a known "Hit" man was killed in a car accident not far from where Subject resides, and the police are attempting to determine the identity of the intended victim. At this time a fictitious name of the "Hit" man is furnished to the subject and he is asked if he has at any time contacted this man or contracted anyone to murder his wife. The foundation has then been laid for the CQV Test.⁵

The subject is then informed that he will be tested on this issue first¹ the Polygraphist then proceeds to formulate the relevant questions regarding the fictitious crime as well as the control questions. After all of the questions have been reviewed with the subject and he is ready for the examination, he is advised that a preliminary test must be conducted to insure that the instrument is adjusted to his sensitivity. At this point the stimulationtest is administered, and of course the subject is informed immediately of the results; satisfying him that the instrument works on him and is in fact adjusted properly. The Polygraphist should then proceed with the CQV Test.

A minimum of two charts and preferably only two charts should be run on the CQV Test. This procedure is to establish consistency throughout each examination. If only one chart is run on the CQV Test and two or more charts are run on the actual crime test, the innocent subject might become unduly upset or worried over the fact that it took only one chart to resolve the first issue but two or more charts to resolve the second or actual issue. Hence, the subject should always be told at the outset that two or more charts will be run for purity of tracing and consistency of response, and that analysis of the charts will be conducted only upon completion of all tests.

After completion of the first chart of the CQV Test, the Polygraphist should tear off the chart containing both the stimulation test and the first CQV Test, and leave the polygraph suite to another room where he can analyze his charts.

A review of the stimulation test should ideally reflect some reaction to the number selected by the subject to which he deliberately lied during the test. In addition to determining the subject's minimum capability of response, this test can provide guidance to the Polygraphist in making necessary mechanical adjustments, such as the degree of increase or decrease required in the Galvanic Skin Response sensitivity. In the event no response is found in any of the tracings, the Polygraphist has two courses of action to follow; if he administered a known-solution stimulation test, he may proceed with the CQV Test on the assumption that the subject failed to respond on the stimulation test because the question posed no threat to him. On the other hand, he should postpone the examination if he suspects that subject's failure to respond on the stimulation test is due to fatigue, use of drugs or other factors which will adversely affect the examination.

⁵See page 175 for an illustration of the use and results of the CQV Test in an actual examination.

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A review of the first CQV Test chart should indicate reactions to the control questions if they were ideally formulated, which would then indicate that the control questions are functioning as designed. If the CQV Test shows no reaction to the control questions and no reaction to the relevant, or fictitious crime questions, then obviously the control questions need to be changed. The Polygraphist should consider his training and experience to determine whether he simply needs to restrict or expand the age limitation prefacing control questions or to change the control questions complete by using alternate questions more fitting to the subject's background. It has been my experience that sometimes a mere re-emphasis of the control questions is sufficient to obtain the desired arousal on the control questions in the subsequent COV Test. I usually resort to this remedy when the control questions are functioning at less than full capacity: that is, the subject's psychological set is not fully on the control questions in the first chart of the CQV Test. After remedial action has been taken, the second CQV Test chart should be run to measure the effectiveness of the re-emphasized, ameliorated or changed control questions.

Should the first chart of the CQV Test reflect no reaction to the control questions but reflect reaction to the relevant question(s), this may indicate that the control questions were not formulated properly. Therefore the same remedial action as suggested above applies, excluding re-emphasis of the control questions which in this case are obviously ineffective. After remedial action has been taken, the second CQV Test chart should be run to measure the effectiveness of changed control questions.

In the event that subject continuously shows reaction only to the relevant questions in the CQV Test after all remedial action has been taken and at least two charts have been run, the subject should still be tested in the actual crime test. If the results show consistent reaction to the control questions, the most likely conclusion is that the subject is truthful regarding the actual crime questions. If, however, the results show consistent reaction to the relevant questions, the Polygraphist must call the results inconclusive, due to the lack of adequate control questions as demonstrated on the CQV Test.

After two charts have been obtained using the CQV Test, the subject should not be apprised of the results. The Polygraphist should immediately formulate and review the relevant questions dealing with the actual crime test. The reason for this procedure are three-fold. First, there may be several issues to cover in the actual crime test, each requiring a minimum of two charts. These tests must be administered with the first test having the combined greatest adequacy of information, case intensity and distinctness of issue. Since the subject is not apprised of the results until all tests regarding the actual crime have been conducted, it would be inconsistent for the Polygraphist to apprise him of the results of the CQV Test. Second, to apprise the subject of the results of the CQV Test immediately after the last chart has been run, would reduce the effectiveness of the control questions, inasmuch as the subject may feel that he was found to be truthful regarding the fictitious crime in spite of the fact that he lied to the control questions. The writer does not feel that advising the subject that he was truthful only to the relevant questions is sufficient to retain maximum effectiveness of the control questions. Third, I do not fear the possible lingering effect

of the fictitious crime on the actual crime test, by not apprising subject of the results of each test as they occur. The writer feels that for the innocent subject, for whom the actual crime has been especially traumatic, the fictitious crime should serve to divide or diminish the subject's concern over the actual crime which he did not commit, because of this new allegation, rendering the control questions more effective. Whereas, the guilty subject's concern would still be on the crime he did commit. An illustration of this effect was a case concerning an innocent subject accused of murder, who found his wife stabbed 12 times with part of the blade still in her chest. Obviously, when this subject was asked the relevant question "Did you yourself stab your wife?" he undoubtedly visualized the murder scene as he found it. Needless to say, control questions with enough threatening power to draw the subject's psychological set away from that traumatic "picture" are not easily developed. The fictitious crime would serve to draw subject's concern away from the actual crime, - that is, to weaken it, by offering the subject's psychological set a third threat to his well being. even though it is not included in the actual crime test, because it immediately precedes the actual crime test and he is not apprised of the results of the CQV Test. In short, the objective is to obtain good balance and consistency between the CQV Test and the actual crime test, so that credible comparisons can be made between the two.

I have noted that when introducing the fictitious crime to guilty subjects, they generally welcome the test, sometimes too readily, suggesting to the writer an attempt to delay the final outcome of the actual crime test. In not one instance, has the writer ever encountered a refusal or even a hesitation to answer fictitious crime questions, by either the guilty or innocent subjects.

After the relevant questions have been formulated and reviewed with the subject, the Polygraphist should then review the same control questions used in the CQV Test with subject giving them the same emphasis as the relevant questions. Of course this review should be followed by a review of other questions, <u>e.g.</u>, symptomatic, etc., as normally used in the technique employed. When all questions have been reviewed with the subject, he then is advised that a minimum of two charts will be run and the examination should proceed without delay.

After the first chart of the actual crime test has been run, the Polygraphist should leave the polygraph suite with all charts for the purpose of conducting a spot analysis to determine which questions show reaction and whether remedial action is necessary before continuing with a second chart. Obviously at this stage, the Polygraphist's concern is directed to the effectiveness of his relevant questions which he should have formulated in accordance with the rules of his technique. If this first chart reflects little or no reaction to the control questions and no reaction to the relevant questions, it may be assumed that the relevant questions have not been properly formulated; so changes must be made before a second chart can be conducted.

When the spot analysis reveals that all questions are functioning as designed or when all remedial action has been made, the Polygraphist then may proceed with the administration of a second chart. When the Polygraphist has obtained a sufficient number of charts showing consistency of response either to the control questions or the relevant questions, he has then achieved his objective.

As a practical matter, the addition of the CQV Test in a specific type examination requires basically two additional charts of approximately four minutes each; moreover, introduction of the CQV Test to the Subject plus the analysis of the CQV Test charts requires about another 20 minutes. Therefore, excluding the required pre-test preparation, only about one-half hour additional time is required to administer the CQV Test; a small price to pay for the results it provides.

<u>CONCLUSION</u>: The CQV Test provides for a determination of the effectiveness of control questions, allows the polygraphist to obtain a known truthful chart, and, moreover, provides the polygraphist with additional credibility when confronting a guilty subject with the results of both tests. More importantly, however, the polygraphist who uses the CQV can demonstrate the effectiveness of his control questions when requested to defend his polygraph examination in court.

Illustration of the CQV Test in a Verified Case

The following is an illustration of a verified polygraph examination in which the CQV Test was used.

The subject, a 21 year old male caucasian, was arrested late on evening along with two male negros. All three persons were attempting to elude two police cars, pursuing them based upon an anonymous tip that three men, one armed with a sawed off shotgun, were parked outside the Lilly White Tavern. The subject claimed that while returning home, he was forced at gunpoint to admit these two male negros into his car, and to drive them to the tavern in question. Further, that upon arrival of the police cars at said tavern, the subject was forced under threat of his life to elude the police. The subject admitted to his attorney that he was vaguely acquainted with one of the negros who had threatened him with the shotgun, due to the fact that the assailant's mother had rented a house from the subject's father. During the pre-test interview, the subject mentioned that the police inferred that he was probably a dope pusher.

The following tests were administered (only the control and relevant questions are listed below:

CQV Test:

Mild Relevant:	Regarding whether or not you are the person named "SKIP" who escaped a narcotic raid on 20 Jul 73: Do you intend to answer truthfully each question about that"
Control:	Between the ages of 16 and 20 - do you remember ever telling a serious lie?
Relevant:	Are you the person known as "SKIP" who escaped in a narcotic raid in Boston, NY on 20 Jul 73?

- Control: During the first 16 years of your life do you remember ever lying to hurt someone?
- Relevant: Regarding that narcotic raid on Samuel St., in Boston, NY on 20 Jul 73, were you on those premises at that time?
- RESULTS: Two charts were run. Strong and consistent responses to Control questions were present. No strong or consistent responses to Relevant questions.

ACTUAL CRIME TEST:

Target A

- Mild Relevant: Regarding whether or not John Fiction and Joe Noname forced their way into your car on the evening of 1 Nov 74: Do you intend to answer truthfully each question about that?
- Control: Same as in CQV Test.
- Relevant: Did John Fiction and Joe Noname force their way into your car?
- Control: Same as in CQV Test.
- Relevant: On the evening of 1 Nov 74, under threat of your life, did John Fiction and Joe Noname force their way into your car?
- <u>RESULTS</u>: Two charts were run. Strong and consistent responses were present on both relevant questions. No strong or consistent responses to the control questions.

Target B

- Mild Relevant: Regarding whether or not you were forced to speed away from the police on the evening of 1 Nov. 74: Do you intend to answer truthfully each question about that?
- Control: Same as in CQV Test.
- Relevant: Did John Fiction threaten you with a shotgun forcing you to speed away from the Police?
- Control: Same as in CQV Test.
- Relevant: At the time the police car approached your car, did you speed away under threat of your life by Fiction?
- <u>RESULTS</u>: Two charts were run. Strong and consistent responses were present on both relevant questions. No strong or consistent responses to the control questions.

FINAL RESULTS: The Subject was confronted with the results of CQV Test, and the results of Actual Crimes Tests A & B, whereupon he confessed he had lied to the police and his own attorney.

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THE POLYGRAPH AS SEEN FROM THE COURTHOUSE

By

James R. White, J.D.

Preface

Although no one has asked it, the thought has arisen that since most students of polygraph today, are in law enforcement, there might possibly be some interest in how a criminal defense lawyer could use the instruments and the techniques involved.

Perhaps the frustration of the serious student attempting to find precisely how the courts view the polygraph can best be illustrated by examining various court decisions. Most state courts treat polygraph as though it were an invisible phenomena which the court wishes did not exist. As a result of this the courts often pretend it does not.

In Florida, for instance the State's Supreme Court ruled that a defense motion for mistrial was properly denied when the arresting officer, responding to a prosecution question as to whether the defendant made any statement when arrested, said the man had asked for a lie-detector test.

After the defense counsel objected, this being out of the presence of the jury, the Judge sustained the objection. Later in the proceeding, with the jury present, the same question was asked and the same response was given by the police officer, at which time defense counsel once again objected and the Judge sustained the objection and ordered the jury to disregard the alledged statement made by the defendant. Upon being asked the same question again by the prosecutor as to what statements, if any, the defendant made upon being arrested, the officer, complying with the court rule, answered that the defendant made no statement at all. Thus we can see how one healthy policeman can manage to swallow one healthy polygraph when instructed to do so by the Court.

Another example of how the courts can treat the polygraph as though it never, in fact, existed occurred in a Michigan case captioned <u>People v.</u> <u>Mattison</u>, 26 Mich App 453. The court there held that the Trial Judge properly ruled that although the report of the polygraph examination, which had been prepared by a private examiner and was favorable to the defendant's claim of innocence, was introduced into evidence as a defense exhibit without objection by the prosecution, the Trial Judge was not obliged, as the trier of the facts, to treat such evidence as having any probative value. It is interesting to note that most evidencies which are not in fact objected to, do in fact become evidence even though if objected to they would have been excluded. Apparently in Michigan, the Appellate Court felt that the polygraph would be an exception to this widely accepted standard of admissibility of evidence.

It is perhaps excusable if laymen have some difficulty in deciding whether or not polygraph evidence should be admitted in the trial of a case when we see that learned Judges at the highest level quite often seriously disagree and court opinions provoke nothing but further confusion on the subject.

Perhaps this can best be seen in a New Jersey case entitled <u>State v.</u> <u>McDavitt</u>, 62 N.J. 36, where the defendant had been implicated in a breaking and entering by a co-defendant who had pleaded guilty and testified for the State. The co-defendant and another defendant had been arrested at the scene and in turning state's evidence, the co-defendant testified that McDavitt had planned the crime and was acting as a lookout at the time.

At the trial McDavitt took the stand in his own behalf and denied being involved in the breaking and entering and stated that he had not been with either of the co-defendants on the day in question. The third co-defendant, who had also previously pleaded guilty and had been sentenced, testified as a defense witness for McDavitt and corroborated his story. During McDavitt's testimony, he made reference to an offer that he had made while under arrest to take a polygraph test "to prove my innocence." This testimony was admitted over objection of the prosecution. When cross-examing McDavitt, the prosecutor asked him if he was still willing to take a polygraph test, at which time he said that he was. The Trial Judge informed McDavitt he had no obligation to take one and that usually the results are not admissible. Whereupon McDavitt conferred with his counsel and entered into a stipulation whereby a polygraph test would be administered and the results admitted into evidence.

A state police polygraph examiner, whose qualifications were not objected to by either side, conducted the test and indicated that the defendant had been deceptive and was not telling the truth about the breaking and entering and his part therein.

Once the trial began, defense counsel moved to exclude the test results stating that the test was improper and some of the questions were bad and arguing that polygraph results are not admissible in criminal trials. The Trial Judge denied the motion and stated that the defendant could not repudiate his stipulation. The jury subsequently found McDavitt guilty.

What is meant by learned judges disagreeing on material subjects of the polygraph took place when the Appellate division in New Jersey, which is an intermediate appeals court, reversed the conviction holding that it was "plain error" to have the jury consider polygraph evidence.

The highest court in the state, however, the Supreme Court of New Jersey, reversed the Appellate division, reinstated the judgment of conviction and held that the polygraph evidence admitted pursuant to a stipulation is admissible.

The jurisdiction of the State of New Mexico seems to indicate an active area for advocates urging admissibility of polygraph evidence in trials there. In 1974, in the case of <u>State v. Alderete</u>, 86 N.M. 176; that state's appellate court ruled that scientific recognition of polygraph tests have arrived on condition that the polygraph examiner be qualified and the test he uses be accepted by his profession with the added provision that the test must be reasonably precise to the issue to be resolved. Attorneys F. Lee Bailey and Henry B. Rothblatt, in a 1976 supplement to their book, "<u>Investigation and Preparation of Criminal Cases</u>" refer to three 1972 opinions, which were decided in three separate, distinct jurisdictions, separated by many miles and dealing with the issue of admissibility of polygraph evidence in United States District Court levels.

The first of these cases is <u>U.S. v. DeBetham</u>, 348 F.Supp. 1377. This case is from the United States District Court for the Southern District of California and was in an opinion written by Judge Thompson on September 8, 1972, rejected polygraph evidence proffered by the defendant, who was charged with transporting heroin from Mexico into the United States.

The main proffer was that the defendant had undergone a polygraph examination and had allegedly shown that he was not attempting to deceive the examiner when he answered carefully prepared questions relative to the material issues in the case. Judge Thompson's decision, a lengthy and wellthought out opinion, dealt mainly with the subject of whether the defendant had succeeded in demonstrating the reliability of polygraph evidence to the court.

The Judge referred continually to the landmark case of Frye v. United States, 293 F. 1013.

As most advocates of the polygraph are aware, the <u>Frye</u> decision, which was rendered in 1923, did much to retard judicial acceptance of polygraph evidence. The court in <u>Frye</u> found that the lie detection technique sought to be used in that case had not achieved "general acceptance in the particular field in which it belongs." The technique, of course, referred to in Frye was the Marston Sistolic Blood Pressure Deception Test and relied only on the one channel of activity rather than the more sophisticated, multiple channels, including GSR and pneumograph, in addition to the cardio function.

Although Judge Thompson's decision not to permit the defense use of unstipulated polygraph examination was apparently based on the failure of the defendant to comply with the dictates of Frye in demonstrating the "general acceptance," some of the language used by the learned Judge, seems to indicate the usual judicial reluctance to do what judges fear may be done by the polygraph -- namely, usurping the jury's function of determining the truthfulness of a witness.

Judge Thompson, in his decision, quoted from District Court Judge Kaufman's decision in <u>State v. Smith</u>, ll Ohio App, 461, in discussing the jury's function, Judge Kaufman stated, "It is the basic premise of the jury system that twelve men and women can harmonize those variables and decide, with the aid of examination and cross examination, the truthfulness of a witness . . . I am not prepared to rule that the jury system is as yet, outmoded. I still prefer the collective judgment of twelve men and women, who had sat through many weeks of a trial and heard all of the evidence on the guilt or innocence of a defendant."

Thus it can be said that judges traditionally jealously guard the sanctity of the jury system and are often repelled by any attempts to have the truthfulness of a witness or an issue decided by a scientist such as a polygraph examiner. It is ironic that the same judges regularly permit testimony of psychiatrists, fingerprint experts, handwriting analysts and other forensic experts. These experts regularly make judgments and testify on matters which are vital to the truth or falsity of the issues to be determined in a case.

It is likewise ironic that while the District of Columbia Circuit was deciding the Frye case in 1923, Dean Wigmore, who is the author of many recognized texts dealing with the subject of evidence and the admissibility thereof, was declaring "If ever there is devised a psychological test for the evaluation of witnesses, the law will run to meet it." Wigmore, <u>Evidence</u> (2d Ed. 1923)§ 875.

Although Judge Thompson did not run to meet any test in the DeBetham case, better things were being decided in October of 1972, by Judge Joiner in the United States District Court, Eastern District of Michigan, Southern Division, in the case of <u>United States of America v. Richard Ridling</u>, 350 F.Supp. 90. Perhaps this case takes on added importance due to the fact that it was alleged that the defendant had made statements under oath to a grand jury, which he knew were false. The indictment charged perjury. As part of the defense, Ridling indicated his intention to offer testimony of one or more polygraph experts who have tested him and found him to be non-deceptive on the issue of his testimony before the grand jury.

After the motion offering this testimony had been filed by the defense, the Court ordered a pre-trial evidentiary hearing on the admissibility of the test and the opinions of the polygraph experts. The Court heard evidence in the case from experts on the use of polygraph to establish the value and reliability of the test and the evidence adduced at that hearing included:

- 1. the basic theory of the polygraph;
- 2. the reliance on the polygraph by government agencies;
- 3. the reliance on the polygraph by private industry and
- 4. the comparative reliability of the polygraph and other scientific evidence, such as fingerprint and ballistic evidence;
- 5. the opinions of the experts as to whether polygraph evidence would be a valuable aid in connection with the determination of the issues, such as the one facing the court in the Ridling case and in the administration of justice.

In a very scholarly opinion, Judge Joiner commented on the widespread use of the polygraph in police departments and in other areas and discussed also the rules of evidence and the question of self-incrimination and hearsay, all of which had to be considered in the final determination as to whether polygraph evidence would be admitted.

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Ultimately, the Judge ruled that the evidence of the polygraph experts and their opinions will be admitted subject to six terms and conditions:

1. The parties will meet and will recommend to the Court three competent polygraph experts other than those offered by the defendant.

2. The Court will appoint one or more of the experts to conduct a polygraph examination.

3. The defendant will submit himself for such examination at an appointed time.

4. The expert appointed by the Court will conduct the examination and report the results to the Court and to counsel for both the defendant and the government.

5. If the results show, in the opinion of the expert, either that the defendant was telling the truth or that he was not telling the truth on the issues directly involved in the case, the testimony of the defendant's experts and the court expert will be admitted.

6. If the test indicates that the examiner cannot determine whether the defendant is or is not telling the truth, none of the polygraph evidence will be admitted.

There was one final proviso and that is that if the defendant declined to participate or cooperate in the test ordered by the Court, then none of his polygraph evidence would be admitted into evidence. This, it would seem, was a decision which had built in all of the safe guards which should be utilized in the admissibility of polygraph evidence and in the opinion of polygraph advocates, was a long step toward establishing the right of polygraph experts to testify in pending court matters.

Just four days following the opinion of Judge Joiner, the United States District Court for the District of Columbia in the case of <u>United States of</u> <u>America vs. Errol Zeiger</u>, 475 F2d 1280, ruled in favor of polygraph testimony.

That court, speaking through Judge Parker, ruled that a defendant who was charged in a multi-count indictment with assault with intent to kill while armed and related offenses, could introduce the results of a polygraph examination administered to him about two weeks after the alleged commission of the crimes by Lieutenant Hamilton W. Shoop, who was then a member of the metropolitan police department.

Over several days of hearings, the defendant submitted expert testimony, which was intended to establish the foundation for the admissibility of the testimony of Lieutenant Shoop regarding the polygraph examination.

Judge Parker ruled that the defendant, had, in fact, overcome the barriers which courts have established since the 1923 decision in <u>Frye v. U.S.</u>

and stated that the defendant was able to prove the general acceptance and reliability of the polygraph. A random examination of various jurisdictions throughout the country establishes a variance in the pattern of acceptability of the polygraph in courtroom evidence.

Not only do the courts talk of the admissibility of test results but an equal amount of litigation has been devoted to statements regarding the defendant's willingness or unwillingness to submit to a polygraph examination and the courts are divided even about this abstract issue.

In Kentucky, for instance, in a case of first impression, the Kentucky Court of Appeals upheld a lower court decision which denied the defendant the right to introduce into evidence, a written offer made by him to submit to a lie-detector test. "In the first place, we have recognized that polygraph test have not attained sufficient scientific recognition of dependability and reliability to make admissible in evidence, the results of such a test." the Court cited, and continued "this being true, an offer to take such a test (or refusal) has no evidentiary significance whatsoever." <u>Penn v.</u> <u>Commonwealth</u>, decided June 30, 1967. The Court in this <u>Penn</u> case, added that "While this question has not been heretofore passed on in this State, other jurisdictions consistently have rejected evidence tending to establish that an accused was either willing or unwilling to take a lie-detector test." (See 95 ALR 2d, 819).

On February 9, 1968, the Michigan Supreme Court granted a new trial to an inmate named Frechette, who had been convicted of murder in 1935. The basis for the granting of a new trial involved the fact that in 1935 Mr. Frechette had evidence admitted against him that he had undergone a lie-detector test. The Supreme Court noted in its 1968 opinion that there were fifteen pages of testimony supporting the reliability of such tests and an expert's statement that he did have an opinion concerning the truthfulness of the defendant. The jury in the 1935 trial heard that a polygraph examiner had in fact, administered a test to the defendant but was not permitted to hear what the expert's opinion was as to the truthfulness of the defendant. Looking at the transcript thirty-three years later, the Michigan Supreme Court said that this was sufficient error to grant Frechette a new trial. It is interesting to note that the Michigan Supreme Court remarked time and time again that the use of polygraph test results in this jurisdiction "is clearly inadmissible."

In 1969, the Maryland Court of Special Appeals, in a question of first impression in this State, stated that the rule against admissibility of polygraph results "is a soundone." The Court went on to say that "Liedetector tests have not yet attained sufficient scientific acceptance as a reliable means of ascertaining truth of deception (Rawlings v. State, Md. Ct. Spec. App. 9969).

A similar position was taken by the New York Court of Appeals in the case of <u>People v. Leone</u>, decided on December 11, 1969. In that opinion, the New York Appellate Court stated that results of lie-detector tests still have no place in the courtrooms of New York. The court commented that numerous authorities reject the contention of some polygraph proponents that lie detectors "are ninety-five per cent accurate." The Court stated that the lie-detector techniques utilized had "many shortcomings." On the question of whether a person's physical reactions can be said to indicate reliably whether he is telling the truth, the Court commented "The record before us does not adequately establish the reliability of the test to be admissible in evidence." The criterion for interpretation of the test chart has not yet become sufficiently definite to be generally reliable so as to warrant judicial acceptance; nor can it be said that the examiner's opinion demonstrates reasonable certainty regarding the accuracy of the polygraph test in most instances.

The New Mexico Court of Appeals in 1970, ruled that a defendant who submitted to a polygraph examination and had stipulated that its results would be admissible, could not complain when such results of the test and the examiner's opinion as to truthfulness were in fact admitted, since there had been no objection by defense counsel to the admissibility. In the case of Chavez v. State, N.M. Ct. of App., 12/18/70, Judge Oman noted that the defendant had not been given Miranda warnings but had agreed that he would take a polygraph examination and that the examiner's interpretation of the results would be admissible into evidence. When the examiner testified in Court, there was no objection to his giving the results of the test and the interpretation of the examiner of the evidence. It was only after the expert had testified that an objection was raised dealing with the argument that the results of the polygraph should be rejected since the polygraph "has not gained general acceptance in the particular field in which it belongs." The Court did indicate in its opinion that had Chavez or his attorney objected to the results and interpretations by the examiner, the results probably could have been kept from the jury, but since no objection was made, the defendant waived the rights he had to introduction of evidence of the matters he now claims were self-incriminating.

A similar type of waiver situation was decided by the Supreme Court of Alaska in the case of <u>Pulakis v. State</u>, 11/9/70, when the defendant in that case not only failed to object to the qualifications of the examiner and the results of the polygraph examination administered by a police sergeant, but in fact introduced the question of polygraph tests himself in the questioning of prospective jurors prior to the trials' outset.

The Alaska court seemed to indicate that the defendant had brought the results of the test upon himself and that the fact that the police sergeant was able to testify that as a result of the examination, he found that the defendant had been deceptive in certain material fields could not be the grounds of a valid complaint by the defendant since there was no objection to the test results or the qualifications of the examiner.

The court itself expressed skepticism throughout the opinion in stating that ordinarily "Lie-detector results should not be admitted into evidence even in the absence of an objection." It was only in the peculiar circumstances of the Pulakis case that the Court felt that the defendant had brought any complaint or difficulty upon himself by introducing the subject matter himself.

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The court did pay token tribute to the polygraph saying that "The central problem regarding admissibility is not that polygraph evidence has been proved unreliable, but that polygraph proponents have not yet developed persuasive data demonstrating its reliability." Thus they seem to be reaf-firming the court decision of Frye.

The Supreme Court of Virginia restated the unreliability aspect in its opinion in the case of <u>Skinner v. Commonwealth</u>, Va. Sup. Ct. 10/11/71/

In its opinion, the Court stated that lie-detector evidence, whether offered by the state or defense, is still inadmissible in the courts of Virginia. Skinner was a defendant convicted of rape who unsuccessfully fought to offer lie-detector evidence at his trial, which he claimed would clear him. The Supreme Court of Virginia referred to earlier opinions holding that the polygraph hasn't yet been proven scientifically reliable and that Skinner had not shown anything additional to compel the Court to change its stated view.

On May 31, 1971, the Supreme Court of the Commonwealth of Pennsylvania underlined its earlier rulings that results of polygraph examinations in the absence of stipulation, are inadmissible as evidence in court. In the case decided that day, that of <u>Camm v. Commonwealth</u>, Judge Pomeroy writing for the majority cited the fact that once again, waiver by defense counsel had been responsible for certain polygraph evidence being heard by the jury.

In that case the defendant had been given a polygraph test and on cross examination, the examiner was asked what occurred between the time the defendant took the polygraph and the time that he made a statement to police.

The witness indicated that one of the things that occurred is that he had told the defendant that "son, you're in trouble." And further went on to say he advised the defendant to get a lawyer. Defense counsel later complained that this had an unfavorable effect and had the effect of having the jury perhaps infer that the results of the polygraph examination were prejudicial and adverse to the defendant's best interest. Since the polygraph charts and results were offered into evidence by the defendant's own counsel, the Supreme Court refused to grant a new trial and set aside the conviction. It is interesting that even in the light of the aggravated circumstances complained of, two members of the Court, Judges Eagen and Roberts dissented and stated that the events were so prejudicial that they would order a new trial.

It is interesting to note that in 1973, there was a bill introduced in the California State Senate and submitted to its Judiciary Committee, which would have permitted the admissibility of polygraph results in judicial proceedings. The legislation represented the first time that any legislative body in the country had attempted to permit the introduction of polygraph evidence in judicial proceedings and aimed at setting out orderly procedures to govern the admissibility. The bill provided that the Court still had the discretion to permit or refuse to permit the results of polygraph examinations in all judicial proceedings. The bill further provided that the Court might exclude the results of a non-party witness regarding polygraph results where the evidence was "cumulative or otherwise a wasteful consumption of time."

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The bill would have provided that the party desiring to submit polygraph result evidence would give thirty day notice to the opposing party and after service upon opposing party, the Court could, upon motion of opposing party, require the submission of the subject to a polygraph expert of the choosing of said opposing counsel.

Although the California bill was not successful in passage, it did mark one small step forward for proponents of polygraph result admissibility.

Of course, 1972 was the year in which the McDavitt, Zeiger and Ridling cases were decided and these have already been discussed in the earlier part of this project paper.

In 1973, two federal prisoners attempting to utilize the Court's opinion in <u>U. S. v. Ridling</u>, demanded that polygraph examinations be given so that they might defend against the charge that they escaped from a federal prison and assaulted deputy marshalls who had them in custody.

The Fifth Circuit of the U.S. Court of Appeals found no error in the trial court's refusing to authorize the polygraph examinations. The defendants maintained that they escaped from the marshalls by means of bribe offers rather than assault. Fifth Circuit stated "Where a trend may be emerging toward loosening the restrictions on polygraph evidence . . . the rule is well established in federal criminal cases, that the results of lie-detector tests are inadmissible . . . " This was the opinion in the case of <u>U.S. vs. Frogge</u>, decided April 11, 1973.

The United States District Court for Central California speaking through Judge Gray ruled that although the Court was convinced of the polygraph's general worth, that after three days of scientific evidence in the case of <u>U.S. vs. Urquidez</u>, the Court found that the evidence in that particular case contained too many variables in lie-detector administration and evaluation - to say nothing of its in-court interpretation - to make such tests admissible as evidence. In that case a female defendant charged with two sales of heroin to a narcotic agent, claimed that she had been entrapped by the agent obtaining sexual favors from her in order to induce her to make said sales. She prof-fered evidence that she had undergone a polygraph examination and stated that the results of said examination would in fact show that she was telling the truth about the entrapment claim.

The prosecution objected to the admissibility of the lie-detector evidence proffered and further countered that they could produce an expert witness who would show the results of the specific polygraph test being proffered were unfavorable to the defendant. The Court, in a lengthy opinion, stated that in light of the controversy, that various expert witnesses testifying on different sides of the same subject matter, would probably result in more confusion than enlightenment and refused to admit the results of the test.

The State of Texas, in an opinion by its Circuit Criminal Appeals Court in <u>Romero v. State</u>, decided April 18, 1973, rejected the use of lie-detector test results due to their unreliability. In a case of first impression for that Court, Judge Onion speaking for the Court, ignored the fact that there had allegedly been a stipulation by both defense and prosecution that a polygraph would be administered and its results would in fact be admissible.

Following the administration of the test, but prior to trial, the defendant filed a motion to prevent the State from using the results of the test, contending that contrary to the stipulation, the polygraph examiner was not qualified and that further the defendant had been given methadone prior to the administration of the test when he was not supposed to be given any drugs for forty-eight hours prior thereto.

In a sweeping opinion, the Judge refused to go into the question of the validity of the stipulation and quoted from the opinion of the Alaska Supreme Court in the Pulakis case, which has already been discussed herein, in stating that the results of polygraph tests "should not be received into evidence, over objection, regardless of whether they are admitted by stipulation or not." The stipulation does nothing, according to the Texas court to enhance the reliability of the evidence being offered by either side or the guilt or the innocence of the accused.

On November 14, 1974, the New Jersey Superior Court, in <u>State v. Godfrey</u>, upheld the position that the administration of a polygraph examination by law enforcement officials is testimonial in nature and therefore required that the defendant be given Miranda warnings as well as other rights explained in waiver form.

In that case the State unsuccessfully argued that the defendant voluntarily presented himself at the police station and likewise voluntarily submitted to the polygraph test, and was free to leave following the conclusion of it, therefore he was not in custody. The New Jersey court, in rejecting such argument, stated that such an examination was in fact accusatory in nature and was tantamount to an in custodial interrogation, therefore the defendant should have been warned that anything that he said could be used against him and therefore the Court reversed the conviction.

The New Mexico Court of Appeals on February 12, 1975, in the case of <u>State v. Dorsey</u>, clarified its decision of one year before in <u>State v. Lucero</u>, 526 T2d 1091, in ruling that the five part test governing the admissibility of polygraph results was in fact, not applicable in the Dorsey case since three prongs required the establishment of the operator's qualifications and expertise, the validity of the testing procedure employed, and the validity of the test with respect to the individual suspect. In Dorsey there had been a stipulation, and since neither party objected when the results were offered at trial, the three prongs referred to above were inconsistent with the stipulation. Since the New Mexico court had already ruled that polygraph results were admissible where stipulations occurred on both sides, the court reversed the conviction in Dorsey and stated that the trial court should have admitted into evidence, results of the polygraph proffered by the defendant.

It is interesting to note that the Justice Department's Criminal Division, although it approves the use of polygraph examinations by federal investigative agencies in limited circumstances, opposes the introduction of polygraph evidence into federal trials.

Testifying before the Foreign Operations and Government Information Subcommittee of the House Committee on Government Operations, Henry S. Dogin, then Assistant Attorney General of the Criminal Division, explained that relatively few polygraph examinations were given in connection with matters under the prosecutive supervision of the criminal division. He said that they are given by various federal investigative agencies in conjunction with their investigations of alleged criminal violations. In sensitive cases, the criminal division or a U.S. Attorney's Office, might ask the agency involved to conduct a polygraph examination of a key witness or potential defendant provided such persons consent to the examination.

Overall, he stated that the Department believes that the polygraph has proved to be a useful adjunct in the normal interview and interrogation. In particular, he cited its usefulness in screening members of closed groups with access to property that was stolen or embezzled or an informant screening device to prevent unnecessary investigative efforts.

In his testimony, however, Dogin, stressed that the department continues to oppose the use of polygraph results at trial and stated that United States Attorneys throughout the country are instructed not to seek the admission of such results. In his testimony given in May of 1975, Mr. Dogin attacked the reliability of polygraph and stated that polygraph results could not be viewed with the same equanimity as the results of forensic tests, such as fingerprints, ballistics and blood tests, because there is no specific physiological reaction indicative of deception. He disputes the claim of proponents that polygraph results are eighty to ninety per cent or even higher accurate. He says that these statistics are open to challenge because of the difficulty in obtaining independent corroboration of the results of the vast majority of examinations. As far as can be observed, the policy announced by Mr. Dogin in 1975, is apparently still very prevalent in most jurisdictions. This is proven by the fact that in a very, very small number of cases, United States Attorneys request any polygraph evidence and in those cases where polygraph evidence is proffered by the defense, it is generally followed by vigorous objection by the United States Attorney's Office.

In May of 1975, the Massachusetts Supreme Court ruled that it was reversible error for a trial judge to offer the defendant an opportunity to take a lie-detector test with the stipulation that if he passed it, the verdict would be "not guilty" and if not the verdict would be "guilty."

The Appellate Court in the case of <u>Commonwealth v. Howard</u>, criticized the trial judge for making such an offer and said that the proceeding "failed to afford the appearance of justice and thus was incompatible with the dignity of the court. . . While we accept the trial judge's statement that the defendant's refusal to take the test made no difference to the outcome of the case . . . we are not convinced that the proceedings as a whole have the appearance of fairness and impartiality necessary to our judicial system." The Appellate Court added that it was reaffirming its finding in a recent decision of Commonwealth v. A Juvenile, 313 N.E.2d, 120, in stating that

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"We do not mean to preclude the use of polygraph evidence where it would otherwise be appropriate." It merely cited that in its opinion, it was not appropriate in the Howard case.

Another New England Supreme Court, that of the State of Maine, on July 22, 1975, reaffirmed its earlier ruling that "Not only are polygraph tests inadmissible, but also that the evidence that a defendant agreed to take a polygraph test, or refused to do so, is not admissible."

In the case of <u>State vs. Bowden</u>, the Maine Supreme Court did allow admissions of guilt which had been obtained from the defendant while he was taking a polygraph test. The Court's reasoning was that the defendant had received sufficient warnings against self-incrimination beyond a reasonable doubt, which showed that the statements so obtained were voluntary irrespective of whether or not they were obtained during ordinary interrogation or interrogation while being tested by a polygraph examiner.

In its most recent decision, the Court of Appeals of Maryland, in the case of Johnson vs. State, ruled that the fact that an individual had undergone a polygraph examination, must be made known to the jury, where the prosecution is attempting to introduce a confession that was obtained subsequent to the giving of the test.

The High Court's logic was based on the fact that the test itself, or the offer to administer the test and the acceptance of the defendant in taking same is proper ground of inquiry for a jury to make a determination as to whether the offer and acceptance were coercive in nature and whether such alleged coercion led to the making of a statement. If the jury feels that coercion was involved, then of course the confession is not voluntary and should not be admitted. The reverse, of course, is true.

Although the cases cited are not intended to be all inclusive, they are indicative, it is respectfully submitted, of the progress, or lack thereof, of proponents of polygraph admissibility over a given period of time.

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Source Material: Acknowledgement that research for this paper was obtained from the various federal and state appellate reports referred to, as well as information contained in the "<u>Investigation and Preparation of Criminal Cases</u>," both Federal and State, by F. Lee Bailey and Henry B. Rothblatt, and the 1976 Supplement thereto, as well as the various editions of the Criminal Law Reporter, edited by the Bureau of National Affairs and distributed in looseleaf form weekly.

POLYGRAPH REVIEW

By

Bobby J. Daily and Ronald E. Decker

How would you score on a licensing examination? Are you sufficiently up-to-date about such subjects as psychology, physiology, instrumentation, test question construction, chart interpretation, interview techniques, etc? Are you prepared to undergo direct and cross-examination on polygraph subjects in court? A score of 9 or 10 is excellent, 7 or 8 is good, and below 7 may indicate some review is warranted. The review in this issue is on polygraph functions and maintenance. The assistance of Mr. Ronald E. Decker in the preparation of this review is acknowledged and appreciated. (Answers are on page 155.)

- 1. During a polygraph examination, it is noted that the cardio pen movement is sluggish and jerky. What is the most common cause?
 - a. The cardio pressure is too low.
 - b. The cardio pressure is too high.
 - c. There is a loose or dirty jewel bearing.
 - d. The sphygmomanometer is defective.
- 2. The approximate length of a roll of standard six inch chart paper is:
 - a. 50 feet.
 - b. 75 feet.
 - c. 100 feet.
 - d. 125 feet.
- 3. You have disassembled your three channel instrument. In replacing the recording units in the panel, care should be taken in their alignment. Proper alignment of these three units may be accomplished with:
 - a. the repositioning of the seven inch pen.
 - b. the community inkwell.
 - c. the allen alignment bar.
 - d. a standard calibrator.
- 4. When examining a subject with a high level of resistance, how should you adjust the GSR sensitivity control?
 - a. Low, in order for the subject's high resistance to compensate for the low setting.
 - b. High, because it is necessary to adjust the sensitivity of the GSR recording unit to the subject's resistance.
 - c. Medium, for this setting allows the subject's resistance to fluctuate without the usual, but reliable, overload reaction.
 - d. None of the above, as the sensitivity control merely controls the amplitude of the GSR pen tracing.

- 5. To prevent possible damage to the instrument prior to handling the pneumo chest assembly, you must insure that:
 - a. the vent is open.
 - b. the vent is closed.
 - c. the beaded chain is securely attached to the tube.
 - d. the lock record bar is in the "lock" position.
- 6. (T) (F) The length of the centershaft within the pneumo recording unit determines the sensitivity of the pneumo tracing.
- 7. (T) (F) A non-electronic cardio recording unit has an enosed bellows.
- 8. (T) (F) The pen centering control of the pneumo recording unit actually moves the bellows.
- 9. (T) (F) The lock/record bar assembly of a cardio recording unit comes in direct contact with the pen cradle.
- 10. (T) (F) Sensitivity of the cardio and pneumo recording units are increased by moving the adjustable fulcrum, causing the drive shaft to be moved away from the center shaft.

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MEASURES FOR PSYCHOLOGICAL ASSESSMENT:

A GUIDE TO 3,000 ORIGINAL SOURCES AND THEIR APPLICATIONS

by Ki-Taek Chun, Sidney Cobb and John R. P. French, Jr. Ann Arbor, Michigan: Institute for Social Research

A REVIEW

Norman Ansley

Although there is no mention of the polygraph technique, this work is invaluable to the practitioner who is searching for a psychological test to serve a specific purpose. Most psychologists know of only the more popular tests, those readily available and frequently cited in the literature. However, there are thousands of tests which may be qualitatively better than the popular measures, or more directly suited to the psychologist's needs.

The Institute for Social Research of the University of Michigan (Box 1248, Ann Arbor, Michigan 48106) has a computerized national repository of social science measures, and this book is a product of that collection. It is cross referenced by topics, and contains notations on where the tests have been used, in addition to the usual entries on authors, publishers and sources. The first of the volume's sections lists the original sources for each of the tests. The second section cites and annotates all of the studies in which each measure was subsequently used. The book includes material from 26 measurement related journals in psychology and sociology for the period 1960 through 1970.

- 5. To prevent possible damage to the instrument prior to handling the pneumo chest assembly, you must insure that:
 - a. the vent is open.
 - b. the vent is closed.
 - c. the beaded chain is securely attached to the tube.
 - d. the lock record bar is in the "lock" position.
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INTERACTION RITUAL: ESSAYS ON FACE-TO-FACE BEHAVIOR

By Erving Goffman. New York: Anchor Books, Doubleday and Company, 1967, 270 pp., \$2.70, paperback.

A REVIEW

Norman Ansley

The book is a collection of six papers on interaction which deal with the social organization of contacts, especially spoken ones. The focus is on social ritual and the nature of self must have if its possessor is to give and receive civilities, discourtesies, and other interpersonal gestures. "I assume," Goffman writes, "that the proper study of interaction is not the individual and his psychology, but rather the syntactical relations among acts of different persons mutually present to one another. None the less, since it is individual actors who contribute the ultimate materials . . . a psychology is necessarily involved, but one stripped and cramped to suit the sociological study of conversation, track-meets, banquets, jury trials, and street loitering."

Goffman is concerned with the time span of conversation, the space, restrictions, ritual properties of persons, and the egocentric forms of territoriality. The behavior materials are the glances, gestures, positionings, and verbal statements that people continuously contribute to a meeting, intended or not.

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NEW FILMS TO HELP PREPARE CRIMINAL CASES

In fighting crime, winning all the battles and still losing the war is an all too real possibility admits Patrick Healy, executive director of the National District Attorneys Association. Improved training and enhanced technology are helping law enforcement officers do a better job of solving crimes and apprehending the perpetrators, he states, but many times the most important battles are lost in the courtroom because of a prosecutor's error or lack of knowledge.

This is anything but an indictment against the 6,500 district attorneys and other prosecutors belonging to the national association, Healy adds. "Our legal education system does a much better job of preparing attorneys on both sides of civil suits," he contends. "There is simply very little in the legal literature that effectively guides an inexperienced prosecutor through getting information into evidence. As a result, errors are made and considerable evidence is never heard by juries."

The National District Attorneys Association is now taking a giant step towards bridging that education gap, he continues. Funded with a grant from Law Enforcement Assistance Administration (LEAA) under the auspices of

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Each film is a 15 to 20-minute dramatization of an actual situation, using real judges, attorneys and prosecutors with professional actors playing the roles of witnesses and the accused. Every film begins with a brief restaging of the crime, and then advances to a courtroom where the prosecutor goes through the legal procedure. One film deals with drug identification and chain of evidence, another with lineup identification, a third on hearings for competency to stand trial and a fourth on preliminary hearings for armed robbery.

"What made the movie medium really viable for use," Schmidt says, "was the advancement of small-format -- super 8 sound film -- technology. While we think that law schools, seminars and other places where large numbers of prosecutors are gathered will use larger format films, our main objective was to put this information into the hands of every prosecutor in a way that it could be used at a moment's notice."

Developments in super 8 sound film technology have made this possible, he explains. The initial eight films are being sold in a package along with a Kodak Supermatic 60 sound projector for the association by Motorola Teleproductions, Inc.

The projectors sold with the package are cartridge-loading and easy to use, Schmidt says. "All the attorney has to do is pull the cartridge he or she wants to vse from the office's law library and place it into the projector. The machine can be used in room light because of a built-in, highgain projection screen that yields a bright, sharp image.

"This is an important feature," Schmidt continues, "because it allows the attorney to take notes of cross-reference texts while viewing the film. Furthermore, the single-level control permits stopping on any frame or reviewing any part of the film instantly. And at the end of the film, the projector rapidly rewinds itself."

The movies are being produced by Worner Films in Miami, Florida, on a new 16 mm color negative film made by Eastman Kodak Company. Color release prints are being made both in 16 mm and super 8 sound formats.

All told, some 60 additional films are planned over the coming five years.

Further	information	may be	be	e obtained	from:	Motorola Teley 4825 N. Scott Suite 26	programs, Street	Inc.
					Schiller Park	, Illinois	60176	

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