VERBAL AND NONVERBAL CLUES TO TRUTH AND DECEPTION DURING POLYGRAPH EXAMINATIONS

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VERBAL AND NONVERBAL CLUES TO TRUTH AND DECEPTION DURING POLYGRAPH EXAMINATIONS

By

Frank S. Horvath

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ABSTRACT

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The behavior of one hundred polygraph subjects, fifty known truthful and fifty known lying, was analyzed to determine whether their behavior provided clues to the subject's actual truthfulness and deception. The behavior studied was broken down into three categories: elicited verbal behavior, spontaneous verbal behavior, and nonverbal behavior.

Elicited verbal behavior was defined as the subject's verbal answers to each of fourteen structured pre-test interview questions. A significant number of the truthful subjects answered ten of these questions with answers, which, according to accepted theory were answers typically given by truth-tellers; a significant number of the lying subjects gave answers typical of liars to six of the questions. Only three of the interview questions were found to be significant discriminators between the truthful and lying subjects.

Spontaneous verbal behavior was defined as those comments, requests, and complaints which a subject makes during a polygraph examination without direct prompting from the

examiner. The hypothesis that lying subjects exhibit spontaneous verbal clues more often than truthful subjects was found to be correct.

Nonverbal behavior was defined as the subject's demeanor and appearance during the examination. It was hypothesized that the subjects would exhibit nonverbal behavior, which according to prior research was more typical of their actual classification (truthful and lying) more often than nonverbal behavior which was, according to prior research, not typical of their actual classification. The hypothesis was found to be correct; a significant number of the truthful subjects more often appeared as "truth-tellers" than "liars"; whereas, a significant number of the lying subjects more often appeared as "liars" than as "truth-tellers."

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DEDICATION

To My Parents

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INTRODUCTION

THE PROBLEM

Polygraph examiners frequently disagree about whether or not judgments concerning a polygraph subject's behavior should be used in making truth or deception decisions. On the one hand, some examiners insist that behavior judgments should not be used at all. They insist that behavior is too evanescent and impalpable to be objectively studied. These examiners wish to replace behavior judgments with a total reliance on physiological concepts, which they feel to be more substantial. They maintain that polygraph record analysis, unsupported by behavior judgments, is "pure lie detection." Thus, the proponents of this method liken the polygraph examination to a mathematical procedure wherein any subjectivity is eliminated.[1]

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[1]See for example: U.S., Congress, House, Committee on Government Operations, Foreign Operations and Government Information Subcommittee, Use of Polygraphs as "Lie Detectors" By the Federal Government, Hearing, 89th Congress, 2nd Sess., April 7, 8, and 9, 1964, Part 1, Panel Discussion with Private Polygraph Practitioners (Washington: Government Printing Office, 1964), esp. pp. 33 and 91, testimony of Cleve Backster; and, see: Cleve Backster, "Lie Detection Comes of Age," Law and Order, date and page unknown, reprint supplied to the writer by Mr. Backster, January, 1970.

On the other hand, some examiners maintain that while judgments of a polygraph subject's behavior should not be used to make truth and deception decisions, they should be used to reinforce polygraph record analysis.[2] These examiners have intuitively developed techniques to elicit and observe behavior and to relate what is observed to the record analysis. The combined use of record analysis and behavior judgments is said to make the polygraph examination a diagnostic technique in which all factors of the subject and inquiry at hand are studied in terms of truth and deception. This technique is likened to medical or psychiatric examinations, wherein both subjective and objective means of evaluating physical and mental well being are used.

STATEMENT OF PURPOSE

The purpose of this study is to determine whether the verbal and nonverbal behavior of polygraph subjects provide valid clues to the subjects' truthfulness and deception. In this study the behavior of known truthful subjects and known lying subjects will be analyzed; and, while verbal and nonverbal behavior will be considered separately,

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[2]John E. Reid and Fred E. Inbau, Truth and Deception: The Polygraph ("Lie-Detector") Technique (Baltimore: The Williams and Wilkins Co., 1966), pp. 11-16, 152.

verbal behavior will be further broken down into that which is either elicited or spontaneous.

NEED FOR THE STUDY

The only research on polygraph subject behavior was published in 1953.[3] Consequently, there is a need to update that research and to relate it to new developments in polygraph technique. Furthermore, the past research did not specifically distinguish between verbal and nonverbal behavior or between elicited and spontaneous verbal behavior. These distinctions are necessary for the further refinement of polygraph technique.

The primary source of behavior data in polygraph examinations occurs during the structured pre-test interview. This interview has been developed and refined largely on an intuitive basis and, while it is claimed to be effective, it has never been statistically evaluated. The need for such an evaluation was pointed out by Jesse Orlansky in his study on "lie detection" for the Institute of Defense Analyses.[4] Thus, it is important that an evaluation of behavior data be accompanied by a statistical evaluation of the polygraph interview itself.

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[3]This research will be cited and discussed in the next chapter of this paper.

[4]Jesse Orlansky, An Assessment of Lie Detection Capability, Declassified Version, Technical Report 62-16 (Arlington, Va.: Institute for Defense Analyses, Research and Engineering Support Division, July, 1964), pp. 29-30.

DEFINITIONS

Examiner

The term examiner is used synonomously with polygraph examiner, the person administering a polygraph examination.

Interrogation, Interrogational Device

The term interrogation refers to any type of questioning wherein the purpose of the questioning is to influence the questionee into answering truthfully. Such influence is exerted through the use of interrogational devices such as sympathy, empathy, flattery, etc. Interrogation is to be distinguished from interviewing.

Interview

The term interview refers to a period of questioning during which the interviewer maintains a neutral, objective attitude toward the interviewee. Interrogational devices are not used; the interviewer neither attempts, nor desires, to influence the interviewee to answer his questions truthfully.

Interview Sheet

An interview sheet is the paper on which a polygraph examiner records data pertaining to a subject's verbal and nonverbal behavior, along with other information pertaining to the subject's examination.

Lying Subject

As used in this study the term lying subject refers to a person who admits subsequent to a polygraph examination committing the offense investigated by that examination. A lying subject did not tell the truth to those questions concerning the area of inquiry of the examination.

Polygraph, Polygraph Instrument

A polygraph is a multi-channel diagnostic instrument which records in ink on a chart paper certain of a person's physiological activity. Usually the polygraph used in "lie detection" records, at least, a person's blood pressure-pulse rate, respiration rate and amplitude, and Galvanic Skin Response (GSR).

Polygraph Examination

A polygraph examination is the procedure employed by a polygraph examiner to determine the veracity of a person's statements to a specified area of inquiry. All polygraph examinations consist of at least a pre-test interview, a series of polygraph tests, and an interpretation and analysis of polygraph record data.

Polygraph Records

Polygraph records are the chart paper recordings made by the polygraph instrument of a subject's physiological activity.

Polygraph Subject Behavior

Polygraph subject behavior is defined as the words, actions, and appearance of a person taking a polygraph examination. The person's words are either elicited verbal behavior (clues) or spontaneous verbal behavior. Elicited verbal behavior is that which a subject says in response to a direct question from the examiner; spontaneous verbal behavior is that which a subject says without prompting from the examiner. The person's actions and appearance, or demeanor, are defined as nonverbal behavior.

Structured Pre-Test Interview

A structured pre-test interview is a period prior to polygraph testing in which a subject is asked questions by the examiner from a standardized format. The purpose of these questions is primarily to elicit from a polygraph subject verbal and nonverbal behavior which the examiner observes and records. The terms interview and pre-test interview are used synonomously with structured pre-test interview in this study.

Subject

The term subject refers to the person taking a polygraph examination.

Truthful Subject

As used in this study the term truthful subject refers to a person who neither committed nor aided in the commission of the offense investigated by a polygraph examination. The truthful subject told the truth to those questions concerning the area of inquiry of the examination.

Chapter 2

REVIEW OF THE LITERATURE

Reviewed in this chapter will be the available literature pertaining to verbal and nonverbal behavior of polygraph subjects. However, because this literature is very limited, and in order to provide a complete assessment of the scope of this study, data pertaining to the use of behavior judgments in situations similar to the polygraph examination will also be presented. These latter data will be broken down into three categories: 1) observational comments concerning the use and value of behavior judgments in non-polygraph interrogation; 2) research which has been conducted in an attempt to detect deception by evaluating behavior in the absence of polygraphic data; and 3), research which has been conducted in an attempt to assess the use of nonverbal behavior as a communication system, separate from a spoken language.

BEHAVIORAL CHARACTERISTICS OF POLYGRAPH SUBJECTS

The foremost advocate of the viewpoint that a judgment of a subject's behavior should be a standard part of all

polygraph examinations is John E. Reid. Through his experience and expertise in the art of non-polygraph police interrogation Reid hypothesized that certain behavior patterns were common to lying persons while certain others were common to truthful persons. While this is an assumption made by almost all criminal interrogators and is frequently commented upon in interrogation manuals, Reid voiced the belief that the ability to accurately interpret behavior patterns was not, as many felt, a "sixth sense," but rather, a good use of the five senses. This led him to conclude that an objective study of the behavior of persons taking polygraph examinations might be useful in diagnosing truth and deception.

In 1953, Reid and Richard Arther reported the results of a five year study of 809 polygraph subjects.[5] Although they cautioned that in the polygraph examination "no specific type of behavior - even though it is highly typical of one [lying] or the other [truthful] group - should ever be considered proof of guilt or innocence,"[6] they did find that the conduct and statements of the lying and the truthful differed widely in some respects; in others they were quite similar.

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[5]John E. Reid and Richard O. Arther, "Behavior Symptoms of Lie-Detector Subjects," The Journal of Criminal Law, Criminology and Police Science, 44, 1 (May-June, 1953), pp. 104-108; hereafter this will be referred to as Reid in the text.

[6]Reid and Arther, "Behavior Symptoms," p. 104.

Of the 486 lying subjects Reid studied, none of them was anxious to take a polygraph examination; none had made the initial request. Many of the lying subjects either postponed their examination date, were late for their appointment, or failed to appear for their original appointment. Usually prior to their polygraph examinations these subjects tried to explain that they had a nervous, or other mental or physical defect which could cause "false" lying reactions on the polygraph. Many of them complained of physical pain or discomfort from the polygraph apparatus; generally, lying subjects would want to leave the examining room as soon as possible and would complain that the examination was taking too long or that they were late for an appointment elsewhere.

In contrast to the lying subjects Reid studied, many of the 323 truthful subjects were glad to take a polygraph examination to prove their innocence. They often requested the examination and voiced their confidence in both the polygraph instrument and the procedure. If they expressed a fear that their nervousness or physical abnormality might affect their results, they did not persist after the examiner assured them that their peculiar difficulty made little difference.

Aside from studying the general statements of polygraph subjects, Reid also analyzed the conduct of his subjects.

He found that lying subjects often look worried and highly nervous. Sometimes they act aggressively, express a bitter attitude, appear to be in a shocked condition, experience mental blocks, are evasive, have a "dry mouth," sigh and yawn frequently, fail to look the examiner in the eye, and move about. Sometimes, the lying subject is overly friendly and polite to the examiner.

The general conduct of truthful subjects often differs from that of liars. They are usually "at ease, light hearted, and talkative."[7] They appear to be sincere and straightforward when talking to the examiner. If truthful subjects exhibit anger or impertinence, they can usually be relaxed by the examiner and even though they are cooperative in this respect, they do not appear to be overly friendly or polite.

Reid concluded his study with the finding that behavior judgments provide a definite advantage. Primarily, they allow the examiner to assess the subject's attitude and to treat him accordingly. The highly nervous subject must be relaxed; the quiet subject must be reassured, etc. Also, behavior judgments did seem to provide some basis for discriminating between lying and truthful persons, although as Reid pointed out, the advantage in this respect could

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[7]Reid and Arther, "Behavior Symptoms," p. 106.

not be definitely stated, "since practically all behavior symptoms are subject to general rule exceptions."[8]

BEHAVIORAL CHARACTERISTICS OF SUBJECTS IN NON-POLYGRAPH INTERROGATION

Reid's finding that some behavior patterns differ between the lying and the truthful in polygraph examinations was precipitated by his observations of persons undergoing non-polygraph police interrogation. Like Reid, other non-polygraph interrogators have also observed and commented upon these same and other behavioral characteristics. Unlike Reid, however, none of these other interrogators have offered any objective proof of the reliability of their observations. Even so, it is believed that these observations, at least those supplementing what has previously been reviewed, still warrant comment here. They are consistently reported on in interrogation manuals written by different authors, and, in that sense at least, have some reliability and some bearing upon the general topic of this stuy.

William Dienstein has suggested that the following behavioral characteristics provide helpful, but not completely accurate indications of a person's deception:

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[8]Reid and Arther, "Behavior Symptoms," p. 107.

Sweating

"Sweating with ruddy or flushed face indicates anger, embarrassment, or extreme nervousness. Sweating with pallid face, 'cold sweat' may indicate shock or fear. Sweating hands may indicate tension."[9]

Dry Mouth

"Continual swallowing by the subject, licking of the lips, and drinking excessive amounts of water are indicative of tension."[10]

Clenching of Hands

"The clenching of the hands indicates tension and may be coupled with anger. The wringing of the hands, rubbing against the clothing, twisting and knotting handkerchiefs, or manipulating objects are indicators of tension."[11]

Respiration

"Controlled breathing indicates a critical question. It may be betrayed by a slight gasp, a sudden intake of breath, a holding of the breath or a sudden expulsion of the breath."[12]

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[9]William Dienstein, Techniques for the Crime Investigator (Springfield: Charles C. Thomas, 1952), p. 109.

[10]Dienstein, Techniques, p. 109.

[11]Dienstein, Techniques, p. 109.

[12]Dienstein, Techniques, p. 109.

General Nervousness

"Constantly moving about in the chair, pulling of the ears, rubbing of the face, picking or tweaking the nose, crossing and uncrossing the knees or legs, shifting the position of the feet (there is a tendency to brace the feet on critical questions), rubbing the hair, eyes, or eyebrows, biting or snapping of fingernails, all may indicate tension."[13]

In addition to those characteristics cited by Dienstein, other interrogators - Reid, Inbau, Aubry, Arther, Caputo, and O'Hara - have reported that the following characteristics may be indicative of lying:

Color Change

"A flushed face indicates anger, shame or embarrassment but not necessarily guilt. A pale face is a more reliable sign of guilt."[14]

Heart beat, pulse

"An increase in the rate of heart beat is indicative of deception. The pulse beat is observable at times in the veins of the neck."[15]

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[13]Dienstein, Techniques, p. 110.

[14]Charles C. O'Hara, Fundamentals of Criminal Investigation (Springfield: Charles C. Thomas, 1956), p. 111.

[15]O'Hara, Fundamentals, pp. 111-112.

Elbow Position

"Due to the large nervous area under the upper arms, some interrogators attach considerable importance to the position of the elbows, claiming that when the elbows are hanging in a relaxed position, the suspect is under no pressure, but when the elbows are brought in close to the sides, it is a strong indication that the questioning has become critical."[16]

Fidgeting

"Involuntary movements consist of jerking and twitching of the hands, face, legs, arms, feet and in rare instances, the general involvement of the whole body."[17] "Shifting of movements and crossing of legs most often occur right after the suspect is asked an important question about the crime."[18]

Facial Tics

Facial tics, (grossly exaggerated muscle spasms of various parts of the face) are said to be positive indica-

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[16]W. R. Kidd, Police Interrogation (New York: The Police Journal, 1940), pp. 94-95.

[17]Arthur Aubry and Rudolph Caputo, Criminal Interrogation (Springfield: Charles C. Thomas, 1965), p. 130.

[18]Richard Arther and Rudolph Caputo, Interrogation for Investigators (New York: William C. Copp and Associates, 1959), p. 92.

tions of lying. "These tics take the form of strange grimaces of all the facial muscles in general; sometimes these tics may extend to and involve the arms, legs, and even the whole body will occasionally participate in characteristic muscular incoordination."[19] Facial tics and bodily twitching, tremors, and spasms may also be of an hysterical nature, especially those consisting of sudden, abrupt and rapid involuntary contractions of a muscle or a group of muscles - rapid blinking of the eyes, shrugging of the shoulders, twitching face, protrusion of the tongue, and vague motions of the hand and arms, legs and feet."[20]

Adam's Apple Activity

"The fact that an acceleration of its (Adam's Apple or Epiglottis) up and down movement is experienced by many offenders when questioned - and particularly when first accused - is well recognized among experienced interrogators."[21]

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[19]Aubry and Caputo, Criminal Interrogation, p. 131.

[20]Aubry and Caputo, Criminal Interrogation, p. 131.

[21]Fred Inbau and John Reid, Criminal Interrogation and Confessions (Baltimore: The Williams and Wilkins Co., 1962), p. 30.

BEHAVIORAL CHARACTERISTICS USED FOR DETECTING DECEPTION

Reviewed next will be some of the research which has been conducted in an attempt to correlate deception with specific behavioral characteristics. Although much of this consists of work which may be considered outdated, it is nevertheless, relevant and should be noted here. In fact, some of this research provided the impetus for the development of the polygraph instrument and its application to the detection of deception.

Association and Reaction Time

Carl Jung was perhaps the first to attempt the detection of deception with the use of associative reaction time.[22] The basis of this attempt rests upon the theory that if a person is asked to associate freely to a number of words, some of which are critical to a given crime and some of which are non-critical, he will, if lying, give longer reaction times when answering to the critical words. A shortcoming of this technique is that to truthful persons critical words may be unfamiliar and may, therefore, automatically elicit a longer reaction time.

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[22] C. G. Jung, "On Psychophysical Relations of the Associative Experiment," Journal of Abnormal Psychology, 1, (1907), pp. 247-255; also see: C. G. Jung, "The Association Method, American Journal of Psychology, 21, (1910), pp. 219-269.

Subsequent to Jung's studies, other investigators have researched the correlation between deception and reaction times to various stimuli. Marston, in 1920, concluded that subjects with short reaction times and subjects with long reaction times were displaying deception responses when told to obey or disobey requests to perform arithmetic operations.[23] More recently, Ellson, et al., conducted research on reaction time in answering questions about an artificial crime. He concluded that reaction time significantly differentiated between truthful and deceptive responses.[24] Although others have investigated reaction time as an indicator of deception, and some have quarreled with its value, generally researchers have found that reaction times will probably increase with deception involving a significant stimulus.[25]

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[23]William M. Marston, "Reaction Time Symptoms of Deception," Journal of Experimental Psychology, 3, (1920), pp. 72-77.

[24]D. G. Ellson, R. C. Davis, I. J. Saltzman, and C. J. Burke, A Report of Research on Detection of Deception, (Prepared for Office of Naval Research, Contract N6onr-18011), Dept. of Psychol., Univ. of Ind., (1952).

[25]See also; H. B. English, "Reaction Time Symptoms of Deception," American Journal of Psychology, 37, (1926), pp. 428-429; Eva R. Goldstein, "Reaction Times and the Consciousness of Deception," American Journal of Psychology, 34, (1923), pp. 562-581; W. M. Marston, "Negative Type Reaction-Time Symptoms of Deception," Psychological Review, 32, (1925), pp. 241-247.

Muscular Movements

The correlation between deception and voluntary and involuntary movements of a person's hands when responding to word associations was investigated by Luria, a Russian Psychologist.[26] He presumed that a change in the pattern of hand movements would occur as a person responded to a critical word association. Unfortunately, even though Luria reported considerable success with his technique, there does not seem to be any recent research to corroborate his findings. John Reid does advocate the use of a muscular movement recorder in polygraph examinations; data are not available, however, which either proves or disproves the value of such a device although Reid does present some evidence that voluntary muscular movements may, in some cases, be directly related to deception.[27]

Voice Quality

There are several studies which have explored the relationship between voice quality or modulation and deception. Two of these have attempted a subjective analysis

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[26]A. R. Luria, The Nature of Human Conflicts: On Emotion, Conflict and Will, trans. and ed. W. H. Gantt (New York: Liveright, 1932).

[27]John E. Reid and Fred E. Inbau, Truth and Deception The Polygraph ("Lie Detector") Technique (Baltimore: The William and Wilkin Co., 1966), see esp. pp. 208, 213, 264, and 271.

of deception. Fay and Middleton[28] found that about 55 percent of the time, persons hearing other persons lie or tell the truth over a public address system could discriminate between the two types of statements. In a more recent study, Olechowski found that three separate groups of persons could not discriminate between liars and non-liars from hearing a tape-recorded interview. He presented the recordings of 20 liars and 20 non-liars to 21 experienced detectives, 145 psychology students, and 200 high school students. None of these groups was more successful in detecting the liars; also, he concluded it was not possible to establish a "lie symptomatic"[29] from the tape recordings.

An analysis of the correlation between voice modulation and deception was conducted by Alpert, Kurtzberg and Friedhoff.[30] They measured the amplitude of a person's verbal response with a voltmeter during a deception situation. Amplitude increases in a low frequency band to critical stimuli were found to be significantly different

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[28]P. J. Fay and W. C. Middleton, "The Ability to Judge Truth-Telling or Lying from the Voice as Transmitted Over a Public Address System," Journal of General Psychology, 24, (1941), pp. 211-215.

[29]Richard Olechowski, "Experiments Ober den Stimmund Sprechausdruck bein Lugen," /Experiment on Voice Modulation While Telling Lies/ Zeitschrift fur Experimentelle und Angewandte Psychologie, 14, (1967), pp. 474-482; from Psychological Abstracts, 42, (April, 1968), p. 484.

[30]M. Alpert, R. L. Kurtzberg, and A. J. Friedhoff, "Transient Voice Changes Associated with Emotional Stimuli," Archives of General Psychiatry, 8, (1963), pp. 362-365.

from increases to non-critical stimuli.

Eye Movements

Polygraph examiners who advocate using judgments of behavioral characteristics believe that observing a person's eye contact reveals much about whether or not a lie is being told. This idea is apparently based upon the common assumption that a liar cannot look another person in the eye. For example, it is not at all uncommon for a parent who suspects his child of wrongdoing to command the child to "look him in the eye" and deny the wrongdoing. The child who cannot do this may be presumed to be lying.

Some research data suggest that a correlation exists between eye movements and deception. Berrien conducted a study in which eye movements were evaluated during a mock crime situation.[31] Although he detected no difference in the amount of eye movement during critical and non-critical questions, he did find that during a pre-question period, the eye tremors of lying persons decreased; eye tremors of truthful persons did not. Furthermore, he found that evaluators of the eye tremors could discriminate between the lying and truthful persons about 70 percent of the time.

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[31]F. K. Berrien, "Ocular Stability in Deception," Journal of Applied Psychology, 26, (1942), pp. 55-63.

Ellson, et al., tried to determine if lying produces characteristic patterns of eye movements which can be used as indicators of deception.[32] For his study he assigned students to one of five groups, each of which was to view a quadrant box. Two of these groups were to take a coin from a quadrant of the box and later to deny they took it; two were to take a coin and admit they took it; one was simply to view the box when no coin was present. Afterwards, all groups were tested to determine if eye movements of the liars could be differentiated from the truth-tellers. In all cases, eye movements to the quadrant from which the coin had been taken were greater than movements to other quadrants. Also, the difference in this respect was greater for those persons who were instructed to lie about taking the coin than for those who told the truth.

Facial Expression and Body Movement

Paul Ekman and Wallace Friesen have conducted extensive research on the correlation between facial expression and body movement and deception.[33] Their work is primarily oriented toward improving psychotherapy and psychotherapuetic

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[32]Ellson, A Report of Research, Chapter X, pp. 28-30.

[33]Paul Ekman and Wallace V. Friesen, "Nonverbal Leakage and Clues to Deception," Psychiatry, 32, (1969), pp. 88-106.

techniques. However, because they believe that "actions speak louder than words" and that during deception, body movements and facial expression emerge as clues to the truth, their work is of interest here.

Ekman and Friesen considered two forms of deception: alter deception, where ego, the deceiver, conceals information from the other interactant, alter; and self deception, where ego is the object of his own deception, concealing information from himself.[34] Since during a polygraph examination only alter deception seemsto be relevant, the following discussion will not consider Ekman's data on self deception.

During alter deception a person (ego) is aware of what he is attempting to conceal and plans his behavior accordingly. He realizes that the safest way to avoid detection is to cut off all communication; he also realizes, however, that by doing this, he may be giving himself away, so he chooses a second alternative. He offers information (to alter) contrary to, or at least selectively misrepresentative of, the concealed information. In doing this, Ekman reports, a person engages in "nonverbal simulation" which is imperfect and as a result offers a major

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[34]Ekman and Friesen, "Nonverbal Leakage," p. 89.

form of deception clues to an observer (alter), if he is capable of reading the clues.

Ekman has found that the hands and feet of a person are more likely to offer deception clues to an observer than is the face, or facial expression alone. He points out, with regard to the hands, that even though a person may be smiling and pleasant, he may, at the same time, be "digging into his cheek, protectively holding his knees, and so forth."[35] In the same way the feet can also offer clues to deception. These would include "aggressive foot kicks, flirtatious leg displays, autocratic or soothing leg squeezing, abortive restless flight movements,...tense leg positions, frequent shift of leg posture, and restless or repetitive leg and foot acts."[36]

It is interesting to note that even though Ekman reports the hands, legs/feet to be the best source of deception clues, he feels that this is true only because these are the least within ego's awareness, and thus, are less subject to control. "The best sender, the face, is most closely watched by alter, most carefully monitored by ego, most subject to inhibition and dissimulation, and

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[35]Ekman and Friesen, "Nonverbal Leakage," p. 99.

[36]Ekman and Friesen, "Nonverbal Leakage," p. 99.

thus the most confusing source of information during deception,"[37] The face reportedly becomes a very good sender of deception clues if one considers "micro-expressions." These, Ekman points out, are more often than not overlooked by an observer; because of their short duration and the observer's limited experience in evaluating them, they are confusing, contradictory, and misleading. Thus, even though the face may actually leak the most it is at the same time equipped to lie the most. It is a deceptive source of deception clues.[38]

NONVERBAL BEHAVIOR AS A COMMUNICATION SYSTEM

Research on nonverbal behavior as communication will be discussed in this section. Much of the information considered first will have to do with the relationship between the emotional expression of stress (or other affective states) and the ability to detect it. Then, general comments will be made regarding nonverbal behavioral characteristics as a communication system which is "in accordance with an elaborate and secret code that is written nowhere, known by none, and understood by all."[39]

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[37]Ekman and Friesen, "Nonverbal Leakage," p. 99.

[38]Ekman and Friesen, "Nonverbal Leakage," p. 99-100.

[39]Edward Sapir, "The Unconscious Patterning of Behavior In Society," Reprinted in: R. G. Mandebaum, Ed., Selected Writings of Edward Sapir in Language, Culture and Personality (Berkeley: University of California Press, 1963); cited in: Starkey Duncan, "Nonverbal Communication," Psychological Bulletin, 72, (1969), p. 118.

Detecting Body Movement and Facial Expression Significance

In a study reported by Krout[40] in 1935 an attempt was made to discover the significance of various bodily movements. He presented a list of 160 of these to 120 persons and asked them: (1) to give the first word which comes to mind and, (2) to write down the meaning the movement would have for them if they observed another person making it. Although Krout's detailed association results are too lengthy to report here, he concluded that responses are made up largely of popular preconceptions of what a movement is supposed to mean and that movement and appearance can be interpreted only in terms of their context.

Krout's findings, and the findings of others doing similar research, led to the belief that emotion could not be judged from facial expression or bodily movement alone; it was suspected that it was all a matter of inference from knowledge of the situation. This, however, has seemed to be proven untrue.

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[40] M. H. Krout, "Autistic Gestures: An Experimental Study In Symbolic Movement," Psychological Monographs, 46, (1935); reported in H. Zimmer, Psychophysiologic Variables as Indications of Emotional Stress, Technical report no. RADC-TR-65-296 (New York: Rome Air Development Center, 1966), pp. 41-49.

There are many studies which have found a significant reliability in the ability of observers to judge certain emotions from the facial and bodily expressions of photographs, etc., of people. Feleky[41] found that 74 of 100 persons viewing a certain photograph of a person agreed that the emotion of surprise, wonder, or astonishment was depicted. On the basis of viewing another photograph they agreed 50 percent of the time that the emotion of disgust or repugnance was being shown. Munn[42] found that college students could judge emotions from the facial expressions on persons in photographs with an accuracy range from 65 to 95 percent; further, his results showed that performance was not improved when the context in which the person was experiencing the emotion was added.

Other studies have shown that the "accuracy with which emotions are recognized from facial expression alone increased when still photographs were replaced by short movies and that adding a sound track to silent movies of faces increased accuracy in judging fear and surprise (though not other emotions), even though the voices were

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[41]A. M. Feleky, "The Expression of the Emotions," Psychological Review, 21, (1914), pp. 33-44; in Irving Janis, et al; Personality, Dynamics, Development and Assessment (New York: Harcourt, Brace and World, Inc., 1969), p. 601.

[42]N. L. Munn, "The Effect of Knowledge of the Situation Upon Judgment of Emotion from Facial Expressions," Journal of Abnormal and Social Psychology, 35, (1940) pp. 324-38; in Irving Janis, et al; Personality, Dynamics, Development and Assessment (New York: Harcourt, Brace and World, Inc., 1969), p. 603.

merely reciting irrelevant, neutral materials."[43]

GSR Responsiveness Related to Emotional Expression

Harold Jones conducted two studies in an attempt to assess the relationship between galvanic skin response (GSR - a physiological phenomenon often used in both applied and experimental "lie detection") and overt emotional expression. In his first study,[44] 1935, he used 86 preschool children as subjects and simultaneously measured the intensity of GSR and the amount of overt emotional expression. He concluded that the average galvanic deflection recorded for a given subject gave little or no prediction of his average overt response but that the average galvanic deflection recorded for a given stimulus agreed closely with the average overt response for that stimulus.

In his second study,[45] 1950, Jones used adolescents as subjects. Their overt behavioral characteristics were compared with their GSR recordings in eleven test situations. Jones found that the "'high reactives' were less

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[43]Irving Janis, G. Mahl, J. Kagan, and R. Holt, Personality, Dynamics, Development and Assessment (New York: Harcourt, Brace, and World, Inc., 1969), p. 603.

[44]Harold Jones, "The Galvanic Skin Reflex as Related to Overt Emotional Expression," American Journal of Psychology, 47, (April, 1935), pp. 241-251.

[45]Harold Jones, "The Study of Patterns of Emotional Expression." In M.L. Reynert (ed.), Feelings and Emotions: The Mooseheart Symposium (New York: McGraw Hill, 1950); cited in: Jack Block, "A Study of Affective Responsiveness in a Lie Detection Situation," Journal of Abornormal and Social Psychology, 55, (1957), pp. 11-15.

assertive, less animated, less talkative, and less attention seeking than the 'low reactives,'"[46] and that the high reactive group was "more calm, more deliberative, more good-natured, more cooperative, and more responsible than the low reactives, who were judged as irritable, excitable, impulsive, and immature."[47]

In 1957 Jack Block[48] reported a study similar to those of Jones' but one in which the "more stressful circumstance of lying was employed as the stimulus situation"[49] and the subjects were older and probably were a more homogeneous group. Also, objective test measures and ratings were used for comparison to GSR reactivity. Generally, the results Block reported were: (1) that GSR reactivity could not be ascribed to "intellectual factors as these are ordinarily understood and measured."[50] (2) That reactors seemed to be withdrawn, worrying individuals who turn their "anxieties toward internal routes of expression" and non-reactors seem independent, aggressively direct, and relatively nonconforming.[51] (3) "Reactors appeared to be more dependent, dreamy, idealistic and

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[46]Reported in: Jack Block, "A Study of Affective Responsiveness in a Lie Detection Situation," Journal of Abnormal and Social Psychology, 55, (1957), p. 11.

[47]Block, "A Study," p. 11. [48]Block, "A Study," pp. 11-15.

[49]Block, "A Study," p. 11. [50]Block, "A Study," p. 12.

[51]Block, "A Study," p. 13.

suggestible; non-reactors were evaluated as relatively cool, evasive, opportunistic, and independent."[52]

The results of the Jones and Block studies seem to suggest that there is a relationship between GSR reactivity and personality structure and behavior. However, the most significant result of their studies, at least for purposes of the present study, is that they did not find a direct reciprocal relationship between behavioral characteristics (overt motor response) and autonomic activity. As Block points out, internal activity (that which is recorded via the polygraph for "lie detection") seems to be an expression of an affective state; it does not itself reduce tension; this can only be brought about by "appropriate cognition, fantasy, or motor behavior."[53] Thus, behavioral characteristics may be tension reducing signals which may or may not be consonant with autonomic activity. Therefore, for "lie detection" purposes the interpretation of behavioral characteristics would seem to be important information which should be considered along with the analysis of polygraph record responses. When the two are redundant, i.e., when both show truthfulness or deception, for example, the examiner's task would seem to be easier.

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[52]Block, "A Study," p. 15.

[53]Block, "A Study," p. 14.

Obviously, the same could hold true for other diagnostic procedures.

Classifying Behavioral Communication

Besides being a product of deception and other stress situations, behavioral characteristics also seem to be, in and of themselves, a communication system separate from, and, at times, contradictory to, the spoken word. In fact, since the early 1950's there have been many studies reported which describe systems for recording and classifying various nonverbal behaviors. A brief review of some of these studies follows.[54]

Paralanguage. Attempts at classifying nonverbal behavior can be divided into at least three distinct areas, each with its own pioneering investigator. First, the study of voice quality and sounds such as laughing, yawning, and grunting was developed by George Trager. He termed his work the study of "paralanguage" and divided this into two components: (1) vocalizations, and (2) voice qualities. "Trager's work constitutes the foundation for further work in the field; and, in fact, his system is quite applicable in a practical sense, enabling worthwhile transcription of paralinquistic behaviors in empirical studies."[55]

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[54]The review of the literature which follows was primarily obtained from: Starkey Duncan Jr., "Nonverbal Communication," Psychological Bulletin, 72, (1969), pp. 118-137.

[55]Duncan, "Nonverbal," p. 119.

Proxemics. A second area of study of nonverbal behavior was developed by E. T. Hall. This area is termed "proxemics" and consists of the study of "social and personal space and man's perception of it."[56] Hall primarily is concerned with the concept of culture as a communication system and describes distances or zones of human interaction as variables between cultures. An extension of Hall's work is the concept of "territoriality" which has to do with animal behavior in setting up and defending fixed territories; this is discussed by Ardrey in his book The Territorial Imperative.[57]

Kinesics. Ray Birdwhistell is noted for the development of "kinesics," or the study of body movements and gestures.[58] Of the three areas mentioned, this one seems to be the most developed in the study of nonverbal behavior. In kinesics, body movements or gestures are treated as a means of communication; and a system of symbolizing virtually

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[56]Duncan, "Nonverbal," p. 118; and, E. T. Hall, The Silent Language (Garden City, N.Y.: Doubleday and Co. Inc., 1959).

[57]Robert Ardrey, The Territorial Imperative (New York: Atheneum, 1970).

[58]See: R. L. Birdwhistell, "Background to Kinesics, etc.," A Review of General Semantics, 13, (Autumn, 1955); and, Introduction to Kinesics (Louisville: University of Louisville Press, 1952) cited in: Julius Fast, Body Language (New York: M. Evans and Co., Inc., 1970).

every possible human movement has been developed which leads to, what could be termed, a non-speech language.

The relationship which nonverbal behavior as a communication system has to the detection of deception would seem to lie primarily in its value as a means of codifying the behavior of polygraph subjects. If for example, symbols were used to describe certain actions (if necessary, through a study of video tape replay) such as the system advocated by Birdwhistell, it would seem that the evaluation of verbal and nonverbal behavior of subjects taking polygraph examinations could lend much to the determination of truth and deception.

SUMMARY

This chapter has reviewed some of the literature pertaining to the use of verbal and nonverbal behavioral characteristics in the detection of deception. In an effort to clarify this literature it was divided into four categories: (1) research on behavioral characteristics of polygraph subjects; (2) observational comments of the use and value of behavioral characteristics in non-polygraph interrogation; (3) research directed at detecting deception by analyzing specific behavioral characteristics; and (4) research pertaining to the use of behavioral characteristics as a communication system.

Most of the literature presented in this chapter lends credence to the belief that "lie detection" can and should be accomplished through a study of both autonomic activity and overt verbal and nonverbal behavior. This is not, however, a new idea, but it is one which deserves considerably more attention than it has received. For example, some of the first known efforts to detect liars, about 900 B.C., involved the study of behavior. Trovillo reports that in one of the papyrus Vedas the following information was offered as a means of detecting poisoners:

> A person who gives poison may be recognized. He does not answer questions, or they are evasive answers; he speaks nonsense, rubs the great toe along the ground, and shivers; his face is discolored; he rubs the roots of the hair with his fingers; and he tries by every means to leave the house...[59]

Many of the characteristics of poisoners in 900 B.C. are similar to those Reid found in lying polygraph subjects in 1953 A.D. Certainly, something which seems so basic to human nature to endure for over 2000 years warrants investigation.

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[59]Paul V. Trovillo, "A History of Lie Detection," The Journal of Criminal Law and Criminology, 29, (March-April, 1939), pp. 848-849.

Chapter 3

THEORETICAL BASE OF DATA STUDIED

Presented first in this chapter will be an analysis of the theory and application of the structured pre-test interview technique. Subsequent to this analysis, a summary of the previous research findings on both spontaneous verbal behavior and nonverbal behavior will be discussed. A thorough understanding of this chapter is essential to an understanding of the methodology employed in the present research.

ELICITED VERBAL BEHAVIOR: THE STRUCTURED PRE-TEST INTERVIEW[60]

Prior to detailing the analysis of the structured pre-test interview a prefatory comment is necessary in order to place the interview in the proper context. At no time during the interview does the examiner-through sympathy, accusation, or any other "interrogational device" - attempt to influence the subject into answering the interview questions truthfully. The examiner does not point out to

[60] A complete description of the structured pre-test interview has not been published. Therefore, the description which follows is based upon the writer's experience in the use of this interview and on the partial description which appears in: John E. Reid and Fred E. Inbau, Truth and Deception, The Polygraph ("Lie Detector") Technique (Baltimore: The Williams and Wilkins Co., 1966), pp. 11-16.

the subject any inconsistencies in his alibi or statements. Rather, during the interview the examiner's attitude is objective and non-committal; he is cordial, but firm. His purpose during the interview is not to obtain an admission of lying but rather to elicit, observe, and record the subject's verbal and nonverbal behavior.

The interview starts when the examiner first greets the subject, who has usually been ushered into the examining room by a secretary. After his cordial, but reserved, greeting the examiner immediately proceeds to place the polygraph attachments on the subject.[61] While doing this he asks the subject: "Have you ever had a polygraph ('lie detector') test before?"[62] No further comment is made by the examiner during the time when the attachments are placed on the subject. However, the examiner listens carefully to whatever the subject may say in reaction to the instrument or the test itself.

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[61]The attachments are placed on the subject at this time only for the purpose of allowing him to become accustomed to them. At no time during the interview are any polygraphic recordings made.

[62]Reid and Inbau explain in Truth and Deception, p. 11, Note 15, "If the subject has not been told the purpose of his appearance in the testing laboratory, the examiner should, of course, explain that the test is desired of him as part of the investigation regarding the particular loss, offense, or incident, and as much time should be spent in this preliminary explanation as the circumstances reasonably warrant. Only thereafter should there be any attachment of the instrument to the subject."

When the examiner has completed placing the polygraph attachments he sits in a chair in front of the subject. At this time he immediately records whatever comments the subject made up to this point. Then, the examiner proceeds with the interview, asking first, questions about the subject's background. For example, he asks the subject his name, age, home address, and marital status and, in most cases, asks basic information regarding the subject's place of employment. All of this information is recorded on the examiner's interview sheet along with the subject's sex and race, and the date.

After background information is acquired the examiner proceeds with the asking of the structured pre-test interview questions. In asking these questions he uses as a guide abbreviations of each question which appear on the back of the interview sheet. Each of these questions appears on the sheet in a fixed order; however, the examiner may, or may not, ask them in that order. Further, depending on the case at hand, he may not ask certain of the questions because they are inapplicable to the facts of the case.

As the examiner asks each interview question he records the subject's verbal answer on the interview sheet alongside a number corresponding to the question asked. It is these recorded verbal answers which comprise the

verbal behavior studied in the present research. As the subject answers each question the examiner notes the subject's nonverbal behavior; he observes the subject's physical appearance, eye contact, demeanor, etc. This nonverbal behavior, while as important as verbal behavior will be discussed separately and does not appear in the description of the interview which follows.

You Question[63]

The first structured interview question is abbreviated on the examiner's interview sheet as "You." The "You" is a guide to the examiner to ask the subject a direct question in the form of: "Did you do it (the murder, theft, etc.)?" If, for example, the purpose of the examination is to investigate a certain murder the examiner may say to the subject: "You know, of course, you're going to be tested about the killing of Joe Jones. What I want you to understand is that if you didn't commit this killing, the polygraph testing will show that. If you did do this thing, the polygraph will show that. (Subject's name) did you kill Joe Jones?"

When confronted with such a direct question concerning whether or not he committed the offense, a lying

[63]The short phrase which precedes some of the following paragraphs corresponds to a similar phrase which is the abbreviation of each interview question as it appears on the examiner's interview sheet.

subject will usually hesitate before giving a verbal answer; his answer will usually be evasive and will not really answer the examiner's question. For example, a typical liar's answer would be as follows: "I can't understand this whole thing. I hardly knew Joe Jones. I don't know why anyone would want to kill him." On the other hand, a truthful subject will usually answer the "you" question in a very direct manner. He typically will say something like this: "I didn't kill Joe Jones. I had nothing to do with it but I sure hope you catch the guy who did."

Suspicion Question

The examiner then asks the subject if he has any suspicions as to who committed the offense. The subject is requested to reveal his suspicions even if he does not know for sure. A truthful subject will usually do so. He will reveal names and the reasons for his suspicions. A lying subject will typically refuse to blame anyone and, in fact, may try to shift the blame for the offense to persons who probably could not have committed it. For example, in an investigation involving the theft of money from a bank vault, a lying subject, when asked of his suspicions, may say something like: "It could have been anybody. Even the customers could have gotten that money."

Who Not Suspect Question

The subject is asked if there is anyone who he would personally vouch for and who he feels did not commit the

offense. A truthful subject will typically respond to such a question by naming one or more persons who he feels would not have committed the offense. He may, at times, name himself. For example, the truthful subject may say, "Well, I know I wouldn't do it. And, I know the two fellows I work with, Joe Smith and John Jones, are too honest to do it." The lying subject will usually fail to name anyone. He may say that he does not know anyone well enough to vouch for them or that he suspects everyone. He may answer something such as: "I don't trust anyone. I don't pay attention to other people." He does not want anyone to be relieved of suspicion; he desires to keep the investigation as broad as possible.

Think Stolen Question

The examiner will ask the subject if he thinks the offense really was deliberate. For instance, in a theft case the examiner will ask the subject if he thinks that the missing items were actually stolen. A lying subject typically responds to such a question, even though it is obvious the items were stolen, by answering: "No, I don't think they (the missing items) were stolen. They were probably lost or something. It happens all the time." In contrast to this, the truthful subject tends to readily admit that the items were stolen and may say: "Of course they were stolen. They had to be. They didn't just walk away by themselves."

The lying subject, of course, has good reason for wanting the examiner to believe that the missing items were lost or misplaced. If he can convince the examiner and everyone else of this, he himself would be relieved of suspicion and would be "successful" in his theft.

Best Opportunity Question

The examiner asks the subject to assume that, in a theft case, for example, the missing items were actually stolen. He then asks the subject which of the groups of persons, out of those which could have been involved, probably committed the theft. Typically, a truthful subject will restrict the theft to one particular group of people and may even name the group to which he belongs as the one most likely to have committed the theft. For example, a truthful bank teller may say: "Well, it had to be one of the tellers. It's impossible for anyone else to have done it." A lying sybject will usually be reluctant to restrict the theft to any one group. A lying bank teller may say: "It could be anyone in the bank. Even a customer could have stolen it."

The lying subject attempts to broaden the investigation as much as possible and to direct it away from himself. The truthful subject will narrow the investigation to the group or groups most logically involved.

Fingerprint Question

If the case is one in which fingerprints or footprints might have been left at the scene of the offense, the examiner will say to the subject: "'Is there any reason why your fingerprints should be on /e.g., a beer bottle or a glass in John Jones' home/ or your footprints /e.g., on the ground at First and Main Street/?' Except when the circumstances indicate the possibility of the innocent /truthful/ subject's prints being there, he will usually say: 'No, there's no reason why my fingerprints /or footprints/ should be there.' A lying subject, on the other hand, is inclined to offer an explanation of their presence (e.g., 'Well, I may have handled a beer bottle or a glass in his house, or I may have walked by First and Main Street recently'). In other words, a lying subject may seek to forestall any incriminating inference from such a fingerprint or footprint. He may feel impelled to offer an explanation. A truth-telling person, however, will experience no such concern."[64]

The "fingerprint" question may be asked in a different form than that stated above. For example, in cases where there are witnesses to the offense, a subject may be told: "'Now, if you were at First and Main Streets /or other location of the murder, rape, etc./ that night at any time, say so. You could have been there and yet that would not

[64]Reid and Inbau, Truth and Deception, pp. 13-14.

necessarily mean you shot John Jones. Maybe you were there just before or soon after and had nothing to do with it. Someone could have seen you before or after, but later on he may assume or believe he saw you there when Jones was shot. So it's important that we get this straightened out before the test. Tell me, then, were you there at any time that night?'"[65] The lying subject may answer such a question by saying: "Well, I was there that day, and maybe someone saw me; but I didn't shoot anyone." The truthful subject, on the other hand, tends to deny that he was at the scene of the offense, barring, of course, situation where his presence is legitimately explainable.

Borrow Question

In those instances where a theft of money (from an employer) is being investigated the examiner may ask the subject: "Did you ever borrow any money (or merchandise) from your employer even though you paid it back?" A lying subject will usually answer such a question with an admission of borrowing such as: "Well, I did take some money for lunch from petty cash one time, but, I paid it back as soon as I got my paycheck." A truthful subject will typically respond: "I never borrowed anything. The only money I take out of there is my pay."

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[65]Reid and Inbau, Truth and Deception, p. 14.

The reason the "borrow" question is said to be helpful is that borrowing is reputedly the first step toward stealing, especially in cases of embezzlement. A lying subject, recognizing this, readily admits his "borrowing" as this conduct is minimized in his mind by his more serious stealing activity. The truthful subject, however, even if he did borrow on occasion, is reluctant to admit it as its seriousness is maximized in his mind.

Ever Happen Before Question

A subject may be asked by the examiner if he had ever been involved in an investigation similar to the present one. A subject who states that he had been involved before, particularly if that involvement had occurred on numerous other occasions, is more typically a lying subject. If investigations of a certain type of offense (e.g., theft, murder, rape, etc.) seem to "follow the subject" it is presumed that they may do so because of his involvement in them. A truthful subject usually has not been involved in investigations of serious offenses on numerous occasions. He may tell the examiner: "No, this is the first time I've ever been questioned about any crime." Whereas, a lying subject may answer: "I've been questioned lots of times about this type of thing, but I've never been convicted or anything."

Think Question

The "think" question is one which an examiner can adapt to most any type of investigation. It is based upon whether the subject ever thought about doing anything similar to, or the same as, the act under investigation. For instance, in a murder case in which the victim was shot to death, the subject would be asked: "'Did you ever think about shooting or killing anyone, even though you didn't? If so, I want you to get this off your mind before the test.' The characteristic answer of a person who did not do the killing is: 'I never thought of shooting or killing anyone!' His answer is emphatic and unequivocal, for even though he may have had a fleeting thought along that line, he interprets the examiner's question to mean a serious, deliberate thought of killing someone. On the other hand, a lying subject is likely to respond by saying: 'Sure, I've thought about doing things like that; everyone does. But I didn't do it.'"[66]

Approach Question

The examiner may ask a polygraph subject, in a theft case, for example: "Have you ever been approached by anyone to help them steal something like this (the stolen item

[66]Reid and Inbau, Truth and Deception, p. 14.

in the investigation) even though you didn't go along with them?" The subject's answer to such a question provides the examiner with some insight into how the subject is viewed by his acquaintances. A lying subject, for instance, may tell the examiner: "Sure, I've been asked a lot of times. But, I've never gone along with anyone in something like that." A truthful subject, typically answers the "approach" question in a very direct manner. He may say something such as: "No one ever asked me to do anything illegal. They know better than that. I'd turn them in."

How Will L.D. Come Out on You Question

The examiner asks the subject how he thinks his test will come out; for instance, the examiner may say: "How do you think you will come out on the polygraph (lie detector) test today?" The truthful subject will usually give a very direct, unequivocal answer. For instance, he may say: "I'll come out perfect. At least I better come out perfect because I didn't do it."

On the other hand, a lying subject will typically offer excuses for the polygraph test indicating that he is lying. He will tell the examiner that he has some immediate physical or emotional problem, or, will offer some other reason for the polygraph test to give misleading indications. He may say, for instance, something like: "Well, I don't know what the test will show. I'm a very nervous person and I've heard that the 'lie detector' doesn't work well on nervous people. Anyway, I don't

believe in 'lie detectors.'"

Truth Serum Question

In some investigations the examiner, for observational purposes, may ask a subject an interview question regarding the subject's willingness to take "truth serum" in the immediate investigation.[67] For example, the examiner may say: "We find that the polygraph does not work on everyone. Sometimes we cannot tell if a person is, or is not, telling the truth. In other words, sometimes our tests are inconclusive; and, while this only occurs in about 5 percent of our cases, if it happens in your case, would you agree to take truth serum to resolve this (murder, rape, theft, etc.)?"

A truthful subject will usually not hesitate in affirming his willingness to take "truth serum" if the need arises. He may say: "Sure, I'll take that or anything else you want to give me. I want to prove I didn't do this thing." A lying subject, believing in the infallibility of truth serum, will usually decline to take it. Or, if he

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[67] A polygraph examiner, of course is usually neither equipped, nor qualified, to administer a truth serum test. For an interesting discussion of the use of truth serum see: Fred E. Inbau, "Scientific Evidence in Criminal Cases," Journal of Criminal Law and Criminology, 24, (March-April, 1934), pp. 1153-1157.

agrees to take it, he will qualify his agreement with conditions which would, in effect, preclude, or at least delay, the truth serum test. For example, a lying subject may say: "No, I won't take truth serum. I don't like needles. This 'lie detector' test is as far as I will go;" or, "Well, I will have to talk to my wife, attorney, and doctor before I take the stuff." When asked the names of his doctor and attorney the lying subject will usually be reluctant to give them or will tell the examiner that he doesn't have any now but will have to get them.

What Should Happen to Doer Question

When asked by the examiner what should happen to the actual perpetrator of the offense being investigated a truthful subject will characteristically want him dealt with in a very harsh manner. He may express a desire to see the perpetrator "locked up," even for a very minor offense. He may also indicate to the examiner that he himself would like to deal with the perpetrator and inflict his own form of punishment. A truthful subject's typical answer to the "what should happen to the doer" question would be: "He should be put in jail. He caused me a lot of trouble and I'd like to get a hold of him myself."

In contrast to the truthful subject, a lying one will usually want the perpetrator treated "softly." He may

offer excuses for the perpetrator's conduct and may indicate that the perpetrator needs help, not punishment. For instance, a lying subject may respond to the "what should happen to the doer" question by saying: "I don't know what should be done with him. Maybe he just couldn't help himself and the crime wasn't his fault. Maybe he should go to a psychiatrist instead of jail." Or, in a theft case, the lying subject may say merely that the perpetrator should pay the money (or merchandise) back and be given a second chance.

Attitude Question

This question is usually the last of the structured interview questions asked.[68] The examiner asks the subject how he feels about taking the polygraph examination. While the subject's answer provides the examiner with some insight to the subject's actual attitude, it also reportedly provides the examiner with a verbal clue to the subject's truthfulness or deception. For example, a truthful subject will typically respond to such a question in a manner that indicates his willingness, and sometimes eagerness, to take the polygraph examination. He may, for

[68]As previously explained the order in which the interview questions are asked may vary. However, the "attitude" question is usually asked last in order to allow the examiner to determine if the subject's expressed attitude is consistent with the examiner's impressions of his attitude up to that point.

instance, answer with: "I'm glad to take it (the examination). I want to prove my innocence; and, besides, it's a new and interesting experience for me."

A lying subject will usually answer the "attitude" question with words that express his contempt for the examination or his disbelief in its effectiveness. He may, for example, answer as follows: "I don't like taking this test. I think it's a silly thing to do and a waste of money; and besides, I don't believe in 'lie detectors.'"

After the examiner has asked the structured interview questions of the subject, he then reviews with the subject the exact test questions. He will also, at this time, make any necessary explanations or clarifications to the subject. However, the examiner does one other thing before he starts the actual polygraph testing. He records, on the front of his interview sheet, his appraisal of the subject's behavior during the pre-test interview. He notes, for example, if the subject looked like a typical lying subject or like a typical truthful one, if the subject talked like a typical lying subject or a truthful one, and, if the subject had good eye contact or poor eye contact, etc. These notes provide the information for the nonverbal behavior studied in the present research.

SPONTANEOUS VERBAL BEHAVIOR

In his 1953 study of polygraph subjects' behavior, John Reid found that lying subjects frequently make certain types of spontaneous statements to the examiner throughout the examination. In some cases they try to explain why their polygraph responses "might mislead the examiner into believing that they are lying. Hence, they complain of being nervous, and if that does not seem to impress the examiner, they further emphasize their 'nervous condition' or mention a physical defect which they may or may not actually have. Also, they frequently feel it necessary to assure the examiner that they are very religious, hoping that the examiner will dismiss them as innocent because of their alleged righteousness."[69]

Reid also found that lying subjects sometimes complain of physical pain caused by the polygraph apparatus. On occasion they complain that the examination is taking too long and they frequently inquire of the examiner, throughout the testing, as to how they are doing.

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[69]John E. Reid and Richard O. Arther, "Behavior Symptoms of Lie-Detector Subjects," The Journal of Criminal Law, Criminology and Police Science, 44, 1 (May-June, 1953), p. 105.

Truthful polygraph subjects, Reid found, do not usually complain. While they may refer to their nervousness, they do not persist in this after the examiner assures them that nervousness makes no difference. Since they are usually anxious to take the polygraph examination, truthful subjects do not usually ask to hurry the examination.

A questioning attitude was found by Reid to be common to both truthful and lying polygraph subjects. They inquire as to the use of the polygraph apparatus and what the examiner can tell them about themselves. For example, they may ask the examiner if he can tell them what their blood pressure is, etc.

NONVERBAL BEHAVIOR

Nonverbal behavior is defined as the demeanor and appearance of the polygraph subject during the examination. Reid found that in many cases the nonverbal behavior of lying subjects differed from that of truthful subjects. Lying subjects look worried and highly nervous; they sometimes have a "dry mouth," continually sigh or yawn, fail to maintain good eye contact with the examiner, and are usually quite fidgety. At times, lying subjects act aggressively, appear in a shocked condition, or may be overly friendly and polite to the examiner.

Truthful subjects, Reid reported, are usually "at ease, lighthearted, and talkative."[70] They appear to be sincere and direct in talking to the examiner, but they are not overly friendly or solicitous.

[70]Reid and Arther, "Behavior Symptoms," p. 106.

Chapter 4

DESIGN OF THE INVESTIGATION

There will be three main sections of discussion in this chapter. First, background information of the data studied in the present research will be presented. This will include the source of the data, a brief description of the original procedure used in collecting the data, and an analysis of the sample studied. Second, the hypotheses formulated for each category of data studied and the methodology employed will be discussed. Finally, in order to put the study into perspective, some of the limitations of the data and the methodology will be presented.

BACKGROUND INFORMATION OF DATA STUDIED

Source of Data

This study is based upon an analysis of verbal and nonverbal behavior clues recorded during actual polygraph examinations. While these examinations were conducted during the years from 1964 to 1971, all were conducted according to standard Reid Control Question Technique (RCQT).

Essentially, the RCQT consists of a structured pre-test interview and polygraph testing. During the interview, the examiner explains to the subject the purpose of the test and the nature of the instrument; he also formulates and reviews with the subject the actual test questions. Moreover, during the interview, the examiner asks certain questions of the subject from a structured format.[71] The purpose of these structured questions is to elicit behavior clues from the subject. As the subject answers the structured questions, the examiner records those answers on an interview sheet. These answers are said to provide elicited verbal clues to the subject's truthfulness or deception. In addition to these clues, however, the examiner also notes nonverbal clues. He observes and records on the interview sheet, the subject's physical reaction to each question and any changes in either the subject's demeanor or attitude. At the conclusion of the interview, which lasts about twenty minutes, the examiner proceeds with the polygraph testing.

The polygraph testing consists of the asking of relevant, irrelevant and control questions during a number of separate tests. The questions in the 3,5,8,9,and 10 positions are relevant and relate to the matter under investi-

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[71]See Chapter 3, pp. 35-51.

gation, such as, in a murder case, "Did you kill John Jones?" and "Did you shoot John Jones with a .38 caliber revolver?" The questions in the 1,2,4, and 7 positions are irrelevant to the issue being investigated; they deal with such matters as, "Do they call you Joe?", "Are you over 21 years of age?", etc. These irrelevant questions are asked for the purpose of establishing the subject's normal pattern of responsiveness. The remaining two questions are control questions. They are placed in the 6 and 11 positions. A control question is one which is unrelated to the matter under investigation, but is of a similar, though less serious nature and one to which the subject will, in all probability, lie; or at least his answer will give him some concern with respect to either its truthfulness or its accuracy. For instance, in a burglary investigation the control question might be, "Did you ever steal anything?" or "Except for what you have already told me, did you ever steal anything else?" The response or lack of response to the control question (in respiration, blood pressure-pulse rate, or GSR) is then compared with what appears in the tracings when the subject is asked the questions relevant to the issue under investigation. This comparison is the primary basis for

the examiner's ultimate truth and deception decision.[72]

Throughout the testing period the examiner observes the subject. He notes on the interview sheet any comments or complaints made by the subject; he also notes any questions the subject asked during the testing period. These notes are said to provide spontaneous verbal clues to the subject's truthfulness or deception.

At the conclusion of the polygraph testing the examiner interprets the subject's polygraph records and his behavior in terms of truth and deception. If both the records and the behavior are congruent, i.e., if both indicate deception, for example, the subject is reported as being deceptive. However, if the records and behavior are not congruent, the records always take precedence. In other words, behavior clues are used only to reinforce and aid polygraph record interpretation; they are never used to overrule it.[73]

Subjects Studied

The interview sheets of one hundred different polygraph subjects were randomly selected from the verified files of John E. Reid and Associates, a security consulting

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[72]The previous paragraph is an excerpt from Fred E. Inbau and John E. Reid, "The Lie Detector Technique: A Reliable and Valuable Investigative Aid," American Bar Association Journal, 50, 5 (May 1964), p. 470.

[73]See: John Reid and Fred Inbau, Truth and Deception, The Polygraph ("Lie Detector") Technique (Baltimore: The Williams and Wilkins Co., 1966), p. 152.

agency specializing in the administration of polygraph examinations, 600 S. Michigan Avenue, Chicago, Illinois. These files consist only of data pertaining to polygraph subjects whose truthfulness or deception is certain. For example, if in a certain murder case, ten subjects are given polygraph examinations and one of those subjects offers a complete and fully corroborated confession, he would be considered a verified lying subject and his case data would be filed accordingly. The remaining nine subjects would be considered verified truthful.

Fifty of the subjects selected for this study were of the verified truthful category; fifty were verified liars. Table 1 summarizes the background data for each category of subject.

Of the fifty truthful subjects studied, 24 were males and 26 females; 47 were Caucasian, and 3 were Negro. The age range for these subjects was from 13 to 68 while the mean age was 34 and the median age, 28.

Of the fifty lying subjects, 43 were males and 7 were females; 40 were Caucasian, 10 Negro. The age range for these subjects was from 13 to 65 with a mean age of 30 and a median age of 25.5.

Table 1

Comparison of Background Information
of Polygraph Subjects

INFORMATION		TRUTHFUL SUBJECTS (N=50)	LYING SUBJECTS (N=50)
Sex:	Male	24	43
	Female	26	7
Race:	Caucasian	47	40
	Negro	3	10
Age:	Range	13-68	13-65
	Mean	34	30
	Median	28	25

The Original Investigations

Of the 50 verified truthful subjects, 48 of them were involved in theft investigations, e.g., employee theft, burglary, robbery, etc.; 1 each of the remaining two subjects were involved in the investigation of a murder and of sexual offense, respectively. A total of 6 different examiners conducted the examinations on the truthful subjects.

Of the 50 verified lying subjects, 41 of them were involved in theft investigations, 5 in sexual offenses, 2 in bribery, and 1 each in a child beating investigation

and the illegal use of alcohol, respectively. A total of 4 different examiners conducted the examinations on the lying subjects.

Table 2 shows the distribution of the types of original investigations for each subject category.

Table 2

Comparison of the Original Investigation Issues

INVESTIGATION ISSUE	TRUTHFUL SUBJECTS (N=50)	LYING SUBJECTS (N=50)
Theft	48	41
Murder	1	
Sexual Offense	1	5
Drinking		1
Bribery		2
Child Beating		1

The Polygraph Examiners

No precise data are available as to the background information of the ten examiners who had conducted the examinations on the subjects studied. However, it is known that all the examiners were licensed as Detection of Deception Examiners in the State of Illinois; all had

undergone a six month internship training program conducted at John E. Reid and Associates, Chicago; all had been taught to conduct examinations according to the RCQT and to observe and record polygraph subjects' behavior in a similar manner; and, all had a minimum of one year of full time experience in conducting polygraph examinations.

METHOD OF STUDY

This section contains a discussion of the procedure used in categorizing and evaluating information from the subjects' polygraph interview sheets. The discussion will involve first, elicited verbal clues, then spontaneous verbal clues, and finally, nonverbal clues.

Elicited Verbal Clues

Elicited verbal clues are defined as the polygraph subject's verbal answers to each of the examiner's structured interview questions. In other words, the answers which the subject gives in response to the structured interview questions are supposed to provide a clue to the subject's truthfulness or deception (about the offense being investigated), according to the theory of the interview, as previously discussed. These answers are recorded by the examiner, as the subject

says them, on the interview sheet alongside a number corresponding to the particular question answered. For example, if a subject answers the "think" question with: "No, I never thought of killing anyone." and, the "truth serum" question with, "Sure, I'll take truth serum.", the examiner records these answers on his interview sheet alongside the numbers 9 and 12, respectively, as these are the ninth and twelfth structured interview questions. The examiner follows this same procedure for recording all of the subject's answers to the interview questions.

Three hypotheses were formulated as regards the elicited verbal clue data. These were:(1) The truthful subjects will give significantly more "typical truth-teller" than "typical liar" answers to each of the structured interview questions than would be expected on a chance basis for either answer. (2) The lying subjects will give significantly more "typical liar" than "typical truth-teller" answers to each of the structured interview questions than would be expected on a chance basis for either answer. (3) Each of the structured interview questions will provide a basis for discriminating between the truthful and the lying subjects. That is, the truthful subjects will give significantly more "typical truth-teller" and the lying subjects significantly more "typical liar" answers (than would be expected on a chance basis) to each of the structured interview questions.

In order to test the hypotheses it was necessary to classify the recorded verbal answers of all the verified truthful and lying subjects. This classification was done by reviewing each of their answers to all questions asked of them independent of any knowledge of their actual truthfulness or deception. As each recorded answer was reviewed a judgment was made as to whether or not that particular answer was one which, according to the theory of the structured pre-test interview, would be said by a truthful subject or by a lying subject in response to that particular interview question answered. Each answer for each question was then classified as being either the answer of a "typical truth-teller" or a "typical liar." For example, if a subject's recorded verbal answer to the "truth serum" question was similar to: "Sure, I'll take truth serum, or anything else you want to give me.", it was classified as a "typical truth-teller's," answer. On the other hand, if the recorded answer was something like: "I won't take truth serum until I check with my doctor.", it was classified as a "typical liar's" answer.

All recorded verbal answers to the structured interview questions were classified independently of other verbal answers. Also, the classification was made only on the recorded verbal answer; any nonverbal behavior which may have been noted at an answer was disregarded. In the case where a verbal answer's actual classification was

doubtful, i.e., where a classification judgment was extremely difficult, that answer was classified as a "typical truth-teller's" answer. The reason for this is that for verbal answers to be useful in discriminating between the truthful and the deceptive, they should do so without extraordinary interpretation; the presumption of truthfulness should take precedence over ambiguity.

The recorded interview answers for all subjects were classified. Then the number of "typical truth-teller" and "typical liar" answers to each interview question was tabulated for both categories of subjects. For example, the number of "typical truth-teller" answers to the "you" question for the fifty verified truthful subjects was determined; then, the number of "typical liar" answers to this same question for the same subjects was determined. This procedure was followed for all interview questions for all verified truthful subjects; and, was repeated for the verified lying subjects. A master data sheet for each category of subject was used to tabulate the elicited verbal clue results.[74]

Spontaneous Verbal Clues

Spontaneous verbal clues are those comments which a polygraph subject makes during the examination without

[74]See Appendix A, Section I for master data sheets for both categories of subjects; and, Section II for samples of actual verbal answers and their classification.

direct prompting from the examiner. When a subject makes such a comment the examiner records it on the front of the interview sheet.

Reid's prior research suggests that spontaneous verbal clues are usually made by lying subjects although he offered no hard data to support this position. Therefore, for the present research, the following hypothesis was formulated: The lying subjects will exhibit spontaneous verbal clues significantly more often than the truthful subjects.

It was decided that it may be of some practical value to classify spontaneous statements, even though this was not essential to the testing of the hypothesis. Based upon Reid's research this classification resulted in three groupings of spontaneous statements: complaints, questions, and requests to hurry the examination.

All of the subjects' interview sheets were reviewed. The recorded spontaneous statements were placed into one of the three groups and the frequency of occurrence of spontaneous clues in each group, for both categories of subjects, was tabulated.[75] From this the spontaneous clues recorded for the truthful subjects were compared to those of the lying subjects.

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[75]See Appendix B.

Nonverbal Clues

Nonverbal clues include such things as the general appearance and demeanor of the polygraph subject, the way in which he answers questions, and the examiner's impression of whether or not the subject looks and talks as a truthful subject or as a lying subject. These clues, and any others which the examiner may observe during the interview and examination, are recorded by the examiner on the front of his interview sheet.

Reid's prior research suggests that the nonverbal behavior of truthful and lying subjects often differs. It also suggests, however, that at times truth-telling subjects exhibit some behavior more typical of "liars" and vice versa. Therefore, two hypotheses were formulated as regards nonverbal clue data. These were: (1) A significantly greater number of the truthful subjects will exhibit "typical truth-teller" nonverbal clues more often than "typical liar" nonverbal clues than would be expected on a chance basis. (2) A significantly greater number of the lying subjects will exhibit "typical liar" nonverbal clues more often than "typical truth-teller" nonverbal clues than would be expected on a chance basis.

The testing of the hypotheses required that the nonverbal clue data recorded on the interview sheets be

classified according to what is supposed to be "typical truth-teller" and "typical liar" behavior.

Reid's prior research was used as a basis for this classification. From his data two equal groups of descriptors were developed. One group consisted of nine "typical truth-teller" descriptors. These were: "genuinely friendly," "direct answers," "good eye contact," "cooperative," "light hearted," "composed," "relaxed," "talkative,"[76] and "truth-teller's appearance." On the other hand, the "typical liar" grouping consisted of: "overfriendly," "evasive answers," "poor eye contact," "uncooperative," "scared," "nervous facial appearance," "nervous bodily movements," "untalkative"[77] and "liar's appearance."

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[76]The word "talkative" is used here as meaning responsive to the examiner's questions. Reid explains that truthful subjects "usually become more responsive and begin to talk quite freely" after the interview begins. See John Reid and Richard Arther, "Behavior Symptoms of Lie-Detector Subjects," The Journal of Criminal Law, Criminology and Police Science, 44, 1 (May-June, 1953), p. 107.

[77]The word "untalkative" is used here as meaning only minimal responsiveness to the examiner's interview questions, such as, only a "yes" or "no" when a more lengthy answer would seem to be in order. Reid explains that lying subjects are often "afraid to speak for fear of trapping themselves" and rarely, if ever, change from this non-talkative state. See Reid and Arther, "Behavior Symptoms," p. 107.

The descriptors "truth-teller's appearance" and "liar's appearance"require some elaboration. By themselves, of course, they are not specific nonverbal clues. Rather, they are an examiner's "shorthand" for his overall appraisal of a subject's nonverbal clues. However, because this researcher was aware that the original examiners had been trained to use such shorthand and because these descriptors do give a good indication of an examiner's nonverbal clue appraisal, they were included.

The interview sheets were reviewed for the presence of words and phases which the examiners had recorded to describe the subjects' nonverbal behavior. All words and phases were then converted into the descriptor which came closest in meaning to the examiner's words and phases. For example, if an examiner had recorded the word "fidgety," it was converted into the descriptor "nervous bodily movements;" if the word "calm" was recorded it was converted into the descriptor "composed;" if the phrase "dry mouth" was recorded it was converted to "nervous facial appearance" etc.

Subsequent to the conversion of all nonverbal clue data to the appropriate descriptors, all subjects were classified as "typical truth-tellers" or "typical liars." This was,for the most part, a quantitative classification and was accomplished by assigning one point for each

descriptor appearing in either of the "typical" groups and then totaling the points for each group for each subject. The "typical" group with the most points was used as the basis for classifying subjects. For example, if the non-verbal descriptors for a subject were: "composed," "relaxed," "good eye contact," "evasive answers," and "over-friendly" that subject was classified as a "typical truth-teller." This is so because the first three of these descriptors are those of a "typical truth-teller" while the latter two are those of a "typical liar." Thus, the subject received three truth-teller points and only two liar points. In no case was any single descriptor counted more than one time for any subject regardless of the number of words or phrases which were converted into that descriptor. The reason for this was to lessen the possibility of a subject being classified on the basis of only one outstanding behavior trait.

In four instances the total "truth-teller" points equalled the total "liar" points; all of these occurred on the verified lying subjects. In these cases, a qualitative decision had to be made. This was done by giving preference to descriptors which indicated the examiner's overall appraisal, e.g., "truth-teller's appearance" etc. Thus, if the following descriptors were recorded for a

subject, "truth-teller's appearance," "good eye contact," "nervous facial appearance" and "uncooperative" that subject was classified as a "typical truth-teller."

There were four interview sheets on which nonverbal clue data were not recorded; three of these were sheets of verified truthful subjects and one was of a verified lying subject. Therefore, of necessity, the nonverbal clue results are based upon forty-seven and forty-nine subjects for the truthful and lying categories, respectively.[78]

LIMITATIONS OF THE STUDY

This research was based on "after-the-fact" information derived from real-life polygraph examinations. As a consequence, it was not possible for the researcher to allow for all the variables involved in the subjects' examinations. For instance, the sample subjects were selected only on the basis of their known truthfulness and deception. No attempt was made to select subjects according to their personal characteristics or to the case type in which they were involved; nor were the truthful subjects matched with the lying subjects. Moreover, it was not possible to evaluate the personal characteristics of the original examiners. Although an attempt was made to compensate for these shortcomings by describing the subjects and examiners in as great detail as possible it is readily admitted that any of these variables could

[78]See Appendix C for the nonverbal clue master data sheet.

have influenced the original data on which the research is based.[79] However, since the purpose of this research was to determine if a difference exists between the behavior of truthful and lying subjects, truthfulness and deception were considered irrespective of the possible influence of other factors; the results must be viewed accordingly.

There is no assurance that the sample subjects are representative of all polygraph subjects. The reason for this is that only about 30 percent of all polygraph subjects are found to be lying; of these, only a small percentage are ever verified. About 70 percent of all polygraph subjects are reported as truthful;[80] only a small percentage of these are ever verified. Thus, selecting subjects from the verified files does not necessarily

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[79]See for example: Goldine C. Gleser, Louis A. Gottschalk, and Watkins John, "The Relationship of Sex and Intelligence to Choice of Words: A Normative Study of Verbal Behavior," Journal of Clinical Psychology, 15, (April 1959), pp. 182-191; Robert Malmo, Thomas Boag, and A. Arther Smith, "Physiological Study of Personal Interaction," Psychosomatic Medicine, 19, (1957), pp. 105-119; and, J.S. Bruner and R. Taguiri, "The Perception of People" in G. Lindzey (ed.), Handbook of Social Psychology, 2, (Reading, Mass.: Addison-Wesley, 1954), pp. 634-54.

[80]See: Fred E. Inbau and John E. Reid, Lie Detection and Criminal Interrogation (Baltimore: The Williams and Wilkins Co., 1953), pp. 110-113; and, R. A. Sternbach, L. A. Gustafson, and R. L. Collier, "Don't Trust the Lie Detector," Harvard Business Review, 40, (Nov.-Dec., 1962), pp. 127-134.

mean that the subjects are representative of all polygraph subjects.

The criterion used as the verification of the sample subjects' truthfulness or deception was a fully corroborated confession. There are some who would quarrel with the validity of such verification.[81] Nevertheless, at the present time, a corroborated confession is believed by this researcher to be the only effective index of truth-telling and lying for purposes of real-life polygraph research.

It may have been preferable for the coding, or categorization, of the data in the present research to have been done by two, or more, persons. This may have increased the reliability of the coding or, at least, would have made the reliability measurable. However, due to time and expense factors it was not possible to train coders for this purpose. Nevertheless, it is believed that the methodology employed by the researcher, and his experience with and knowledge of the polygraph technique, provided the basis for more accurate coding than could be obtained by persons without such knowledge and experience.

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[81]For discussion of an alleged "false positive" polygraph examination and the problem of using a confession as a valid verification of truthfulness and deception see: H. B. Dearman and B. M. Smith, "Unconscious Motivation and the Polygraph Test," American Journal of Psychiatry, 119, (May 1963), p. 1017.

Two basic assumptions of the methodology used for studying nonverbal behavior were: that if behavior occurred it was observed and recorded; and, if behavior did not occur it was not recorded. These assumptions were necessary because there is no "check off" system which forces examiners to self-code nonverbal behavior during an examination. While these assumptions are open to question, it should be noted that all examiners were trained in the RCQT and all had adequate experience in using it; these factors give some support to the validity of the assumptions. In order to compensate somewhat for the lack of a self coding system, which would have provided for a direct comparison between the various nonverbal clues, a methodology was used which compared these clues collectively, on a quantitative basis, rather than individually on a qualitative basis. The results of this methodology may not be as meaningful to polygraph examiners as would be a qualitative analysis.

Chapter 5

RESULTS OF THE STUDY

The results of the study will be reported in this chapter. In order to clarify these data the three types of behavior clues studied, elicited verbal, spontaneous verbal, and nonverbal, will be considered separately.

ELICITED VERBAL CLUE RESULTS

Table 3 displays the number and percentage of "typical truth-teller" and "typical liar" answers given to each structured interview question by the truthful subjects. Also shown are the results of chi-square tests which were run to test the significance of the results of each interview question. In running these tests a chance expectancy was assumed. That is, the truthful subjects who were asked each question were expected to have given as many "typical truth-teller" as "typical liar" answers. This assumption was made because there is no data available on which a different expectancy level could be

Table 3

Elicited Verbal Clue Results: Truthful Subjects

Abbreviation of Structured Interview Question	No. Truthful Subjects Asked Question	"Typical Truth-teller" Answers		"Typical Liar" Answers		x^2[a] between Columns 2 and 4
		No.	%	No.	%	
You	50	48	96	2	4	40.5**
Suspicion	47	15	32	32	68	5.4 (-)*
Who Not Suspect	24	15	62	9	38	1.0
Think Stolen	49	26	53	23	47	.08
Best Opportunity	30	25	83	5	17	12.0**
Fingerprints	12	8	67	4	33	.75
Borrow	33	31	94	2	6	23.7**
Ever Happen Before	31	27	87	4	13	15.6**
Think	45	40	89	5	11	25.7**
Approach	13	13	100	0	0	11.1**
How will L.D. Come Out on You	49	44	90	5	10	29.5**
Truth Serum	46	40	87	6	13	23.7**
Happen to Doer	37	26	70	11	30	5.3*
Attitude	44	36	82	8	18	16.6**
TOTALS	510	394	78%	116	22%	

[a] with Yates correction for continuity, where necessary
*significant at, or beyond .05 level
**significant at, or beyond .01 level

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based.[82] It should be kept in mind in viewing this table that the results shown across each row are based upon the number of subjects shown in the first column, not necessarily the total sample of fifty subjects.

An analysis of the data in Table 3 shows that ten of the interview questions gave results in agreement with the hypothesis. In other words, a significant number of the truthful subjects who were asked these ten questions gave more "typical truth-teller" than "typical liar" answers. Of these ten questions the "what should happen to doer" question was answered with "typical truth-teller" answers by 70 percent of the subjects asked; this result was significant at the .05 level. The percentage results for the other nine questions ranged from 82 percent to 100 percent; these results were significant at, or beyond, the .01 level.

The four interview questions which did not give results in agreement with the hypothesis for the truthful subjects were the "suspicion," "who not suspect," "think stolen," and "fingerprint" questions. The "suspicion" question gave results in a negative direction; the truthful subjects who were asked this question gave a statisti-

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[82] While Reid used a pre-test interview prior to the publication of his article on behavior symptoms of polygraph subjects, he did not mention the idea of a structured interview at that time. The first mention of the structured interview, though Reid has never termed it this way, was in: Fred E. Inbau and John E. Reid, Lie Detection and Criminal Interrogation (Baltimore: The Williams and Wilkins Co., 1953), pp. 10-13.

cally significant, greater number of "typical liar" answers than "typical truth-teller" answers. The latter three of the questions not in agreement with the hypothesis, while all giving results in the right direction, i.e., more "typical truth-teller" than "typical liar" answers, did not give results approaching significance.

The elicited verbal clue results of the lying subjects are displayed in Table 4. These results, as viewed across each row, are based upon the number of subjects shown in the first column and not necessarily on the total subject sample.

The data in Table 4 show that a statistically significant number of lying subjects gave more "typical liar" than "typical truth-teller" answers to six of the fourteen interview questions. The "suspicion," "think stolen," "best opportunity," and "what should happen to doer" questions were answered with "typical liar" answers by 91 percent, 89 percent, 92 percent, and 83 percent of the lying subjects who were asked these questions, respectively; these results were significant at, or beyond the .01 level. The "who not suspect" and the "truth serum questions were answered with "typical liar" answers by 90 percent and 68 percent of the lying subjects, respectively; these results were significant at the .05 level.

It is interesting to note that for the lying subjects two of the interview questions, the "ever happen before" and the "approach" questions, gave results in a negative

Table 4

Elicited Verbal Clue Results: Lying Subjects

Abbreviation of Structured Interview Question	No. Lying Subjects Asked Question	"Typical Truth-teller" Answers		"Typical Liar" Answers		x^2[a] between columns 2 and 4
		No.	%	No.	%	
You	50	18	36	32	64	3.4
Suspicion	43	4	9	39	91	26.9**
Who Not Suspect	10	1	10	9	90	4.9*
Think Stolen	35	4	11	31	89	19.3**
Best Opportunity	25	2	8	23	92	16.0**
Fingerprints	21	7	33	14	67	1.7
Borrow	13	4	31	9	69	1.2
Ever Happen Before	39	21	54	18	46	.10 (-)
Think	45	19	42	26	58	.80
Approach	31	20	65	11	36	2.1 (-)
How will L.D. Come Out on You	47	20	43	27	57	.76
Truth Serum	40	13	32	27	68	4.2*
Happen to Doer	23	4	17	19	83	8.5**
Attitude	43	20	47	23	53	.09
TOTALS	465	157	31%	308	69%	

[a]with Yates correction for continuity, where necessary
*significant at, or beyond .05 level
**significant at, or beyond .01 level

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direction although these results were not statistically significant. In other words, the lying subjects answered both of these questions more often with "typical truth-teller" than with "typical liar" answers.

Based upon the data in Tables 3 and 4 it is evident that only three interview questions, by themselves, provide a basis for discriminating between the truthful and lying subjects. The "truth serum," the "what should happen to doer," and the "best opportunity" questions all gave statistically significant results in the right direction for both categories of subjects. However, the first two of these questions were significant at different levels for the truthful and lying subjects, while the "best opportunity" question was significant at the .01 level for both categories of subjects.

The "fingerprint" question is the only one which did not show significant results for either the truthful or lying subjects. However, since this question did show results in the right direction for both categories of subjects it is possible that significant results would have been found if a larger sample of subjects had been studied. Only twelve of the truthful and twenty-one of the lying subjects were asked this question.

As explained previously, all polygraph subjects are not asked all structured interview questions depending, of course, upon the case facts at hand. As a consequence of this, it is not possible to analyze the elicited verbal clue results collectively, i.e., to consider the combined

effectiveness of the interview questions, as an examiner does during actual testing. All that can be stated in this regard from the data shown in Tables 3 and 4 is that of the total 510 answers given by the truthful subjects, 78 percent of them were "typical truth-teller" answers; whereas, 69 percent of the total 465 answers given by the lying subjects were "typical liar" answers. These percentages, however, have little meaning since they do not reflect that the interview questions, as a group, were 78 percent and 69 percent effective for the truthful and lying subjects, respectively.

SPONTANEOUS VERBAL CLUE RESULTS

Table 5 summarizes the occurrences of each of the three classifications of spontaneous verbal clues for both the truthful and lying subjects. As is shown, only 2 of the truthful subjects made any kind of complaining statement during their examinations. Both of these subjects complained of the "pins and needles feeling" caused by the polygraph's blood pressure cuff. In contrast to this, 17 of the lying subjects complained during their examinations. Of these seventeen, 7 lying subjects complained about the polygraph attachments; 10 complained about their own physical or emotional condition. For example, complaints about the polygraph attachments were statements

Table 5

A Comparison of Truthful and Lying
Subjects on Three Types of Spontaneous Verbal Clues

SUBJECT CATEGORY	Complains To Examiner		Questions Test Procedure		Requests to Hurry Examination	
	No.	%	No.	%	No.	%
Truthful Subjects (N=50)	2	4	1	2	0	0
Lying Subjects (N=50)	17	34	5	10	3	6

such as: "They're (the attachments) cold.", or, "The chair is uncomfortable." Complaints about the subject's own condition included the following: "I've got an awful lot of personal problems. Will that affect the test?"; or, "I've got hemorrhoids and have bad respiration."

Table 5 shows that 5 of the lying subjects questioned the polygraph testing procedure; whereas, only 1 of the truthful subjects did so. These questions generally concerned the number of individual tests to be given and when the testing results would be known. None of the truthful subjects asked the examiner to hurry the examination. However, 3 of the lying subjects told the examiner to hurry because they had an appointment elsewhere.

To answer the question of whether the lying subjects exhibited more spontaneous verbal clues than the truthful subjects, all such clues, in each of the three classifications, were grouped together for each of the subject categories. The results of this grouping are shown in Table 6; 3 truthful and 25 lying subjects exhibited spontaneous verbal clues. The significance of the difference between the truthful and lying subjects in respect to such clues was tested. A 2 x 2 contingency table was prepared and a chi-square test of independence was run. The

Table 6

Grouped Spontaneous Verbal Clue Results

SUBJECT CATEGORY	Total Subjects Exhibiting Spontaneous Verbal Clues	Total Subjects Not Exhibiting Spontaneous Clues	x^2[a]
Truthful (N=50)	3	47	21.87**
Lying (N=50)	25	25	

[a]with Yates correction for continuity
**significant beyond .01 level

results of this test, also shown in Table 6, indicate significance at the .01 level. The lying subjects did exhibit a significantly greater number of spontaneous clues than the truthful subjects. However, as can be seen from an analysis of the table, the absence of spontaneous clues, while it may give some weight in the direction of the truthful subjects, is not conclusive. The lying subjects were just as likely as not to exhibit such clues.

NONVERBAL CLUE RESULTS

Nonverbal behavior clues are recorded on interview sheets without regard to any standardized "check off" system. Because of this it was considered inadvisable to separately analyze the results of each of the eighteen nonverbal clue descriptors. However, in order to provide some indication of the relative frequency of occurrence of the "typical truth-teller" and "typical liar" descriptors for both categories of subjects, Tables 7 and 8 were prepared.

Table 7 shows the number of times each of the nine "typical truth-teller" descriptors occurred for the truthful and the lying subjects. Table 8 shows the relative occurrences of the "typical liar" descriptors for both categories of subjects. In viewing each of these tables

Table 7

Comparison of Truthful and Lying Subjects On "Typical Truth-Teller" Nonverbal Clue Descriptors

SUBJECT CATEGORY	"TYPICAL TRUTH-TELLER" NONVERBAL CLUE DESCRIPTORS									
	Truth-teller's Appearance	Talka-tive	Good Eye Contact	Direct Answers	Genuinely Friendly	Composed	Light Hearted	Relaxed	cooper-ative	Total
Truthful Subjects (N=47)	38	38	30	28	15	16	7	4	4	180
Lying Subjects (N=49)	3	4	9	7	2	17	2	5	1	50

Table 8

Comparison of Truthful and Lying Subjects On "Typical Liar" Nonverbal Clue Descriptors

SUBJECT CATEGORY	"TYPICAL LIAR" NONVERBAL CLUE DESCRIPTORS									
	Liar's Appearance	Untalkative	Poor Eye Contact	Evasive Answers	Nervous Bodily Movements	Nervous Facial Appearance	Scared	Overfriendly	Uncooperative	Total
Truthful Subjects (N=47)	1	2	0	0	1	2	4	1	0	11
Lying Subjects (N=49)	22	26	24	19	7	15	6	3	2	124

it must be kept in mind that each column is independent of the others and each is based upon a total of 96 subjects, 47 truthful and 49 lying.

Table 9 displays the number and percentage of subjects in both the truthful and lying categories who were classified as "typical truth-tellers" and "typical liars" by the analysis of nonverbal clue descriptors. Also shown are the results of chi-square tests for levels of significance which were run on the data. Separate tests were run for each category of subject in order to determine whether the frequency of classification as "typical truth-teller" and "typical liars" for each differed significantly from a chance expectancy.

As was expected, a significantly greater number of the truthful subjects, 94 percent, exhibited more "typical truth-teller" than "typical liar" nonverbal clues; whereas, a significantly greater number of lying subjects, 82 percent, exhibited "typical liar" clues more often than "typical truth-teller" clues. For both categories of subjects the results were significant beyond the .01 level.

Table 9

Results of Classification of Subjects on Nonverbal Clues

SUBJECT CATEGORY	Classified "Typical Truth-teller" on Nonverbal Clues		Classified "Typical Liar" on Nonverbal Clues		x^2[a]
	No.	%	No.	%	
Truthful Subjects (N=47)	44	94	3	6	34.0**
Lying Subjects (N=49)	9	18	40	82	18.4**

[a]with Yates correction for continuity
**significant at, or beyond, .01 level

Chapter 6

DISCUSSION

The elicited verbal clue results suggest that the interview questions are more effective on truthful subjects than on lying ones. Of course, these results could have been influenced by many factors, such as, differences in the sample subjects, differences between the examiners, etc. The results also could have been a product of the methodology. All recorded verbal answers which were difficult to classify were intentionally classified as "typical truth-teller" answers. This procedure could have led to the spurious classification of some of the lying subjects' answers; thus, for these subjects the results may have been skewed in favor of a "typical truth-teller" finding on some questions.

While three of the interview questions were shown to discriminate between the truthful and the lying subjects, this result may actually have no practical significance. There are two reasons for this. First, such individual question discrimination is not the examiner's basis for deciding the subjects' truthfulness and deception. Thus, examiners may actually use some of the questions only

to get an indication of truthfulness rather than an indication of deception. In fact, the results would seem to bear out that such use of the questions may be an important factor in the interview. For example, the "suspicion," "who not suspect" and "think stolen" questions all gave significant results in the right direction on the lying subjects; none of them did so on the truthful subjects. A reason for this finding could be that the "correct" answers to these questions are always known to the lying subject but may not be known to the truthful subject. The lying subject always knows who did, or did not, commit the offense; he always knows if the missing items were actually stolen, etc. This knowledge may cause him to give false or misleading answers to these questions since the true answers will incriminate him. On the other hand, the truthful subject may not have any of this knowledge; if he does, he may be reluctant to reveal it. The examiner, recognizing that both the lying and truthful subjects may deny their "suspicion", etc. possibly only pays attention to the answers to these questions when they are affirmative, i.e., when the subject tells of his suspicions or knowledge of the offender.

A second reason that individual question discrimination may be unimportant when applied to actual polygraph

examinations is that the verbal answers occur in combination with nonverbal clues. In other words an examiner is attentive not only to what a subject says, but also, how he says it. For example, even though the results show that both truthful and lying subjects are likely to deny their suspicion of the offender, it is quite possible that they give such a denial in completely different ways. As the truthful subject answers, he may be very direct, and "look truthful," etc. The lying subject, however, recognizing the implication of a truthful answer, may stall, falter, or give other nonverbal clues to his deception. In other words, particular questions may have practical value beyond their usefulness in eliciting verbal clues. The subject's verbal answers may be used as a cue to the examiner to be more, or less, attentive to nonverbal clues.

The spontaneous verbal clue data suggest that Reid's prior finding may be correct: truthful subjects do not seem to exhibit such clues as often as lying subjects. However, spontaneous clues are dependent upon the subject doing something beyond what it would seem most subjects do (only 28 percent of the total sample subjects exhibited spontaneous clues); therefore, it seems likely that future research, using a larger sample of subjects than the present study, could lead to more meaningful data in this area.

The results of the present study as regards nonverbal behavior clues seem to substantiate Reid's research. The nonverbal clues which Reid claimed were common to truthful subjects were, in fact, exhibited by the present truth-teller sample more often than were those clues Reid claimed were common to lying subjects. Also, the reverse of this seems to be true; the present lying subject sample exhibited Reid's "liar clues" more often than his "truth-teller" clues.

One important qualification of the nonverbal clue results which deserves discussion is that of the effect of examiner bias on the original data. While it was not possible to determine the extent of this effect, and, while it was assumed that it did not occur, it seems likely that such bias could have influenced the results. For example, in actual examinations the examiner may observe that a subject cannot "look him in the eye," but, he may also observe that the subject seems shy - a possible explanation for his "poor eye contact." When the examiner can in his own mind explain a certain behavioral trait (or believes that he can) he may neglect to note that trait on the interview sheet. Thus, the only nonverbal clues which are noted are those which the examiner cannot explain, or perhaps, those which he feels are not in conflict with his

judgment of a certain trait's meaning. Rosenthal's work, which deals with the effect of experimenter bias on research results, would seem to confirm the possibility of examiner bias on the results of the present study.[83]

It is possible that some of the descriptors which were used as a basis for classifying subjects on nonverbal behavior were of little actual value to the classification. For example, two of the "typical truth-teller" descriptors "composed" and "relaxed" were observed in almost equal numbers of truthful and lying subjects. This finding would seem to conflict with Reid's data. However, there may be an explanation for this. The present research was based primarily upon observation of subjects prior to actual testing; whereas, Reid's study may have been based upon observation over an entire examination. Lying subjects are said to become increasingly nervous as the examination progresses; truthful subjects, less nervous. Thus, an appraisal over an entire examination might well indicate that truthful subjects are more composed and relaxed than lying subjects.

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[83]Robert Rosenthal, Experimenter Effects In Behavioral Research (New York: Appleton-Century-Crofts, 1966).

In general, the results of the present study suggest that both the verbal and nonverbal behavior of truthful polygraph subjects differ in significant, observable respects from those of lying subjects. Because of this, it does seem that behavior data can be a source of useful information in the diagnosis of truth and deception. This does not mean, however, that behavioral data are substantial enough to replace polygraph record interpretation, which, even without such data, can be a highly accurate means of diagnosing truth and deception.[84] What it does mean is that the study of polygraph subject behavior has progressed beyond the point of being useful merely in helping an examiner determine how a subject should be "handled," as Reid suggested in 1953. Behavior data would seem to be useful as an aid to the diagnosis of truth and deception,

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[84]See, for example: Frank S. Horvath and John E. Reid, "The Reliability of Polygraph Examiner Diagnosis of Truth and Deception," The Journal of Criminal Law, Criminology, and Police Science, 62, 2 (June, 1971), pp. 276-281; also see the research on experimental "lie detection," for example: David T. Lykken, "The GSR In the Detection of Guilt," Journal of Applied Psychology, 43 (December, 1959) pp. 385-388; Joseph Kubis, Analysis of Polygraphic Data, Technical Documentary Report No. RADC-TDR-64, 101 (New York: Rome Air Development Center, 1965).

as long as they are regarded as a source of hypotheses to be checked against other data within the examiner's knowledge, such as his polygraph record interpretation. When agreement, or convergence, emerges, the examiner's confidence in the validity of his data, and his diagnosis, increases. When such agreement is not apparent, the examiner can use this as a cue to reassess his data and perhaps, be cautious in his diagnosis.

It is left to future research to determine more precisely than did the present study how behavior differs between the truthful and lying subject. Also, future work could emphasize the development and refinement of present techniques of eliciting, observing and recording polygraph subject behavior, especially nonverbal behavior. It is possible that, as Ekman and Friesen found in their studies of psychotheraphy subjects,[85] certain areas of the body are more important sources of behavior clues to truth and deception than others. Moreover, it is not without

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[85]Paul Ekman and Wallace V. Friesen, "Nonverbal Leakage and Clues to Deception," Psychiatry, 32, (1969), pp. 88-106; Paul Ekman and Wallace V. Friesen, "Nonverbal Behavior in Psychotheraphy Research," in John Shlein (ed.) Research In Psychotheraphy, Vol. 3, (Washington, D.C.: American Psychological Association, 1968).

reason to suggest that future work could lead to an accurate, practical, standardized system of recording behavior data for the use of all polygraph examiners. Perhaps, Birdwhistell's kinesics signs could be a model for this system.[86] Regardless of the direction future research takes, further investigation of polygraph subject behavior is warranted.

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[86]An example of these signs appears in: Julius Fast, Body Language (New York: M. Evans and Co., Inc., 1970), pp. 166-168.

Chapter 7

SUMMARY

Polygraph examiners frequently disagree about whether or not judgments of polygraph subjects' behavior should be used in making truth and deception decisions. On the one hand, some examiners insist that behavior judgments should not be used. On the other hand, some examiners claim that behavior judgments should be used because they provide important information useful in diagnosing truth and deception.

This study was conducted to determine whether polygraph subjects' verbal and nonverbal behavior provides clues to the subjects' actual truthfulness and deception. Verbal behavior was broken down into two categories: elicited and spontaneous. Elicited verbal behavior was defined as the subjects' verbal answers to a set of standardized structured pre-test interview questions. These questions, asked of polygraph subjects prior to actual testing, are said to elicit verbal clues to the subjects' truthfulness and deception. There are fourteen such questions, although not all subjects are asked all questions, depending upon the particular facts of the offense being investigated.

Spontaneous verbal behavior was defined as those comments, complaints, and requests which a subject makes during a polygraph examination without direct prompting from the examiner. Nonverbal behavior was defined as the actions, appearance, and demeanor of the subject during the pre-test interview and the examination as observed by the examiner.

In this study the verbal and nonverbal behavior of fifty verified truthful and fifty verified lying subjects was analyzed. This analysis was made by reviewing the interview sheets of these subjects. The interview sheets contain all data pertinent to the behavior and the examination for each subject.

In analyzing elicited verbal behavior the actual verbal answer given by each subject to the structured pre-test interview questions was classified as being either a "typical truth-teller" or "typical liar" answer, according to accepted theory. The number of classifications in either of the two "typical" groups for all interview questions and for both the truthful and lying subjects was compared to the number expected on a chance basis.

The questions to be answered by conducting this classification were: Did a significant number of the actual truthful subjects give more "typical truth-teller" than "typical liar" answers to each of the interview questions; and, Did a significant number of the actual lying

subjects give more "typical liar" than "typical truth-teller" answers to the interview questions. It was further hypothesized that if these former two questions were affirmed for any of the interview questions then those interview questions discriminated between the truthful and lying subjects.

The results indicated that ten of the interview questions gave results in agreement with the hypothesis for the truthful subjects; only six interview questions gave results in agreement with the hypothesis for the lying subjects. In other words, a significant number of the truthful subjects gave more "typical truth-teller" than "typical liar" answers to ten of the interview questions; a significant number of the lying subjects gave more "typical liar" than "typical truth-teller" answers to six of the questions. Only three of the interview questions were found to give results in agreement with the third elicited verbal behavior hypothesis, i.e., where truthful subjects gave "typical truth-teller" and lying subjects gave "typical liar" answers in significant numbers to the same interview question.

Based upon prior research on polygraph subject behavior it was hypothesized that lying subjects exhibit spontaneous verbal behavior to a significantly greater degree than truthful subjects. This hypothesis was tested by determining the frequency of occurrence of such behavior

for both the truthful and lying subject samples and then conducting a statistical analysis of the data to test for the significance of the difference between the truthful and lying subjects. This analysis revealed that the hypothesis must be accepted. The lying subjects did exhibit spontaneous verbal behavior to a significantly greater degree than did the truthful subjects. Only six percent of the truthful subjects exhibited such behavior; whereas, fifty percent of the lying subjects did so.

Prior research results were used as a basis for developing nonverbal behavior descriptors which would provide a means of classifying the present subject samples on their nonverbal behavior. A series of nine descriptors was developed which, according to prior research, were supposed to be typical of truthful subjects. An equal series of descriptors was developed which were supposed to be typical of lying subjects. Then, the nonverbal behavior of the two actual subject samples was converted into the descriptors. All the actual subjects were classified as being either "typical truth-tellers" or "typical liars" by allowing one point for each descriptor in either of the "typical" groups for each subject. That group receiving the most points was used as a basis for classification.

The classification of subjects on nonverbal behavior provided a basis for answering the two following questions: Did a significant number of the truthful subjects exhibit the "typical truth-teller" nonverbal descriptors more often than the "typical liar" descriptors?; Did a significant number of the lying subjects exhibit the "typical liar" descriptors more often than the "typical truth-teller" descriptors?

The results indicated that a significant number of the truthful subjects, 94 percent, exhibited more "typical truth-teller" than "typical liar" descriptors. A significant number of the lying subjects, 82 percent, exhibited more "typical liar" than "typical truth-teller" descriptors.

The results suggest that the verbal and nonverbal behavior of truthful polygraph subjects differs in significant, observable respects from those of lying subjects. Further investigation of this phenomenon is warranted.

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APPENDICES

APPENDIX A: SECTION I

MASTER DATA SHEETS:

ELICITED VERBAL CLUES

MASTER DATA SHEET: ELICITED VERBAL CLUES
VERIFIED TRUTHFUL SUBJECTS

Structured Interview Questions

Subject Number	You		Suspicion		Who Not Suspect		Think Stolen		Best Opportunity		Fingerprints		Borrow		ever Happen Before		Think		Approach		How L.D. Come Out		Truth Serum		What Should Happen to Doer		Attitude		# T's Asked	# T T Answers	# T L Answers	Sex		Race		Age	Case Type
	*TT	**TL	TT	TL	TT	TL	TT	TL	TT	TL	TT	TL	TT	TL	TT	TL	TT	TL	TT	TL	TT	TL	TT	TL	TT	TL	TT	TL				M	F	C	B		
1	x			x		x	x		x		x				x			x			x		x			x			10	8	2		x	x		22	T
2	x			x	x			x	x		x		x		x			x	x		x			x		x			14	11	3		x	x		22	T
3	x			x			x								x		x				x				x		x		8	6	2	x		x		32	M
4	x			x				x							x		x				x					x			7	5	2		x	x		68	T
5	x			x		x	x		x			x	x		x		x			x	x			x					13	10	3		x	x		20	T
6	x			x				x	x		x		x		x		x			x	x				x				12	9	3		x	x		61	T
7	x			x			x			x	x		x		x		x			x	x		x			x			13	10	3		x	x		27	T
8	x		x			x	x				x		x		x		x			x	x		x			x			11	11	0	x		x		23	T
9	x		x				x		x		x		x		x		x		x		x		x				x		14	12	2		x	x		36	T
10	x				x		x		x		x		x			x	x		x		x					x			12	11	1	x			x	25	T
11	x			x			x					x	x		x				x		x					x			9	7	2		x		x	22	T
12	x			x			x		x		x				x		x		x		x					x			11	10	1	x			x	50	T
13	x														x						x		x				x		5	4	1		x	x		15	B
14	x			x		x	x			x			x		x				x		x			x		x			11	6	5	x		x		38	T
15		x						x													x		x		x					5	3	2		x	x		13	T
16	x		x			x		x	x				x					x			x		x		x		x		11	5	6		x	x		21	T
17	x			x				x	x				x		x		x				x			x		x		x	11	6	5		x	x		48	T
18	x		x				x							x				x			x		x				x		8	6	2	x			x	28	T
19	x			x				x	x						x		x					x	x		x		x		10	7	3		x	x		46	T
20	x			x			x		x								x							x	x		x		8	6	2		x	x		21	T
21	x		x				x		x						x		x				x		x				x		9	9	0	x		x		21	T
22	x		x					x							x			x			x		x		x		x		9	7	2	x		x		20	T
23	x		x		x		x			x					x		x				x		x				x		11	9	2		x	x		21	T
24	x		x		x		x						x				x				x				x		x		10	8	2		x	x		28	T
25	x		x		x			x	x					x				x			x		x				x		11	7	4		x	x		24	T
26	x		x				x		x				x				x				x		x		x				9	8	1	x			x	59	T
27	x			x	x			x		x			x				x					x	x		x		x		11	7	4		x	x		38	T
28	x			x	x			x	x				x		x		x					x	x		x		x		12	9	3		x	x		33	T
29	x			x	x		x		x				x		x		x			x			x				x		11	10	1	x			x	57	T
30	x			x	x			x	x				x		x		x					x	x				x		11	8	3		x	x		20	T
31	x			x			x						x		x		x			x			x		x		x		10	8	2		x	x		41	T
32	x			x	x			x	x			x	x			x	x			x			x		x		x		14	10	4	x		x		47	T
33	x			x		x		x	x						x					x			x		x		x		10	7	3	x		x		31	T
34	x		x				x								x		x				x				x		x		8	6	2		x	x		21	T
35		x		x				x									x		x		x			x			x		8	4	4	x		x		19	T
36	x		x				x						x				x				x		x				x		9	9	0	x		x		50	T
37	x		x		x			x	x				x		x		x				x		x				x		12	11	1		x	x		33	T
38	x		x		x		x					x					x		x									x	9	7	2			x		56	T
39	x			x	x		x						x		x		x				x		x		x				11	10	1	x		x		63	T
40	x			x			x										x				x	x	x		x				8	6	2	x		x		21	T
41	x			x			x				x		x				x				x		x		x				10	8	2		x	x		54	T
42	x			x		x	x		x				x		x		x				x				x		x		12	8	4		x	x		20	T
43	x			x			x		x				x			x	x				x		x				x		11	9	2	x		x		24	T
44	x			x	x			x	x				x			x	x				x		x		x		x		12	9	3		x	x		47	T
45	x			x	x			x	x				x				x				x		x		x		x		11	9	2	x		x		59	T
46	x			x		x		x	x				x		x		x				x		x		x		x		12	9	3	x		x		21	T
47	x			x			x						x				x				x			x	x		x		9	7	2	x		x		18	T
48	x			x		x		x					x				x				x		x				x		10	7	3	x		x		55	T
49	x			x				x					x				x				x		x				x		9	7	2	x		x		50	T
50	x		x				x										x		x		x						x		8	8	0	x		x		30	T
Total	48	2	15	32	15	9	26	23	25	5	8	4	31	2	27	4	40	5	13	0	44	5	40	6	26	11	36	8	510	394	116	24	26	47	3		
# of Subjects Asked	50		47		24		49		30		12		33		31		45		13		49		46		37		44										
% TT	96		32		62		53		83		67		94		87		89		100		90		87		70		82			78							
% TL	4		68		38		47		17		33		6		13		11		0		10		13		30		18				22						

*Typical Truth-teller answers
**Typical Liar answers
*T = Theft
M = Murder
S = Sex

MASTER DATA SHEET: ELICITED VERBAL CLUES
VERIFIED LYING SUBJECTS

Structured Interview Questions

Subject Number	You		Suspicion		Who Not Suspect		Think Stolen		Best Opportunity		Fingerprints		Borrow		Ever Happen Before		Think		Approach		How D.D. Come Out		Truth Serum		What Should Happen to Doer		Attitude		# T's Asked	# T T Answers	# T L Answers	Sex		Race			Age	Case Type
	*TT	**TL	TT	TL	TT	TL	TT	TL	TT	TL	TT	TL	TT	TL	TT	TL	TT	TL	TT	TL	TT	TL	TT	TL	TT	TL	TT	TL				M	F	C	B		
1		x		x		x		x		x				x	x			x		x		x		x		x			11	1	10	x		x			23	T[a]
2	x			x	x			x	x		x			x		x		x	x		x			x					12	4	8	x		x			21	T
3	x			x	x			x		x		x		x		x		x	x			x		x	x				14	6	8		x			x	32	T
4		x		x				x		x						x	x				x	x			x	x			10	3	7		x	x			20	T
5	x			x				x		x		x				x	x				x		x	x		x			11	4	7	x		x			42	T
6	x			x				x		x		x			x						x	x			x			x	11	4	7	x		x			37	T
7		x		x				x							x		x							x					8	2	6	x		x			57	T
8		x	x							x					x		x			x		x		x					10	2	8	x		x			21	T
9	x			x		x	x			x		x				x		x		x				x		x			13	6	7		x	x			39	T
10		x													x				x										3	0	3	x		x			29	T
11		x														x			x		x								5	0	5	x		x			56	B
12	x			x		x				x						x			x		x			x		x			11	2	9	x		x			36	B
13		x		x				x							x				x		x								9	3	6	x		x			21	T
14	x			x				x				x			x		x							x					10	5	5	x		x			25	T
15	x			x				x							x				x		x					x			10	5	5	x				x	22	D
16		x		x				x		x					x				x		x				x				11	3	8	x		x			21	T
17		x		x				x		x		x		x		x				x	x				x				13	5	8	x				x	28	T
18	x			x				x		x				x		x			x		x				x				13	2	11	x		x			26	T
19		x		x				x		x					x				x		x				x				12	3	9	x		x			15	B
20		x		x		x										x			x		x				x				10	1	9	x		x			20	B
21		x		x		x		x							x				x		x				x				11	3	8	x				x	20	B
22		x		x											x		x		x		x				x				9	4	5		x	x			33	T
23		x		x				x										x		x		x							6	1	5	x		x			16	B
24		x		x				x		x				x	x			x	x			x							11	6	5	x		x			23	T
25		x		x				x								x	x			x		x	x						10	3	7	x				x	22	T
26	x		x				x				x							x		x			x	x					10	7	3	x				x	27	T
27	x			x											x				x			x							6	3	3	x		x			58	T
28		x		x				x		x					x		x				x	x							9	4	5	x		x			42	T
29		x		x																									2	0	2	x		x			42	T
30	x			x				x				x			x			x	x			x		x				x	10	3	7	x		x			39	B
31	x			x		x												x	x		x					x			8	5	3	x				x	24	T
32		x		x				x		x		x				x		x	x			x	x				x		12	2	10	x		x			41	T
33		x	x					x										x				x		x		x			8	4	4	x		x			13	T
34	x			x				x		x		x	x			x	x				x			x		x			12	5	7	x		x			19	T
35	x			x		x	x		x			x		x		x	x				x	x			x				13	8	5		x	x			27	T
36	x							x		x					x		x					x				x			9	3	6		x			x	19	T
37		x		x								x			x				x					x				x	8	2	6	x		x			25	T
38		x														x					x								4	1	3	x		x			35	T
39		x		x				x				x				x		x	x			x		x		x			11	3	8	x		x			16	T
40		x		x				x		x						x		x		x		x		x				x	10	0	10	x		x			19	T
41	x			x				x		x					x		x		x			x		x			x		10	5	5	x		x			65	T
42		x																				x						x	3	0	3	x		x			47	T
43		x		x		x		x						x	x		x				x						x		10	3	7	x		x			30	T
44		x	x									x		x				x	x		x					x			8	5	3	x		x			22	T
45		x		x				x		x					x		x		x		x					x			10	5	5	x		x			23	T
46		x								x						x		x				x							5	0	5	x		x			21	T
47		x		x		x		x				x						x		x				x				x	9	3	6	x				x	21	T
48	x			x		x				x					x		x		x		x							x	11	6	5	x				x	26	T
49		x		x				x		x						x						x				x			8	1	7	x		x			54	T
50		x															x				x		x				x		5	1	4		x	x			22	CB
Total	18	32	4	39	1	9	4	31	2	23	7	14	4	9	21	18	19	26	20	11	20	27	13	27	4	19	20	23	465	157	308	43	7	10	40		
# of Subjects Asked	50		43		10		35		25		21		13		39		45		31		47		40		23		43										
% TT	36		9		10		11		8		33		31		54		42		65		43		32		17		47			31							
% TL	64		91		90		89		92		67		69		46		58		35		57		68		83		53				69						

*Typical Truth-teller answers
**Typical Liar answers

[a] T = Theft
B = Bribe
S = Sex
D = Drinking
CB = Child Beating

APPENDIX A: SECTION II

SELECTED ACTUAL ANSWERS TO THE STRUCTURED PRE-TEST INTERVIEW QUESTIONS

SECTION II: SELECTED ACTUAL ANSWERS TO

STRUCTURED PRE-TEST INTERVIEW QUESTIONS

Interview Question	Actual Answers	Classification
You Question:		
Truthful Subject (T.S.)	"No, I can truthfully say I am not involved with that missing money. The first reason I am here is to clear myself."	T.T*
Lying Subject (L.S.):	"Well, the only thing I can say is I didn't see any rings or coins. We've had this come up before."	T.L.**
Suspicion Question:		
T.S.:	"Dale and I were the only two in the vault."	T.T.
L.S.:	"No, I don't know them too good. Their job means more to them."	T.L.
Who Not Suspect Question:		
T.S.:	"I'd vouch for Edwards, Baker and Stone."	T.T.
T.L.:	"I wouldn't suspect anyone. Most of the people I wouldn't suspect."	T.L.
Think Stolen Question:		
T.S.:	"It would have to be stolen. I don't see how it could be a mistake."	T.T.

Interview Question	Actual Answers	Classification
L.S.:	"No, I don't think it was stolen. A mistake in accounting. I don't think it's missing. We'll know for sure in a very short time. In the past we had more than one inventory. It could be a mistake here."	T.L.
Best Opportunity Question:		
T.S.:	"The tellers. We are responsible for the vault count and it's checked by no one other than another teller."	T.T.
L.S.:	"Well, I guess we all did. We all have keys."	T.L.
Fingerprint Question:		
T.S.:	"No, no reason at all (for my fingerprints to be on the cash box.) They are not there, I can tell you that."	T.T.
L.S.:	"I can't figure that out. There's a xerox machine around there (that my fingerprints might be on). We go by it occasionally."	T.L.
Borrow Question:		
T.S.	"No, never. Just a loan (from the bank)."	T.T.
L.S.:	"Yeah, I borrowed change for cokes, and stuff. I always put it back."	T.L.

Interview Question		Actual Answers	Classification
Ever Happen Before Question:			
	T.S.:	"I have never been questioned about my work and I've worked with money for 9 years."	T.T.
	L.S.:	"This is the third time here. I've been involved in every one (loss of money)."	T.L.
Think Question:			
	T.S.:	"No, I don't need money that badly."	T.T.
	L.S.:	"It occurs to everybody's mind. If you're honest, it slips you're mind. I'd like to take some (bank money) home with me."	T.L.
Approach Question:			
	T.S.:	"They better not."	T.T.
	L.S.:	"Oh yeah. Guys from school."	T.L.
How L.D. Come out on Your Question:			
	T.S.:	"I know it will show I had nothing to do with it."	T.T.
	L.S.:	"Well, I don't know how it works. I told you those things and I'll report same things on the machine and nothing else."	T.L.

Interview Question		Actual Answers	Classification
Truth Serum Question:			
	T.S.:	"Yes, I would be glad to."	T.T.
	L.S.:	"Do you mean sodium pentathol? I don't know if I'd agree to that or not. Am I required to take it? If I don't have to, I won't."	T.L.
What Should Happen to Doer Question:			
	T.S.:	"It's up to law. Prosecuted to the fullest extent of the law."	T.T.
	L.S.:	"I'd have to look at all angles of it."	T.L.
Attitude Question:			
	T.S.:	"I feel I want to take it. I have nothing to fear and I want to show this to everyone."	T.T.
	L.S.:	"I don't like it. Frankly, it's a reflection on me."	T.L.

*Typical truth-teller answer

**Typical liar answer

APPENDIX B

MASTER DATA SHEETS:

SPONTANEOUS VERBAL CLUES

MASTER DATA SHEET: SPONTANEOUS VERBAL CLUES*

VERIFIED TRUTHFUL SUBJECTS

SUBJECT #	COMPLAINS	QUESTIONS	REQUESTS TO HURRY
17	X		
24	X		
38		X	
TOTAL	2	1	0

*Only those subjects exhibiting spontaneous verbal clues are listed.

MASTER DATA SHEET: SPONTANEOUS VERBAL CLUES*

VERIFIED LYING SUBJECTS

SUBJECT #	COMPLAINS	QUESTIONS	REQUESTS TO HURRY
4	X		
5	X		X
6	X	X	
7	X		
8	X		
11	X		
12	X		
14			X
17	X		
19	X		
20	X		
24	X		
25	X		
26		X	
30	X	X	
31		X	
32	X		
35	X		
41		X	
42	X		
47			X
49	X		
TOTAL	17	5	3

*Only those subjects exhibiting spontaneous verbal clues are listed.

APPENDIX C

MASTER DATA SHEETS: NONVERBAL CLUES

MASTER DATA SHEET: NONVERBAL CLUES
VERIFIED TRUTHFUL SUBJECTS

Subject Number	"Typical Truthteller" Descriptors									"Typical Liar" Descriptors									Number T.T. Clues	Number T.L. Clues	Classification
	T.T. Appearance	Talkative	Good Eye Contact	Genuinely Friendly	Cooperative	Composed	Relaxed	Lighthearted	Direct Answers	T.L. Appearance	Untalkative	Poor Eye Contact	Overfriendly	Uncooperative	Nervous Facial Appearance	Nervous Body Movements	Scared	Evasive			
1	x	x	x														x		3	1	T*
2	x														x				0	1	T
3	x	x																	2	0	T
4	x	x	x	x	x	x	x		x										8	0	T
5	x	x	x																3	0	T
6	x	x	x																3	0	T
7																					
8	x	x	x	x		x	x		x										7	0	T
9	x	x	x	x		x		x											6	0	T
10								x											1	0	T
11						x													1	0	T
12	x	x	x			x			x										5	0	T
13																	x		0	1	T
14																					
15	x																		1	0	T
16	x	x	x					x											4	0	T
17						x	x				x								2	1	T
18	x	x							x				x						3	1	T
19	x	x	x	x	x	x			x										6	0	T
20	x	x	x			x			x										4	0	T
21	x	x	x	x	x				x										5	0	T
22	x	x	x						x										3	0	T
23	x	x	x	x	x	x													5	0	T
24	x	x	x	x	x												x		4	1	T
25	x	x	x	x					x										4	0	T
26	x	x	x						x										3	0	T
27	x	x	x	x					x										4	0	T
28	x	x	x	x		x			x										5	0	T
29	x	x	x		x	x			x										5	0	T
30	x	x	x	x	x	x			x										6	0	T
31	x		x	x	x				x										4	0	T
32				x															1	0	T
33		x																	1	0	T
34																					
35										x	x								0	2	L
36	x	x	x	x	x			x	x										6	0	T
37	x	x	x	x	x		x		x										6	0	T
38									x										1	0	T
39	x	x	x	x					x						x	x			4	2	T
40	x	x	x	x				x											4	0	T
41	x	x	x	x															3	0	T
42	x	x	x	x					x								x		4	1	T
43	x	x	x		x		x	x	x										6	0	T
44	x	x	x			x			x										5	0	T
45	x	x	x	x	x				x										6	0	T
46	x	x	x	x	x	x			x										6	0	T
47	x	x	x	x	x			x	x										6	0	T
48	x	x	x	x					x										4	0	T
49	x	x	x	x	x				x										6	0	T
50	x	x	x						x										4	0	T
Total	38	38	30	15	4	16	4	7	28	1	2	0	1	0	2	1	4	0	180	11	44T 3TL

*Typical Truth-teller
Typical Liar

MASTER DATA SHEET: NONVERBAL CLUES
VERIFIED LYING SUBJECTS

Subject Number	"Typical Truthteller" Descriptors									"Typical Liar" Descriptors									Number T.T. Clues	Number T.L. Clues	Classification
	T.T. Appearance	Talkative	Good Eye Contact	Genuinely Friendly	Cooperative	Composed	Relaxed	Lighthearted	Direct Answers	T.L. Appearance	Untalkative	Poor Eye Contact	Overfriendly	Uncooperative	Nervous Facial Appearance	Nervous Bodily Movements	Scared	Evasive			
1												x							0	1	TL*
2								x		x	x	x			x				1	4	TL
3			x															x	1	1	TT
4											x	x				x			0	3	TL
5										x	x	x	x						0	4	TL
6										x		x				x			0	3	TL
7			x			x				x	x							x	2	3	TL
8										x	x								0	2	TL
9												x			x	x			0	3	TL
10										x		x							0	2	TL
11																					
12					x					x	x	x	x		x	x	x		1	7	TL
13			x			x					x				x				2	2	TT
14											x	x				x			0	3	TL
15	x																x		1	1	TT
16						x				x	x	x						x	1	4	TL
17		x				x						x							2	1	TT
18			x			x	x			x									3	1	TT
19						x			x			x			x				2	2	TT
20										x	x	x	x						0	4	TL
21										x	x	x							0	3	TL
22										x	x								0	2	TL
23						x	x			x					x				2	2	TT
24						x			x			x			x				2	2	TT
25			x			x			x										3	0	TT
26						x	x		x										3	0	TT
27																		x	0	1	TT
28			x			x												x	2	1	TT
29											x				x			x	0	3	TT
30										x	x	x						x	0	4	TL
31																		x	0	1	TT
32		x										x			x				1	2	TT
33			x			x			x						x				3	2	TT
34	x	x	x			x											x		4	0	TT
35	x	x	x	x		x	x	x	x										8	0	TT
36				x		x					x				x				2	2	TT
37											x	x						x	0	3	TL
38											x							x	0	2	TL
39										x	x	x				x	x		0	4	TL
40											x	x							0	4	TL
41						x												x	1	1	TT
42															x			x	0	2	TL
43										x	x							x	0	3	TL
44										x	x	x						x	0	4	TL
45									x			x			x				1	2	TT
46										x	x			x				x	0	4	TL
47											x	x				x		x	0	4	TL
48						x	x			x	x							x	2	3	TT
49										x	x			x	x		x	x	0	6	TL
50										x	x	x			x		x	x	0	6	TL
Total	3	4	9	2	1	17	5	2	7	22	26	24	3	2	15	7	6	19	50	124	9TT 40TL

*TT = Typical Truth-teller
TL = Typical Liar

APPENDIX D

DISCUSSION OF ADDITIONAL SPONTANEOUS VERBAL CLUES

Appendix D

DISCUSSION OF ADDITIONAL SPONTANEOUS VERBAL CLUES[87]

Spontaneous verbal clues which were not reported in the body of this study but which perhaps warrant some attention involve the test questions for which a subject voices concern. In 1953 Reid did not comment on this aspect of behavior. However, he has since stated that "experience has indicated that a subject who makes some admission or correction with respect to his answer to the control question [as the testing progresses]...is

[87]It is of some historical significance, perhaps, to note that Inbau in 1942 reported that there seemed to be a difference between truthful and lying subjects as regards spontaneous verbal clues. For example, he reported at that time that liars more frequently asked if their nervousness would affect the test results and that they "more frequently asked to go to the lavatory to urinate just before the test. They also more frequently comment that the pneumograph and cuff being adjusted reminds them of the electric chair. These remarks and behavior cannot of course, be relied upon as proof of deception, since they are also made (though in fewer instances) by innocent [truthful] persons. We mention their occurrence more as a matter of academic interest than as helpful criteria in diagnosing deception." See: Fred E. Inbau, Lie Detection, (Baltimore: The Williams and Wilkins Company, 1942) pp. 25-28 and note 14.

usually telling the truth about the relevant issue."[88]

Table 10 below indicates the frequency with which the two subject samples voiced concern for either the test control questions or relevant questions. As can be seen, the truthful subjects did more often "point to" the control questions than to the relevant questions. The opposite of this was true for the lying subjects. Thus, it appears that a subject who "points to" a test control question may, as Reid stated, be truthful although certainly the results are far from conclusive in this respect.

Table 10

NUMBER OF SUBJECTS VOICING CONCERN
FOR EITHER CONTROL OR RELEVANT TEST QUESTIONS

Subject Category	Voiced Concern For Control Questions		Voiced Concern For Relevant Questions	
	No.	%	No.	%
Truthful Subjects (N=50)	18	36	2	4
Lying Subjects (N=50)	7	14	11	22

[88]John E. Reid and Fred E. Inbau, Truth and Deception, The Polygraph ("Lie Detector") Technique, (Baltimore: The Williams and Wilkins Company, 1966), p. 29, and p. 30, note 38.