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Contents

Nothing But the Truth
John Allan Spade 1

The Objective Analysis of GSR in the Detection of Deception
Akihiro Suzuki, Shoichi Watanabe, Kazuo Ohnishi, Kazunobu Matsumo, Nasana Arusuma 53

The Relevant-Connected Control
James Wygant 64

Peak of Tension - A Bibliography
Norman Ansley 68

A Cross Analysis Between Relevant Questions and A Generalized Intent to Answer Truthfully Question
Dan L. Hilliard 73

Polygraph Review
Norman Ansley 78

Book Reviews 80

Abstracts 82

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NOTHING BUT THE TRUTH

The Uncertain Role of Polygraph Evidence in the Judicial Process

By

John Allan Spade

I. Introduction

"Which way is the war, buddy?"

-- Anonymous G.I. at Bastogne

It is not at all difficult to discover where the war over the polygraph is. Just whisper the words "lie detector" in dulcet tones amidst legal and judicial circles -- then duck. The war will be easy to find; you will be in the center of it. However, when the "tumult and the shouting dies," you may find that you have been left more shell-shocked than knowledgeable about the issues involved. The polygraph tends to arouse more fevered and passionate -- if somewhat less articulate -- debate among its advocates and detractors than, say, the application of microphotography to the analysis of altered documents.

The possibly overly-ambitious purpose of this paper is to provide a battlefield guide to the War of the Polygraph. During its preliminary drafts, this study bore two successive working titles. The first, "Everything You Ever Wanted to Know About the Polygraph But Was Afraid to Ask," was rejected somewhat reluctantly on the grounds of implicit arrogance and explicit ungrammaticality. The second, "More Information Than You Ever Conceived of Wanting to Know About the Polygraph," remedied the prior defects but struck a note of flippancy unbecoming to so lofty and scholarly an undertaking. And, too, it contained an underlying element of truth quite deleterious to the ego of the author. However, the titles do suggest something of the intended scope of the work.

The paper is divided, for the sake of tidiness, into three major parts. The first -- The State of the Art -- explores the historical background of "lie detecting," the development of early scientific forerunners of the polygraph, the theory and operation of the modern polygraph, and the disputed reliability of the instrument as a detector of conscious and deliberate deceit. The second -- The State of the Law -- traces the fifty-five-year history of the polygraph in the judicial arena. This overview is of necessity simplified -- more than 400 appellate cases on aspects of polygraph admissibility comprise a forbidding volume of case law -- but definitive,

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unravelling for the sake of clarity the interwoven strands of non-admissibility, stipulated admissibility, and unstipulated admissibility rulings, and considering the implications of statutory law on polygraphy. The third section — Quo Vadimus? -- explores briefly some of the evidentiary and judicial policy issues that remain unresolved, and attempts to analyze areas of applicability and inapplicability of polygraph evidence.

Because the first two sections represent a careful synthesis and consolidation, for the most part, of the judgments of better men and sounder scholars than I, they provide an accurate and reliable summary for the legal researcher or practitioner, though the careful reader may detect a slight authorial bias in the discussion of some of the case law. In the third section, however, I was compelled to abandon the security of scholarly authorities, the stability of heartening citations, and the reassurance of voluminous footnotes, and launch out on less well-charted seas of jurisprudential speculation with little but my own meager wits to guide me. This third section, therefore, is tendered with neither express nor implied warranties of fitness or suitability. Watch out for rocks and shoals.

II. The State of the Art

A. The Thorny Paths to Truth

The discovery of truth and, concomitantly, the detection of lies have preoccupied man virtually since his first failure accurately to assess serpentine veracity led to his loss of arcadian felicity and to his subsequent relocation on less desirable real estate somewhere East of Eden.[1] This concern was perhaps expressed most succinctly by that Biblical progenitor of the modern public prosecutor, Pontius Pilate, in his non-classic query: "What is truth?"[2] Although Mr. Pilate did not bother to search for an answer, many others throughout history have subsequently done so; and man's early efforts to sift the occasional kernal of veracity from the voluminous chaff of falsehood have ranged from the ingenious to the starkly horrible.

Prior to the application of modern science to the problem, man's earlier efforts at determining truth and detecting lies were somewhat simplistic. Generally, they fell into three categories: physical, ritualistic, and behavioral.

Trial by Rack and Thumbscrew

History is replete with unpleasant examples of the physical modes of truth determination. This class of interrogation has the deceptive charm of extreme simplicity of application and nearly total certainty of results. As a British Civil Service officer in India observed: "It is far pleasanter to sit comfortably in the shade rubbing red pepper into a poor devil's eyes than to go about in the sun hunting up evidence."[3] Physical interrogation -- or what the medieval ecclesiastical courts coyly called "the Question"[4] -- proved to have an empirical, rough-and-ready efficacy. If you hurt someone badly enough and long enough in order to get him to tell you what he knows, he will eventually tell you what you wish to hear.

Because the method leads to such unusually high conviction rates,

it has long held an insidious appeal for ambitious prosecutors, whether ecclesiastical or secular. Even today, despite judicial and constitutional safeguards, law enforcement officials in this country occasionally employ direct and physical means of inducing loquaciousness.[5] And in other nations manifesting less tender sensibilities about the rights of the accused, such methods of interrogation remain so commonplace as to be unremarkable. The only significant change wrought by the advance of civilization is the substitution of the devices of modern technology for the more primitive rack, pincers, and hot irons.[6] With its milleniae-long track record of effectiveness, physical interrogation as a method of truthfinding is likely to endure as long as there are those who continue to manifest an ethical confusion between empiricism and pragmatism.[7]

Trial By Ritual

"If I tell a lie, let the symbol of this oath kill me."

-- Ritual Kikuyu "Liar's Oath"[8]

Historically, ritual methods of truth determination have rivalled torture in popularity if not in effectiveness. The most pervasive of these has been the ritual oath. As Forkosch points out, the oath is formulary rather than evidentiary,[9] and it depends for its force more on ethical, philosophical, or metaphysical than on physical constraints.

The forms of the oath have varied as widely as man's imagination; but they generally have certain basic common characteristics: ritual or formulary averment of the truth of the utterance, explicit or implicit assumption -- and acceptance -- of the consequences resulting from falsehood, and references to or association with a sacred symbol or object.[10] In more primitive cultures, the formulary recital is often accompanied by ritual gestures and occasionally by ritual sacrifice.[11]

Modern judicial proceedings -- while dispensing, for the most part, with ritual sacrifice -- still preserve the other customs and trappings of the oath, although contemporary apprehension about the consequences of violating it reside more in the secular penalties for perjury than in serious expectation of divine wrath. Yet present-day judicial reliance upon the oath to insure truthfulness is more than mere token obeisance to juridical tradition; it is a statutory requirement for the testimony of any witness,[12] with the explicit legal assumption of heightened credibility as a consequence.[13]

An early medieval variant of the oath was the ritual of compurgation, in which a group of "oath helpers" -- usually twelve in number, although additional "helpers" were not uncommon -- would swear to the truth of the party's statement.[14] In its earliest period, the rite of compurgation was highly formulary; if each of the oath helpers recited the ritual oath properly, the party prevailed, but if one of the helpers erred by so much as a single word, the party's cause was lost.[15] Unlike the testamentary oath, the rite of compurgation does not survive in modern jurisprudence, although traces of it may be found in the persistent tradition of the twelve-member jury and in the occasional reliance of a party upon the testimony of "character witnesses" who have no direct knowledge about any of the facts in controversy.

Trial By Intervention

Two other interesting modes of ritual truth-finding were trial by combat and trial by ordeal. Although these appear at first blush to offer some of the same physical hazards as inquisitional methods of interrogation, they are conceptually akin to the oath; averment of truth, appeal to divine judgment, and agreement to abide by the outcome of that judgment and to suffer the consequences of falsehood. Pain, suffering, and injury were not the means employed to prompt truth; rather, they were the divine punishment for mendacity.

In its earliest form, trial by combat directly involved the parties in dispute; but more commonly in medieval times it was a conflict -- either au prime sangre or, in more serious controversies, au mort -- between selected champions of the parties. Despite popular opposition in England to this Norman innovation,[16] it was not formally abolished in that country until the early nineteenth century.[17] An uneasy blend of medieval barbarism and Christian doctrinal belief in divine immanence, trial by combat was of slight probative value. It might be said to reflect the underlying conviction, as one cynic phrased it, that "God is on the side of the most cannon."[18] As a noted legal wit has observed, "That is an injudicious application of cannon law."[19]

Of somewhat more interest is the device of trial by ordeal. Another of the medieval forms of proof, it offered such tests as touching or carrying red-hot iron,[20] or plunging the hand into boiling water.[21] If the party being put to the proof remained unscathed (or, at least, healed within a reasonable time), he was adjudged to have told the truth. Still another form of the proof, the water ordeal, consisted of vasting the party, bound hand and foot, into a stream or pond. If he floated, it was a divine indicator that the water had rejected an evildoer, and it proved him a liar. If he sank, this was taken as evidence that he had told the truth.[22] Not uncommonly, however, the party drowned; so the issue became moot.

The use of the ordeal as a test of truth is not merely a Christian tradition. The red-hot iron test was used in ancient Persia.[23] In Northern Bengal, the hill tribes commonly put a party to the test by requiring him to lick red-hot iron.[24] Among the members of Africa's Kikuyu tribe, a similar test is still employed. A red-hot knife blade is touched to the tip of the tongue; and a blister is proof of perjury.[25] Among the more interesting of the ordeals is one reported by Mackay as being used by the Roman Catholic clergy in the twelfth century:

> Of all the ordeals, that which the clergy reserved for themselves was the one least likely to cause any member of their corps to be declared guilty. The most culpable monster in existence came off clear when tried by this method. It was called the Corsnaed, and was thus performed. A piece of barley bread and a piece of cheese were laid upon the altar, and the accused priest, in his full canonicals, and surrounded by all the pompous adjuncts of Roman ceremony, pronounced certain conjurations and prayed with great fervor for several

minutes. The burden of the prayer was, that if he were guilty of the crime laid to his charge, God would send his angel Gabriel to stop his throat, and he might not be able to swallow the bread and cheese. There is no instance upon record of a priest having been choked in this manner.[26]

In both India and China, variations of the Corsnaed emerged. The party on trial would chew a mouthful of rice, then spit it out. In different versions of the test, if the rice was dry[27] or tinged with blood[28] the speaker was proven to be a liar.

The Look of the Liar: Behavioral Tests

"Look me straight in the eye and tell me you didn't do it."

(From an unpublished interview between the author and his mother when he was six.)

Despite the fact that the outcome of at least some of the ordeals was almost certainly influenced by behavioral factors,[29] the essence of the trial by ordeal was a transcendental faith in divine intervention. The ordeal was a non-evidentiary mode of proof; it did not depend upon observation, deduction, or external evidence. In contrast, the early behavioral tests were strongly evidentiary, depending upon close observation of physiological and psychological manifestations. They were, in a very real sense, the precursors of the modern science of polygraphy.

Not surprisingly, the early Greeks explored the possibility of detecting deceit by observation of physiological symptoms. Erasistratus, for example, attempted to establish a relationship between falsehood and the speaker's pulse rate.[30] Although little was done to pursue this line of inquiry during the early Christian era, at least one anonymous account comes down from the Middle Ages of a nobleman who combined word-association techniques with the pulse-rate test to detect his wife's infidelity. His chief minister, so the account goes, began conversing with the wife and, placing a casual hand on her wrist, mentioned the name of the suspected lover. Her pulse rate promptly zoomed. A full confession was subsequently obtained, presumably by more conventional methods.[31]

During the Renaissance, scientific interest in physiological phenomena revived. Galileo developed a pendulum device that would accurately count and record the pulse rate.[32] Lancisi, the Italian physician, developed in the early eighteenth century the theory that a close relationship could be found between coronary behavior and emotions. Unfortunately he hypothesized that the former influenced the latter rather than the converse.[33] However, despite this early recognition between pulse and emotions, there is no record that the possibility of using it as a method of detecting deceit was explored in any depth.

Other behavioral approaches emerged from the field of psychology. In the 1880's, Galton experimented with word association techniques as a device for exploring the mental processes. In reporting on his word association experiments, Galton commented:

> They lay bare the foundations of man's thoughts with curious distinctness, and exhibit his mental anatomy with more vividness and truth than he would probably care to publish to the world.[34]

Other early researchers, including Wilhelm Wundt and Carl Jung followed his lead; but it was not until 1908 that Munsterberg proposed the use of psychological techniques to determine guilt and detect falsehood.[35] Others were quick to adopt and extend this notion. Duprat, the French psychologist, attempted to develop psychological classes, or profiles, of liars;[36] Langfeld did some fruitful experimentation in word-association techniques to detect deception;[37] and Crosland further refined Langfeld's technique, achieving startling accuracy. However, Crosland's methods demanded such precise measurements and complex calculations that it was impractical for general law enforcement or judicial use.[38] By itself, the technique of word-association and reaction-time measurement was only of theoretical interest; but it would come to have significant application to the science of polygraphy.

A variety of other behavioral indices of mendacity have been explored, formally or informally, including gestures and mannerisms, facial expressions, posture, and verbal habits.[39] Many veteran police officers aver that they can "smell out a liar" just by talking to him for a few moments; and, indeed, they often show surprising skill and precision in their informal modes of lie detection. However, such external manifestations are relatively gross measures; and it is not uncommon to mistake the symptoms of shyness, nervousness, fear and anxiety for the stigmata of deception. Conversely, it is not uncommon for the skilled and experienced prevaricator to recount the most egregious falsehood with straightforward and manly gaze, unblushing mien, and total composure, displaying none of the telltale behavioral anomalies traditionally associated with deceit.

B. Deus Ex Machina

> "On ne résiste pas á l'invasion des idées."
> -- Hugo

Unquestionably the shift in emphasis from a dependence upon divine intervention in judicial disputes to a more secular preoccupation with the characteristics of human behavior significantly advanced the methodology of lie detection; but it remained for the science of medicine to provide the tools necessary to lend it precision and objectivity. The three instruments that made possible the modern polygraph are the cardiosphygmomanometer, the pneumograph, and the galvanometer. They are the basic components of the polygraph.

First to be employed in the precise and objective measurement of deception was the cardiosphygmomanometer, a blood-pressure measuring device. Crude techniques for direct measurement of blood pressure had been developed as early as 1733, when a clergyman named Hales inserted a tube directly into the crural artery of a horse and measured the height of the resulting column of blood.[40] Subsequent experimenters explored less heroic alternatives; and by 1896 Riva-Rocci had conceived the cuff mamometer, similar in theory to the device employed by physicians today to measure blood pressure. A number

of refinements followed, most important among them an accurate calibration device; and by 1904 the instrument was an accepted part of the arsenal of diagnostic medicine.[41]

During the course of this development of the sphygmomanometer, several experimenters had noted the close correlation between sudden emotional changes and alterations in the blood pressure; but it remained for the Italian criminologist, Cesare Lombroso, to apply this to the detection of deception. As early as 1895, Lombroso reported on his technique for interrogating suspects, using a "hydrosphygmomanometer," a water-filled drum in which the suspect immersed his hand. Pulsations of the blood in the hand, transmitted through the water, were recorded on a smoked drum.[42] By 1908, Munsterberg was urging judicial adoption of blood pressure techniques to detect deception;[43] and within a decade, Marston had developed an operating lie detector utilizing recorded variations in the subject's systolic pressure.[44] It was, in fact, Marston who developed and administered the first lie detector test to be submitted for judicial scrutiny in a U.S. appellate court in United States v. Frye;[45] and the adverse ruling on admissibility that resulted established a half-century-long precedent that continues to hamper judicial use of the polygraph to this day.

The Marston device was quite simplistic, depending for its measurements upon blood pressure variations alone; but improvements emerged rapidly. Vittorio Benussi had earlier established a correlation between deception and what he termed the "inspiration-expiration" ratio;[46] and by 1930, Keeler had developed a refined instrument employing recordations of blood pressure, pulse rate, and respiration to detect deception with striking precision.[47]

The final element necessary to complete the polygraph as we know it today developed from the independent research of several physiologists who had discovered an interesting and inexplicable relationship between deception and changes in the galvanic skin reflex. Although no one was certain why it worked, the phenomenon was used as the basis for the development of several models of lie detectors in the early 1930's. One, a psychogalvanometer developed by Walter G. Summers, actually gained fleeting recognition and judicial acceptance in People v. Kenny,[49] a 1938 New York lower court case; but following the implicit overruling of this precedent in the same year in People v. Forte,[50] legal enthusiasm for the Summers instrument waned. However, the general principle of GSR measurement was incorporated into the Keeler polygraph to add the last major component to the complex and precise instrument in use today.

Design and Principle of the Polygraph

What is the modern polygraph like, and how does it work? Imagine a subject seated in a straightback chair. Around his chest or his abdomen is a rubber tube, held in place with a beaded chain. Wrapped tightly about his upper arm is a cuff, similar in design to those used by physicians to measure blood pressure. Attached to his hand are electrodes. Tubes and wires trail from these various attachments and connect with a complex and formidable-seeming console unit studded with dials, switches, styluses, and a rotating drug that feeds a strop of graph paper through the unit. The scene is so reminiscent of the laboratory of a mad scientist in a horror movie

that one commentator has referred to it as a modern trial by ordeal.[51]

Appearances are deceiving, however; other than occasional discomfort from the pressure of the momanometer cuff, the subject suffers no more from a polygraph examination than he would from an ordinary conversation. Even the frightening-looking electrodes, part of the apparatus for measuring the galvanic skin reflex, convey a current so slight that it is perceptible only to sensitive instruments.

The maze of gadgetry that makes up the standard polygraph is composed of three major units and a fourth operational unit. These are the cardio-sphygmograph, pneumograph, galvanograph, and kymograph. The sphygmograph, considered by most researchers to be the most important and accurate component of the machine, measures relative blood pressure, changes in pulse rate, and pulse-wave amplitude. This is the device that is attached to our subject's upper arm, forearm or wrist.

The band about his chest is part of the pneumograph section. This measures the subject's respiratory pattern at normal rate and records variations from that norm. Although earlier researchers discounted the reliability of these variations, modern polygraphers have come to consider them as more and more significant.[52]

The third component, of which the hand electrodes are a crucial element, is the galvanograph. This device measures the galvanic skin reaction. Experiments have shown that emotional changes alter the conductivity of the skin; and careful measurement of these changes provides a useful supplementary indicator of deception.

The fourth component, the kymograph, is in many ways the heart of the polygraph. It has a small synchronous motor designed to operate at a constant speed that never varies, regardless of any fluctuations in line voltage. This is the motor that powers the chart drive, conducting graph paper at an exact rate of speed under the styluses that make an inked recording of the various measurements transmitted by the other three components.[53]

The underlying theory behind this maze of tubes, wires, and recording devices is simple. Whan a subject tells a lie the psychological stress results in subtle alterations in those physiological functions controlled by the autonomic nervous system. The machine measures and records these psycho-physiological variations; and from a study of the graphic recordings of thse variations, the polygrapher can make an accurate determination, in most cases, about the subject's veracity in response to specific questions.[54]

Testing and Interpreting

The polygrapher uses a variety of standard testing techniques bearing such imposing names as the Backster Zone Comparison test, Reid Control Question Technique, Arther Control Question Technique, Relevant/Irrelevant Test, and Peak of Tension technique,[55] as well as supplementary or special purpose tests such as the Stimulus Test, the Guilty Knowledge technique, the Silent Answer test, and the "Yes" test.[56] Generally, however, these tests all have the same broad function: to determine whether or not the subject's physiological responses reveal the criteria of deception or guilty knowledge

concerning specific matters.

Typically, the prepared subject will be seated in the chair while the examiner at the machine asks a series of questions to which the subject may reply by answering either "yes" or "no."[57] All of these questions have been discussed with the subject in advance, and the wording agreed upon. The examiner marks the number of the question on the graph, thus coordinating it with the subject's response and with the physiological variations accompanying that response. For comparison purposes, and to get a consistent result, the examiner may go over the same series of questions several times.

In a standard test such as the Control Question test, the examiner employs at least three types of questions including control questions, irrelevant questions, and relevant questions. The control questions are an essential element in the examination. They are questions that are not related to the matter under investigation, but on a similar topic, and deal with matters on which the subject will either lie or have a strong emotional reactions Typical control questions are: "Have you ever stolen anything?" or "Have you ever been questioned by the police?" Irrelevant questions are those having no relation either to the matter under investigation or to any subject on which the person being tested is likely to have a strong emotive reaction, such as, "Are you in Honolulu now?" or "Are you fifty years old?" Relevant questions are, of course, questions that deal directly with the matter under investigation: "Did you steal the $250 from Herman's Drug Store?" or "Do you know who stole the money from Herman's Drug Store?"

From analyzing the graphic tracings of the subject's physiological responses to each question, the examiner can usually make an accurate determination of "stress" areas, indicating either direct deception or guilty knowledge. To oversimplify an extremely complex procedure, the innocent subject generally will show a greater reaction to control questions than to either the relevant or the irrelevant questions. The guilty subject will show a greater reaction to relevant questions than to either irrelevant or control questions.[58]

Other tests are useful in special circumstances. The Peak of Tension test, for example, may be employed to assess response to some detail that could be known only to someone with guilty knowledge. For instance, if the exact amount of a theft could be known only to the criminal, the examiner might use a series of questions referring to various amounts of money, including the amount stolen. An innocent subject would have no unusual physiological reaction to that particular amount; but the guilty subject would react to it.[59]

Some tests are merely preliminary and are employed to establish the subject's physiological response patterns and norms. Characteristic is the Stimulus Test, a technique that would be the envy of a professional magician. In one technique, the subject selects a card, looks at it, then returns it. The examiner shows the cards one by one, asking each time if this is the card that the subject had selected. In each case the subject replies "No." Based on the subject's response pattern, the examiner then tells him which card he had actually chosen. This has the added psychological force of persuading the subject that the machine is accurate, heightening the guilty person's anxiety and his physiological responses to relevant questions on the matter under investigation. It is reassuring to the innocent.

Among other special test techniques employed are the "Silent Answer" test and the "Yes" test. In the former, the examiner asks questions, coding each one on the response graph at the appropriate point. The subject, however, does not reply aloud at all. He is instructed to answer only "mentally." Examiners have had striking success with this technique. Elimination of the oral response, with its resulting slight physical movement, diminishes extraneous instrument response; and repression of oral response in areas of deceit or guilty knowledge seems to have the result of heightening the subject's stress response, leading to clearer and less ambiguous readings.[60]

In the "Yes" test, the subject is instructed to answer "Yes" to every question, irrespective of the truth or falsity of the answer. Interestingly, the innocent subject will show no significant physiological stress pattern to relevant questions, even though by answering "Yes" he is technically "lying"; while the guilty subject, though he is telling the "truth" by answering "yes" to the relevant question, will reveal the characteristic physiological response pattern of deception.[61]

The "Yes" test is illustrative of the fact that the polygraph is not so much a simplistic, science fiction stereotype "lie detector" as it is a complex, accurate instrument for analysis of psychophysiological responses. As Keeler observes:

> To begin with, there is no such thing as a "lie detector." There are no instruments recording bodily changes, such as the blood pressure, pulse, respiration, or galvanic reflex, that deserve the name "lie detector" any more than a stethescope, a clinical thermometer, or a blood count apparatus with a microscope can be called an "appendicitis detector."
>
> However, deception, guilt, or innocence can be diagnosed from certain symptoms just as appendicitis, paranoia, or any other physical or mental disorder can be diagnosed. In every case, the examiner must make his diagnosis from the tangible symptoms, using whatever mechanical aids he has at his disposal.[62]

To develop the specialized skills necessary to effect such demanding "diagnosis," the polygrapher must undergo rigorous training. Only sixteen schools in this country and one in Israel offer polygraph training programs adequate to meet the rigorous certification requirements of the American Polygraph Association.[63] The APA-approved program at the University of Baltimore is typical. It requires basic and advanced courses in psychology, psychophysiology, test construction, test interpretation, polygraph technique, court testimony, ethics, and principles of practice.

Beating the Machine

Among the more persistent myths that clings to the subject of polygraphy is that the machine can be "beaten" by special training or practice, hypnosis, drugs, yoga, and the like; or that a "psychopathic liar" will show no deception criteria when examined. Although it is true that various subterfuges may interfere with the recordation to the extent that the examiner cannot make an accurate determination about whether or not the subject is lying,[64] the

only practical result of this is that the test results will be reported as indeterminate. Inasmuch as the lie detector examination is a voluntary procedure, and is wholly dependent upon the cooperation of the subject, the same practical effect could be attained by the subject refusing to submit to the examination at all.

In effect, then, no known technique will enable the guilty subject to so manipulate his physiological responses as to appear innocent. Diagnostic techniques are so precise and discriminatory that the trained polygrapher not only can detect almost immediately that the subject is attempting to interfere with the results but can usually tell what it is that the subject is doing. For example, wiggling of toes, finger pressure, muscular flexion, or even imperceptible contractions of the anal spincter all have distinctive graphic patterns that alert the experienced examiner.[65]

Even less likely is the possibility, viewed by some courts as a matter of concern, that the innocent subject will appear guilty due to generalized anxiety or stress. Although such nervous tension does influence the innocent subject's psychophysiological responses, the trained operator can quickly and accurately discriminate between such generalized responses and the physiological variations characteristic of conscious deception and guilty knowledge.[66] Thus, the greatest danger associated with polygraph testing, that of casting unwarranted suspicion on a nervous but innocent suspect, is merely a straw man erected by unsympathetic judiciary and other opponents of polygraphy.

Yes, But Is It Really Reliable?

Test data on polygraph reliability is imposingly vast. Although Summer's early claim to have tested 5,000 subjects with his psychogalvanometer with 100 per cent accuracy may be viewed with justifiable scepticism,[67] subsequent and more rigorous experiments have proved that under experimental conditions the polygraph is between 85 and 95 per cent accurate. Typical is a five-year study made by John E. Reid and Associates, reported in 1953. Of 4280 subjects suspected of criminal offenses, the tests showed 2759 (64.5%) to be innocent and 1334 (31.1%) guilty. Indefinite results were reported on 187 (4.4%). Subsequent verification of guilt was obtained in 486 cases; and verification of the innocence of those reported innocent on the test was established through confession of another to the crime in 323 cases. In the entire group of subjects, only three verified errors (.0007%) were reported. On the basis of these results, the experimenters estimated an accuracy of 95 per cent.[98]

Of course, working with actual criminal suspects poses certain problems. Chief among these is verification of actual guilt. Opponents argue that a large number of "undiscovered errors" may occur in such a test situation. To counter this, a number of experimenters have set up controlled experiments using make-believe"criminals." To establish realistic motivating forces and tension levels, rewards were offered to the "criminals" who were successful in concealing their deception. One such study by Lykken in 1959, using students as subjects, resulted in accurate identification of 93.9 per cent of the "guilty" subjects and every one of the innocent subjects.[69] A similar experiment by Davidson in 1968 had substantially the same results: all of the innocent and 92 per cent of the "guilty" were identified.[70] They used only the galvanograph, just one component of the polygraph.

A common charge leveled against polygraphy is that the test data can be interpreted effectively only by the operator who actually conducted the test, thus creating problems of independent verification of test data interpretation. As one commentator observed, "It is difficult, if not impossible, for one qualified examiner to make a diagnosis from another examiner's test data."[71] The notion is plausible but erroneous. In a recent experiment by Horvath and Reid, this issue was explicitly examined. Forty sets of polygraph records, twenty from subjects verified as innocent and twenty from subjects verified as guilty, were analyzed by ten examiners on the staff of Reid and Associates. Of this group, seven were experienced examiners[72] and three were inexperienced examiners.[73] None had any knowledge either of the cases or of the test situations from which the forty records had been derived; nor were they given any of the test questions used in administration of the actual tests. On the sole basis of the polygraph chart results, they were asked to find the guilty subjects and "clear" the innocent subjects.

Results of the study are revealing. Working with data far more scant than any polygrapher might encounter in a real-life test situation, the examiners achieved an overall average of 87.75 per cent accuracy. Among the sub-grouping of "experienced" and "inexperienced" examiners, the experienced group reached a level of accuracy of 91.4 per cent, the inexperienced group an accuracy of 79.19 per cent.[74] Such results are fairly disposive of the assertions of critics that results cannot be independently verified by other examiners.

Even if it were conceded, as some critics assert, that the polygraph is only about 80 percent accurate, the most conservative of all estimates, this would scarcely justify the extent of judicial opposition that the instrument has encountered for the past half-century. As one commentator points out, " ... the uninformed or misinformed critic fails to take into consideration scientific acknowledgment that no other method of truth verification comes close to even an 80 per cent reliability figure."[75] When the accuracy of polygraph results is measured against the standard of relevancy established by FRE 401:

> "Relevant evidence" means evidence having any tendency to make the existence of any fact that is of consequence to the determination of the action more probable than it would be without the evidence.

it is difficult to grant credence to an argument that such results should be excluded because they are "only" 80 percent accurate. Many other forms of evidence that have traditionally been accorded uncritical judicial approbation are far less reliable. For example, the eyewitness account, so dear to the heart of the public prosecutor, has a degree of unreliability that is horrifying to anyone who still clings to any notion of objective certainty in the judicial process.[76]

III. The State of the Law

A. The Battle of the Windmill

Early in the century, Wigmore observed, "If there is ever a psychological test for the valuation of witnesses, the law will rush to meet it."[77] Though an eminent legal scholar, Wigmore proved an inept prognosticator. Far from dashing frenetically forward to embrace the polygraph, jurists for more than half a century have reflected a disheartening degree of near-unanimity in their determination to bury their heads in the sands of outmoded precedent and to rest their decisions upon erroneous assumptions of polygraph unreliability, constricted interpretations of the rules of evidence, insulting low assessments of the perspicacity of jurors, or demands for scientific exactitude so rigorous that one commentator observed with bleak despair, " ... courts are apparently looking for complete infallibility before according approval."[78]

Although the first attempt to introduce "lie detector" evidence in an American courtroom was in 1913,[79] the battle was not really joined until 1923, when the court in Frye v. United States[80] rendered a decision so far-reaching in its effects that it remains today one of the major judicial barriers to admissibility in many of our courts. During the ensuing fifty-five years, proponents of the polygraph have blunted their lances against the windmill of judicial conservatism, indifference, and overt hostility literally hundreds of times, with heartbreakingly little effect in most instances. Despite some victories in recent years in the area of stipulated admissibility, and a tiny handful of decisions holding polygraph evidence admissible even in the absence of mutual, court-approved stipulation, the preponderant weight of judicial decision lies against admissibility.

This half-century-long battle for judicial acceptance falls broadly into three categories: complete inadmissibility, admissibility by stipulation, and admissibility upon proper foundation regardless of stipulation. These are not, however, smooth, sequential steps in an evolution from strict rejection to increasingly liberal standards of acceptability. They are, rather, a complex, tangled snarl in the seamless web of the law. Although it is useful for the purposes of this study to examine these strands separately, it is important to remember that they remain inextricably intertwined; and in many jurisdictions the Frye decision retains the same persuasive force that it had in 1923.

Because so much of the weight of subsequent judicial decision on the polygraph rests on the Frye foundation, it is useful to examine the holding closely. Frye, on trial for murder, offered to submit into evidence the results of a lie detector test administered by Marston, using a systolic pressure device.[81] The trial court refused to accept the test results or to let Marston testify,[82] and the appellate court upheld this decision in an opinion that was to become classic:

> Just when a scientific principle or discovery crosses the line between the experimental and demonstrable stages is difficult to define. Somewhere in this twilight zone the evidential force

> of the principle must be recognized, and while courts will go a long way in admitting expert testimony deduced from a well recognized scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs.
>
> We think the systolic blood pressure deception test has not yet gained such standing and scientific recognition among physiological and psychological authorities as would justify the courts in admitting expert testimony deduced from the discovery, development, and experiments thus far made.[83]

This language established what came to be known as the "general scientific acceptance" doctrine; and subsequent courts have typically interpreted it rigorously, frequently refusing even to examine further evidence of "discovery, development, and experiments" in the field of polygraphy. In passing, it is ironic (but, of course, legally irrelevant) to note that some two or three years subsequent to this decision, Frye was found innocent and released from prison as a result of a confession by someone else to the murder for which Frye was convicted and sentenced.[84]

The second round in the battle came in 1933, in State v. Bohner.[85] Bohner, facing a robbery charge, offered the evidence of a lie detector test administered by a professor of the Northwestern University Crime Detection Laboratory to prove that he was not guilty and was not, in fact, anywhere near the scene of the robbery at the time. The appellate court, in upholding the refusal of the trial court to admit this evidence, said:

> While it may have some utility at present, and may ultimately be of great value in the administration of justice, it must not be overlooked that a too hasty acceptance of it during this stage of its development may bring complications and abuses that will overbalance whatever utility it may be assumed to have.[86]

The court concluded that lie detection had not yet achieved a level of general scientific acceptance and further observed, in its dicta, that introduction of such evidence might serve to "distract" the jury. Thus the score remained: Windmill, 2; Don Quixote, 0. Then came State v. Loniello (1935) in which a Wisconsin court supported a stipulation, and a jury found the defendants guilty.[86.5*]

In 1938 the infant science of lie detection gained its second judicial victory. In People v. Kenny,[87] a lower New York court admitted the result of a psychogalvanometer test administered by Father Summers, a Psychologist at Fordham University. Summers testified that his "pathometer" had proved to be 100 percent effective in more than 5,000 tests, and the court took notice of this, stating, in part:

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*Footnotes with decimal numbers are added by the Editor for further clarification of pertinent information.

> It seems to me that the pathometer and the technique by which it is used indicate a new and more scientific approach to the ascertainment of truth in legal investigation.[88]

However, polygraph proponents quickly found that celebration was premature. The other arm of the windmill swung down in People v. Forte,[89] decided in the same year by a New York appellate court. A trial court in a different district than that of the Kenny court had ruled "pathometer" evidence inadmissible. The Court of Appeals, in upholding the decision, observed that "the record is devoid of evidence tending to show a general scientific recognition that the pathometer possesses efficacy."[90] Thus implicitly overruled, Kenny lay vanquished in the dust of discarded precedent.

A series of one-sided judicial jousts followed. In 1942, in People v. Becker,[91] a Michigan court ruled against admissibility of the polygraph because of lack of general scientific recognition. In 1945, the Missouri Supreme Court held, in State v. Cole:[92] "No doubt the lie detector is useful in the investigation of crime, and may point to evidence which is competent, but it has no place in the court room."[93] The court concluded that the polygraph had not yet gained general scientific acceptance.

The first judicial notice of misuse of the lie detector was noted in a 1946 Illinois case, People v. Sims.[94] The case involved a seventeen-year-old girl charged with murder in Chicago. She was taken into custody, held five days without being booked, and questioned with the aid of a lie detector without her consent and despite her protests. Although the State made no attempt to introduce the actual test results, it did offer in evidence a confession obtained from the girl while she was still attached to the machine. The Illinois Supreme Court dealt rather summarily with this abuse of process, reversing the conviction and remanding for a new trial:

> She was without the advice of counsel and it seems probable that a girl of her age supposed, as she said, that because of the use of the lie detector and the fact that it was attached to her she was required to make a statement. We are of the opinion that what was done amounted, under the circumstances of this case, to a use of the lie detector against her wishes. No court so far as we are advised, has ever held that a lie detector may be used on the accused without his consent.[95]

Kansas joined the ranks of the states rejecting polygraph evidence in 1947, but the corn-belt judiciary added a new twist. In State v. Lowry,[96] the court made the now-hallowed observation that the polygraph had not, as yet, gained general scientific acceptance and recognition; but it further decreed that the machine was "... a mechanical device ... a sort of witness in absentia on the question of the defendant's guilt or innocence ..."[97] and rejected the results on the incredible grounds that the machine could not be cross examined.

From an august judicial perspective, however, this reasoning apparently did not seem frivolous; in 1949 the Nebraska Supreme Court, in Boeche v. State,[98] also held polygraph evidence inadmissible on the grounds that the

machine -- not the operator -- was unavailable for cross examination. Although the majority of the court also held to the hoary apothegm that the polygraph had not yet gained general scientific acceptance and recognition, one bright spot appeared in the gloom. In a concurring opinion, Judge Chappell noted:

> I do not agree with that part of the opinion holding that as a matter of law the so-called polygraph or lie detector, here involved, "used for the determination of the truthfulness of testimony has not yet gained such standing and scientific recognition as to justify the admission of expert testimony deduced from tests made under such theory."[99]

However, the concurring opinion in Boeche failed to portend any serious breach in the solid wall of judicial disapprobation of polygraphy. In 1950 a California appellate court joined the ranks, ruling in People v. Wochnick[100] that the lie detector lacked "scientific and psychological accuracy."

In the ensuing several years, advocates of the polygraph tried other approaches to admissibility. In a 1950 decision, State v. Pusch,[101] the North Dakota Supreme Court considered the admissibility of polygraph evidence coupled with hypnosis and upheld the trial court's rejection almost without comment. The following year, in reviewing the trial court's decision to reject polygraph test results coupled with a "truth serum" test in Henderson v. State,[102] the Oklahoma Criminal Court of Appeals ruled, "... neither the lie detector not the truth serum tests have gained that standing and scientific recognition nor demonstrated the degree of dependability to justify the courts in approving their use in the trial of criminal cases."[103] The court, in its analysis, distinguished the need for "interpretation" of the test results from the use of demonstrable "physical facts," such as analyses of handwriting, fingerprint identification, or X-rays.

Another 1951 case is of equal interest. In Stone v. Earp,[104] the Michigan Supreme Court upheld the trial court's ruling of inadmissibility of polygraph evidence in spite of a prior mutual stipulation of the parties entered into at the instigation of the court. The appellate court said:

> We are not unmindful of the fact that at the direction of the trial court, the parties agreed to submit to the tests, but whether by voluntary agreement, court direction, or coercion, the results of such a test do not attain the stature of competent evidence.[105]

In 1953 the polygraph gained something of the status of a taboo word. In Kaminski v. State,[106] no attempt was made actually to introduce polygraph evidence; however, the prosecution, in order to bolster the credibility of the State's key witness, asked the witness if he had consented to a polygraph test before trial. The witness answered, "I did," and the trial court accepted the answer. Even though the results themselves were not offered, the Florida Supreme Court reversed, holding:

> The successful attempt by the prosecution by the means employed to supplant (sic) in the minds of the jury the impression

> that because the witness had voluntarily submitted to a lie detector test prior to trial he must perforce be testifying truthfully in the course of the trial resulted, in effect, in the substitution of a mechanical device, without fair opportunity for cross-examination, for the time-tested, time-honored discretion of the judgment of a jury as to matters of credibility.[107]

In Parker v. Friendt,[108] a 1954 case ruled on by the Ohio Court of Appeals, the decision to bar polygraph evidence was based primarily upon the lack of experience and training on the polygraph operator, a police examiner with three and one-half years of experience. Although the court cited earlier precedent holding that such tests generally were inadmissible, the decision stressed the necessity for " . . . sufficient training and knowledge to understand the delicate physiological reactions upon which . . . conclusions are based."[109]

The 1955 Michigan case, People v. Davis,[110] is something of a judicial landmark in the Battle of the Polygraph. It represented an ambitious and thorough attempt to lay a sound scientific foundation for admissibility of polygraph evidence. Although it ruled, a priori, that the test results and the supporting testimony were inadmissibile, the trial court allowed an offer of proof to preserve the testimony for the record. But despite a plet hora of evidence and expert testimony on reliability, validity, scientific acceptance, use of the polygraph by the Army, Navy, Air Force and Atomic Energy Commission, and a detailed analysis of the medical and physiological theory underlying the operation of the polygraph, the Michigan Supreme Court ruled that the trial court had not erred in its rejection and that the polygraph had not yet attained a degree of reliability and acceptance sufficient to justify judicial admissibility of such evidence.[111]

Following the resounding triumph of the judicial windmill in Davis, the parade of exclusionary decisions continued unabated. In 1957, the California Supreme Court, in People v. Carter,[112] ruled that polygraph evidence had not yet attained sufficient reliability for judicial acceptance; and it further declared that admission of a witness's statement of his willingness to clear himself of suspicion by taking a polygraph test was an error. In Lee v. Commonwealth,[113] a 1958 Virginia case, the appellate court upheld rejection of polygraph evidence solely on the basis of precedent. Any discussion of the reliability or validity of the polygraph was studiously eschewed. In 1959, a Federal District Court ruled, in U.S. v. Stromberg,[114] that polygraph evidence is "hearsay." The court's reasoning is revealing:

> But a machine cannot be examined or cross-examined; its testimony as interpreted by an expert is, in that sense, the most glaring and blatant hearsay. Though the defendants cite in their brief certain articles which they contend establish the scientific accuracy of the polygraph tests, I am not prepared to rule that the jury system is as yet outmoded. I still prefer the collective judgment of twelve men and women who have sat through many weeks of trial and heard all of the evidence on the guilt or innocence of the defendant.[115]

The early 1960's produced a body of largely repetitive exclusionary decisions. The year 1961 is illustrative. A New Mexico court in State v. Trimble,[116] a new Jersey court in State v. Arnwine,[117] and a North Carolina court, in State v. Foye,[118] all summarily rejected polygraph evidence on the Frye rationale, as embodied in prior cases. The Foye court did additionally suggest, in dictum, that the test results might "distract the jury," whatever that means. In 1963 the Illinois judiciary upheld rejection of polygraph evidence despite a prior mutual stipulation of the parties. The case, People v. Zazzetta,[119] is notable for a decision of such obfuscatory density that it has subsequently been cited as a precedent both for and against admission of polygraph evidence.[120]

That same year, however, a Massachusetts case, Commonwealth v. Fatalo,[121] foreshadowed some relaxation in the rigid judicial posture of exclusion. Though the State Supreme Court rejected the evidence in the particular case, it did comment:

> We do not hold that ... recognition must be universal or that the test must be proven infallible, but rather that the substantial doubts which presently (sic) revolve about the polygraph test must be removed.[122]

The outlook was less promising in the Federal arena. An Eighth Circuit decision, McCrosky v. U.S.,[123] handed down in 1965, merely relied on Stromberg.

In the state courts, however, the slight -- sometimes almost imperceptible -- trend toward liberalization of requirements continued. Illinois, which in 1963 had delivered the uncertain Zazzetta decision,[124] once again ruled against polygraph admissibility in a 1966 case, People v. Potts.[125] However, the court entered into a detailed discussion of the fact that no foundation had been laid concerning test methods and reliability, that qualifications of the examiner had not been established, and that test results were proffered solely as a written report, with no supportive testimony. Although the court did not state expressly that test results would be admissibile upon proper foundation and determination of the qualifications of the examiner, it has been read by some commentators reasonably to imply this.[126]

In a novel 1968 case, People v. Hudson,[127] the defendant may have been prompted by the slight relaxation of the Illinois Supreme Court's posture on polygraph evidence to attempt a unique approach. He submitted to a polygraph test, and when the examiner's assessment of the test results was "inconclusive," the defendant attempted to introduce this into evidence on the theory of "reasonable doubt." The court was unconvinced.

The first slight hint of a possible slackening in the rigid and almost automatic exclusionary policy of the Federal courts was revealed in a 1969 decision by the Tenth Circuit, United States v. Wainwright.[128] In ruling that the proffered evidence was not admissible, the court stated, in part:

> No judgment can be made without relevant expert testimony relating to the probative value of such evidence. Wainwright totally failed to supply the condition noted by Wigmore that

> before such evidence be admitted an expert testify "that the proposed test is an accepted one in his profession and that it has a reasonable measure of precision in its indications." The trial court properly excluded the polygraph evidence, even though in a proper case it may be admissible.[129]

This trend continued in a New York case decided the same year, People v. Leone.[130] The court held that polygraph evidence could be admitted upon proper foundation, despite the fact that an insufficient foundation had been laid in the instant case and that the defense had failed to demonstrate "a general scientific recognition that the polygraph possesses efficacy."[131]

In 1970, an Arizona decision, Bowen v. Eyeman,[132] addressed the collateral issue of admissibility of evidence of the refusal to take a polygraph test. The court ruled that ". . . a compulsory lie detector examination would infringe upon the privilege against self-incrimination,"[133] and that as a result any testimony concerning refusal to take a polygraph test would be "constitutionally impermissible. Proof of silence or invocation of the privilege violates the Fifth Amendment."[134] Further, instructions to the jury to disregard such testimony does not cure such an error because of the "highly prejudicial effect of such testimony."[135]

Despite setbacks, advocates of the polygraph began to gain at least theoretical ground in the 1970's. Appellate courts upheld the exclusion of polygraph evidence as regularly as ever; but they began to concede, in dicta, at least the possibility that such evidence might be theoretically admissible upon proper foundation and at the discretion of the trial court. In a landmark California case in 1973, United States v. DeBetham,[136] the court exercised its discretion to bar polygraph test results in the non-jury trial of a defendant accused of knowingly transporting heroin. However, the court assessed the science of polygraphy in great detail and concluded that such a test, if conducted by a competent examiner, could have significant probative value. "... the field of instrumental lie detection," observed the court, "has ... achieved the status of a department of systematized knowledge that is currently being enriched through further investigation and research."[137] The court concluded that if practical application could approximate the degree of reliability in controlled laboratory experiments of 80 to 90 per cent,"the reliability of the polygraph can fairly be termed to be substantial, thus warranting a finding of probative worth."[138] The Ninth Circuit court, although upholding the district court's discretionary exclusion, commented, "... the evidence ... vigorously supports the accuracy of polygraph evidence."[139]

This was a heartening decision for the proponents of the lie detector; but it failed to trigger a rash of admissibility rulings. Like the Devil quoting Scripture, courts read into DeBetham what they wished to find. In the same year, a California court excluded test results in United States v. Urquidez;[140] and though it paid lip service to the DeBetham decision, recognizing that polygraph evidence is admissible under proper circumstances; the court's interpretation of what might constitute "proper circumstances" served as an effective bar to admissibility under any circumstances with the possible exception of divine intervention. "As of now," the court stated,

"the validity of a polygraph test is dependent upon a large number of variable factors ... difficult, and perhaps impossible, to assess."[141] In another Ninth Circuit decision in the same year, United States v. Alvarez,[142] the DeBetham precedent was cited solely to uphold exclusion on the somewhat capricious ground of trial court discretion. The following year, in United States v. Watts,[143] the Ninth Circuit court once again made the same ruling on the same discretionary basis.[144]

The roster of recent exclusionary decisions would not be complete without some recognition of United States v. Wilson,[145] a 1973 Fourth Circuit case which is, in its own way, as much of a legal landmark as the Frye case decided forty years before. The Wilson court, not content merely with exercising "judicial discretion," resurrected every bogeyman in the cluttered closet of judicial polygraph precedent. First, suggested the court, such evidence might, under some circumstances, violate a defendant's rights under the Fifth amendment. A second judicial concern involved the hearsay issue: the machine, as usual, could not be cross-examined. The reliability and validity of the polygraph were also called into question, and the court concluded that " ... the systematic research relating to the validity of the polygraph is still in its formative period ..."[146] The issues of operator competence and consistency of test data interpretation arose as well: " ... polygraphy, albeit based on scientific theory, remains an art ... The subtleties of physiological and psychological reaction also result in divergence in interpretation ..."[147]

The old bugaboo of "beating the machine" did not escape notice: "Speculation survives that a portion of the population, sometimes called 'pathological liars,' can 'beat' the machine ..."[148] The court also noted in passing the absence of national standards for the education of polygraph examiners, creating the danger of test results produced by "incompetent examiners."[149] Finally, the Wilson court dragged forth the spectre of "trial by polygraph replacing trial by jury ..."[150] and noted, in passing, that this created the collateral risk that the test results might go to prove "the ultimate issue," rather than being limited to the question of credibility.[151]

B. A Crack in the Wall

Despite the preponderance of judicial disapprobation of polygraph evidence, some courts, even in jurisdictions that have ruled the tests generally inadmissible, have permitted the introduction of lie detector test results on the basis of prior mutual stipulation of the parties. Termed a "paradox" by one commentator,[152] the stipulated admission is only a crack in the wall of juridicial rejection. However, it is an increasingly widening crack; and it appears to presage increasing liberalization in the often insurmountably rigorous standards for admissibility erected even by those courts that have conceded the theoretical admissibility of polygraph evidence upon "proper foundation."[153]

After Loniello, the next admission of polygraph evidence on the basis of prior mutual stipulation, and the first to withstand appeal, was in 1948 in People v. Houser,[154] a California case. The defendant, charged with a sex offense, joined with the state in an agreement to submit to a polygraph test, with the proviso that the results would be admissible regardless of

the outcome. It proved to be an injudicious tactic for the defendant; the results were solidly against him. Undaunted, Houser promptly opposed admission of the test results on the grounds that polygraph results were unreliable and that the examiner who had administered the test was incompetent. However, the results were admitted, Houser was convicted, and the appellate court, in upholding the decision, stated:

> It would be difficult to hold that the defendant should now be permitted on this appeal to take advantage of any claim that such operator was not an expert and that as to the results of the test such evidence was inadmissible, merely because it happened to indicate that he was not telling the truth when he denied to the officers that he took the girl to the orange grove and committed the acts alleged upon her.[155]

Although earlier efforts at admitting polygraph evidence by prior stipulation had consistently failed,[156] and the Houser decision was a significant liberalization of judicial precedent, it remained for some time an anomaly. Not until 1960, when an Iowa court in State v. McNamara[157] followed the Houser precedent, was there another case of admission by mutual stipulation. In McNamara, as in Houser, the defendant attempted to exclude test results that were not in his favor. The court, without probing the issue of polygraph reliability, ruled that the accused was bound by his prior agreement, and the appellate court upheld the decision.

In 1962, the Arizona Supreme Court went a step further, upholding the stipulated admission of test results in a landmark case, State v. Valdez.[158] The court reasoned that "...the...lie detector...had developed to a state in which its results are probative enough to warrant admissibility ..."[159] This decision is especially significant in its emphasis not merely upon the estoppel force of the prior stipulation but also upon the evidentiary value of polygraph results. Perhaps equally important, the court also established detailed standards and guidelines for the admissibility of polygraph evidence in future cases involving such stipulated admission within the jurisdiction.[160]

Although the Valdez constitute a clear, objective evidentiary and procedural standard which some other courts have adopted in ruling upon the issue of stipulated admissibility of polygaph results, several jurisdictions, while conceding that test results are admissible on stipulation, persisted in clinging to the estoppel, or "contract," theory as the sole basis for admission. In a 1966 Florida case, State v. Davis,[161] the appellate court dismissed the indictment against the defendant on interlocutory appeal, following the trial court's refusal to admit favorable polygraph evidence from a test taken by prior mutual stipulation. Without discussing the question of test reliability or the acceptability of polygraph evidence generally, the appellate court held that the violation of the state's pledge to admit the test results was a breach of public faith. In 1969, the same court reached substantially the same conclusion on substantially the same basis in Butler v. State.[162] Once again the court skirted the issue of polygraph reliability.

This contract theory of stipulated admissibility did not always prove

auspicious for the hapless defendant, unfortunately. In a 1974 Nebraska case, State v. Sanchell,[163] the appellate court upheld the exclusion of polygraph test results favorable to a defendant accused of rape and robbery on the grounds that despite a clear prior stipulation between the prosecutor and the defendant, the agreement was not enforceable due to the absence of express prior approval and agreement by the trial court judge. Sanchell then sought a writ of habeas corpus in Federal Court, but that was denied by the U.S. District Court in Nebraska, and he appealed again. In 1976 the Eighth Circuit Court in Sanchell v. Parratt, warden,[163.5] again denied a writ of habeas corpus and in so doing said they did not condone the conduct of the prosecution in the case, but held that the validity of the agreement was a matter of state law.

Among the more interesting of the stipulated admissibility cases is Pulakis v. State,[164] a 1970 ruling by the Alaska Supreme Court. In an opinion of such judicial nicety that it has been interpreted by some commentators as reversing the instant case on the grounds of inadmissibility of polygraph evidence,[165] and by others as sanctioning the general admissibility of polygraph evidence upon prior valid stipulation,[166] Judge Rabinowitz deftly affirmed the trial court decision on the basis of "an intelligent waiver of a known right,"[167] while summarily barring future admission of polygraph test results:

> ... we conclude that the results of polygraph examinations should not be received in evidence over objections. Even if no objection has been tendered, the trial court ordinarily should reject such evidence. A stipulation for admissibility does not increase the reliability of polygraph results and therefore should not lead to any deviation from the exclusionary policy.[168]

Although the proponents of the polygraph have achieved less than a total victory in their half-century-long battle, a definite trend may be discerned in the area of stipulated admissibility. Of the 23 states that have adjudicated this issue in 1975 and later, 16 have admitted the test results, while seven have not. Narrowing the focus, of 13 state courts deciding the question during 1976 and 1977, only three have banned the results, while 10 have ruled the polygraph evidence admissible.[169]

Generally, approaches to admission of polygraph evidence through prior mutual stipulation have proved far more fruitful than any other legal strategy. Overall, as of 1977, a total of 24 states either have admitted or have indicated the admissibility of polygraph evidence on valid prior stipulation: Arizona, Colorado (in civil cases only), Florida, Georgia, California, Indiana, Iowa, Kansas, Maryland, Massachusetts, Michigan, Missouri, New Jersey, New Mexico, New York, North Carolina, Ohio, Oregon, Utah, Vermont, Virginia, Washington, Wisconsin, and Wyoming.[170]

Of the remaining states, 19 are unequivocally opposed, holding the judicial view that " ... a stipulation for admissibility does not increase the reliability of polygraph evidence ..."[171] "... whether by voluntary agreement, court direction, or coercion..."[172] They include: Arkansas, Alaska, Alabama, Delaware, Hawaii, Kentucky, Louisiana, Maine, Minnesota, Mississippi, Montana, Nebraska, North Dakota, Oklahoma, Pennsylvania, South Carolina, South Dakota, Tennessee, and Texas.

Seven states -- Connecticut, Idaho, Illinois, Nevada, New Hampshire, Rhode Island, and West Virginia -- are in the "undecided" category, either because the issue has never been adjudicated in the jurisdiction or because judicial decision is unclear.[173, 174]

In the Federal court system, the picture is less optimistic. Among the circuit courts, only three have admitted polygraph evidence, one has rejected it, and seven have not ruled on that precise issue, although several have indicated in dicta that such evidence might be admissible in a proper case.[175] The District of Columbia continues to hold to the Frye precedent. Not surprisingly, U.S. Military Courts consistently reject polygraph evidence, stipulated or not.[176] However, the National Labor Relations Board has held that it is admissible on stipulation in Board hearings at the discretion of the examiner.[177]

C. Once More Unto the Breach

In contrast to the growing trend to admit polygraph evidence upon prior mutual stipulation, few courts have been willing to admit such evidence in the absence of stipulation. Other than the anomalous Kenny holding in 1938, the scant handful of unstipulated admission cases have all been within the past five years or so. Although few in number, however, these cases are of especial interest due to their consistent rejection of outmoded and frozen precedent, and their careful, objective scrutiny of the current state of the science, the reliability of polygraphy, the qualifications of examiners, and the evidentiary problems raised.

A characteristic case is People v. Cutler,[178] a 1972 trial in which the Los Angeles Superior Court held a seven-day evidentiary hearing following the prosecution's motion to suppress polygraph test results and testimony offered by the defendant. In ruling the evidence admissible over the objection of the prosecution, the court observed:

> The science of polygraphy including the development of more sophisticated polygraph machines; the development of standards of procedure in pre-examination interviews; the elimination of unsuitable subjects; the programming of relative and control questions; the training and developing of qualifications for examiners has been the subject of great and significant advance in the last ten years ... Recent laboratory and in the field research has established a generally recognized reliability and validity of the polygraph in excess of 90 per cent.[179]

Although the prosecution initially filed an appeal in this case, the appeal was subsequently dropped due, one commentator suggests, to the fear of establishing appellate precedent for admissibility of polygraph evidence.[180]

Of somewhat greater legal significance are three precedent-setting Federal District Court decisions: one in the First Circuit, one in the Sixth Circuit, and one in the District of Columbia Circuit. In United States v. Zeiger,[181] a 1972 D.C. District Court case, the defendant offered to introduce expert testimony in support of reliability and validity of polygraphy

as a foundation for introduction of test results and testimony of the examiner who had administered the test. An imposing roster of experts took the stand: John Reid, world-famous polygraph expert and co-author of one of the standard textbooks in the field;[182] Lynn Marcy, polygraph examiner who had administered over 25,000 polygraph examinations; Martin Orne, recognized polygraph authority and professor of psychology and psychiatry at the University of Pennsylvania; and others.[183] The court found their testimony persuasive; in ruling the evidence admissible, the judge made passing allusion to the famous "twilight zone" of the Frye holding:

> Today polygraphy has emerged from that twilight zone into an established field of science and technology ... The testimony of the experts and the studies appearing in the exhibits leads the court to believe that the polygraph is an effective instrument for detecting deception ... The polygraph has been accepted by authorities in the field as being capable of producing highly probative evidence in a court of law when properly used by competent, experienced examiners.[184]

Although the appellate court reversed swiftly, per curiam without comment, possibly upon the authority of its fifty-five-year-old decision in Frye, the ruling in Zeiger and the language of the decision have had considerable influence upon subsequent holdings in other jurisdictions.

In the First Circuit, a Massachusetts District Court admitted unstipulated polygraph evidence in U.S. v. Grasso[185] on a defense motion and following proper foundation. The court's holding was substantially similar to that of the Zeiger court; and the jury voted to acquit. Ironically, the jurors revealed in a subsequent interview that they were persuaded of DeGrasso's innocence entirely by the weight of other evidence, and the polygraph testimony had no influence upon their deliberations.[186]

Probably the most far-reaching of all the unstipulated admission cases, however, is United States v. Ridling,[187] a Sixth Circuit case tried in Michigan in 1972. In a sweeping decision, the court examined not merely the reliability and general scientific acceptance of polygraphy but many of the other legal issues surrounding admission of such evidence. The first of these was precedent. Acknowledging that "judicial opinions pertaining to the admission of polygraph evidence seem all to point to exclusion,"[188] the court nonetheless observed:

> Although these opinions are entitled to great weight in considering the matter at this time, they are not persuasive insofar as they are predicated on the unreliability of the polygraph. This is a question to be determined in each case.[189]

Such a determination of reliability, the court said, should be made on the basis of the expert testimony of "properly qualified experts, knowledgeable in the theory and practice of the field ..."[190] On the basis of such expert foundation testimony in this case, the court ruled:

> The record in this case indicates that the theory of the

polygraph is sound and that it is directly relevant to this case (a perjury case), and that therefore the cases denying admissibility on these grounds are not controlling.[191]

In addition, the court examined several evidentiary problems that might be raised by admission of polygraph evidence. As the court pointed out:

The following problems are presented:

1. Is the evidence of such a nature that the jury will attach too much weight to it?
2. What is the effect of the privilege against self-incrimination?
3. Will the trial process be upset by the use of the polygraph?
4. Is there a hearsay problem?[192]

In assessing the first question, the court determined that the evidence was not "in any way remote,"[193] that it did not offer the danger of "the injection of many collateral issues in the trial,"[194] and that "admission of polygraph opinions about the defendant's statements should be valuable to the development of a just result."[195]

The court also examined the danger of "impropriety on the part of polygraph examiners"[196] and the consequent risk that biased evidence might be offered by a defense-selected polygraph examiner. It concluded that this hazard could best be met by having the party submit to another examination by a court-appointed polygraph expert. In the event of clear results from such corroborative test, both defense and court-appointed examiners should be allowed to submit test results and to testify, even though their results "might disagree on the ultimate issue."[197] However, in the event that one test should prove to be inconclusive, the court said, both opinions should be excluded.

The issue of self-incrimination, which has been viewed as a serious danger by several other courts in admitting polygraph evidence,[198] proved to be less of an obstacle for the Ridling court.

A test cannot be made without the full cooperation of the defendant. It seems clear, then, that if adequate warnings are given as to the possible use of the tests ... the taking of the test itself is a waiver of privilege.[199]

The court suggested further that the privilege might not even be involved, citing prior holdings on lineups, fingerprinting, blood samples, and exemplars, all of which have been ruled not to violate the privilege.[200]

Although recognizing that "the trial process very likely will be substantially affected in a number of respects by the use of polygraph opinion ..."[201] the court viewed as unlikely the danger that the trial process would be upset or disrupted. Further, it rejected as specious the ubiquitous bogeyman of "trial by polygraph" rather than by jury:

> The argument that the jury will be displaced by the machine or by a polygraph examiner lacks merit. The jury will make the final determination of guilt or innocence.[202]

On the question of the applicability of polygraph testimony to the issue of the case, the court was explicit:

> Since this is a perjury case, the issue is -- was the defendant lying? The opinion of the polygraph examiner based on a properly conducted examination is more than character evidence, it is direct evidence on this point and may be offered by either side regardless of whether the accused takes the stand or puts his character in issue.[203]

Finally, the court turned its attention to the hearsay problem. The polygraph test questions and answers, if noted, "... are not received into evidence to prove the truth of the fact asserted ..." but as "... evidence of the stimulus for the response of the autonomic nervous system of the subject that is being interpreted by the expert ..." Citing FRE 703, the court said, "The expert may base his opinion on matters which are '... reasonably relied upon by experts in the particular field.'"[204] In ruling that both the examiner's opinion and the data upon which the opinion is founded are within the ambit of expert testimony, the court concluded:

> ... the statements supported by the opinion of the expert appear to be hearsay but since the very purpose of the test is to determine truthfulness, the evidence should be admitted as an exception to the hearsay rule because of its high degree of trustworthiness ...[205]

Like the Valdez court, the court in Ridling conditioned admissibility of polygraph evidence generally upon conformance to explicit judicial guidelines and safeguards,[206] which have served as a model to subsequent courts ruling on polygraph testimony.

A 1974 Massachusetts case, Commonwealth v. A Juvenile,[207] is another landmark decision; it represents the first time that any state supreme court has ruled polygraph evidence admissible in the absence of a prior stipulation of the parties. Although the court meticulously distinguishes its own prior holding made eleven years before in Commonwealth v. Fatalo,[208] which was based in part on the Frye requirement of "general acceptance in the scientific community," that prior decision is now so limited as to be overruled by implication. In its four-three opinion, the Juvenile court said:

> ... if the defendant agrees in advance to the admission of the results of a polygraph test, regardless of their outcome, the trial judge, after a close and searching inquiry into the qualifications of the examiner ... and the methods utilized in conducting the tests, may, in the proper exercise of his discretion, admit the results, not as binding or conclusive evidence, but to be considered with all other evidence as to innocence or guilt. As a prerequisite the

judge would first make sure that the defendant's constitutional rights are being protected.[209]

Although the requirement for advance admissibility agreement by the defendant has been misread by several commentators as requiring prior mutual stipulation of the parties -- and though this will certainly be its practical effect in most cases -- a close reading of the decision discloses no such theoretical limitation.

The defendant, under the Juvenile holding, may move to submit results from tests that have been (1) conducted by an examiner of his own choosing, (2) administered by an expert chosen by the Commonwealth, (3) conducted by a jointly-selected examiner or examiners, or (4) conducted by a court-appointed examiner.[210] Though less rigorous than the safeguards erected by the Ridling court,[211] these options are qualified by the right of the trial judge to exclude results "... in the proper exercise of his discretion ..."[212]

In the same year a New Mexico decision, State v. Alderete,[213] upheld rejection of polygraph evidence at the trial level in the instant case, but it based its ruling on the defendant's failure to lay a proper evidentiary foundation, to qualify the examiner, or to introduce the examiner as a witness. Holding that polygraph evidence might be admitted upon proper foundation, the court expliciting rejected the "general scientific acceptance" test of Frye, replacing it with the requirement that the evidence need only have "logical relevance" to the issue. In a subsequent 1975 decision, State v. Dorsey,[214] the New Mexico court explicitly overruled its own prior holdings in State v. Trimble[215] and State v. Chavez[216] that polygraph evidence admissibility was limited to prior mutual stipulation of the parties or to t he absence of an objection to it at the trial.

Although this general trend toward judicial endorsement of unstipulated admissibility of polygraph evidence is somewhat less than sweeping, these few cases are significant in their consistent rejection of the limitations of frozen precedent, their recognition of the unrealistically rigorous requirements of the Frye test-- at least as it has been judicially applied -- as inconsistent with the standards by which scientific evidence is customarily appraised, their meticulous inquiry into the current methodology and reliability of polygraphy, their explicit discussion and analysis of the evidentiary problems posed by such testimony, and their concern with the establishment of express judicial guidelines and standards -- other than the ubiquitous but amorphous "proper discretion of the trial court" -- to condition and control admissibility.

D. Meanwhile, Back at the Ranch ...

An analysis of relevant case law would be incomplete without some discussion of judicial determination of the question of admissibility of polygraph evidence in Hawaii. This discussion is necessarily brief; only one case, the 1962 Hawaii Supreme Court ruling on State v. Chang,[217] is remotely germane. In an exhaustive and detailed opinion, the court makes its position clear and unequivocal:

We fully agree with the summary in McCain v. Sheridan ...[218]

> 'Beyond question, the results of lie detector tests are inadmissible in evidence on the trial of a criminal case, whether offered by the prosecution ... or the defense ... Nor are such results admissible on trial of a civil case ...'[219]

Such an explicit and unambiguous, judicial posture would seem to foreclose the necessity or even the possibility of further discussion; however, several aspects of this opinion merit somewhat closer analysis. According to the facts of the case, the defendant in Chang was on trial for conspiracy to defraud the municipality. At the trial level, the prosecution was allowed to admit, over defense objection, testimony that Chang had been asked to submit to a lie detector test and had refused to do so. In appealing his subsequent conviction, Chang held that admission of the fact of his refusal to take the test was improper. The real issue in this case, then, is identical to that in Bowen v. Eyeman.[220] It is not a question of admissibility of polygraph evidence -- for no tests were made, and neither the prosecution nor the defence attempted to introduce polygraph results -- but rather of involuntary self-incrimination. The Bowen court summed up the real issue with economy and clarity: "... a compulsory lie detector examination would infringe upon the privilege against self-incrimination,"[221] and that in consequence any reference to the defendant's refusal to take such a test would be violative of his constitutional rights. "Proof of silence or invocation of the privilege," the Bowen court observed, "violates the Fifth Amendment."[222]

The issue that the Bowen court had identified and treated with such juridicial nicety was subsequently dealth with by the U.S. Supreme Court in Doyle v. Ohio,[223] in which the court held that silence in the face of accusations made while the accused was in police custody could not be admitted to support an inference of guilt or to impeach the defendant's credibility. The Hawaii Supreme Court, however, did not choose to address the constitutional issue suggested by the facts of Chang. Instead, with robes metaphorically aflap, it engaged in an ungainly judicial two-step to arrive at a similar result by a far more circuitous path.

As its first step, the court held on the basis of persuasive precedent from other jurisdictions that "courts do not consider the polygraph ... sufficiently perfected nor the interpretation of results in its use reliable enough to permit testimony respecting such a test to be admitted in evidence."[224] As its second step, the court made an unusual inference:

> It follows from the incompetency of the test itself as evidence that the refusal or willingness of a defendant to submit to a lie detector test are matters that may not be brought out in the trial of a criminal case.[225]

From here the court pirouetted to the conclusion that admission of evidence that the defendant had refused to take a polygraph examination constituted a reversible error. Because each of these steps raises its own questions of interpretation, it is useful to examine them in some detail.

In arriving at its first step, the court asserts: "There apparently is only one reported case, People v. Kenny ... which has held testimony on

the results of a lie detector test to be admissible."[226] This blanket assertion is incorrect, of course, as a reading of People v. Houser,[227] State v. McNamara,[228] and State v. Valdez,[229] for example, quickly demonstrates. The Chang court does not ignore Valdez, however. On the contrary, it cites the Valdez holding in support of its general contention of polygraph test result inadmissibility.[230] Of course, the Hawaii Supreme Court is privileged to be persuaded by whatever it chooses to find persuasive; but it is difficult to reconcile a conclusion of general inadmissibility on the grounds of unreliability and lack of probative value with the actual holding in Valdez:

> ... although polygraphic interpretation has not attained that degree of scientific acceptance in the fields to which it belongs to be admissible at the instance of either the state or the defendant ... it has been considerably improved since Frye v. United States ...
>
> Although much remains to be done to perfect the lie detector as a means of determining credibility we think it has been developed to a state in which results are probative enough to warrant admissibility upon stipulation ...
>
> Accordingly, and subject to the qualifications announced herein, we hold that polygraphs and expert testimony relating thereto are admissible upon stipulation in Arizona criminal cases.[231]

The Chang court does allude to the Valdez ruling of stipulated admissibility in a brief and cautious footnote,[232] but, other than suggesting that it is subject to "the discretion of the trial judge,"[233] largely ignores the implications of the holding. It could be argued in mitigation -- though the Chang court does not do so -- that the instant case does not involve the issue of stipulated admissibility of polygraph evidence; but that has the smack of being a non sequitur; the case does not involve unstipulated admissibility either.

The court's second step, that "It follows from the incompetency of the test itself ... that the refusal or willingness of a defendant to submit to a lie detector test ... may not be brought out ..."[234] is logically questionable. The issue is not whether polygraph test results actually are probative of guilt or innocence but, rather, whether the defendant and the jury might reasonably be inferred to believe that they are probative. The test of this is whether the testimony relating to Chang's refusal to be tested might tend to prejudice the jury and to lead them to believe that such refusal showed guilty knowledge on Chang's part; and this does not require any independent determination of the objective reliability or validity of the test itself. The defendant's refusal to undergo a Ouija Board examination would have been equally prejudicial if it could reasonably be inferred that the defendant and the jury believed that the results would have been probative.

Unfortunately, the court in Chang largely skirts this point, referring to it almost parenthetically in a curt dictum:

> Aside from the ready disposition of the point dictated as a matter of law by the authorities above considered, analysis of the circumstances permits only the conclusion that the jury could easily have weighed the answer against the defense.[235]

Yes, indeed it could have.

It is a pity that in achieving a just result in the Chang case, the court felt compelled to incorporate in its opinion a body of findings that, while irrelevant to the real issue in the case, are so sweeping as to have effectively foreclosed subsequent judicial investigation or assessment of the issue of acceptability of polygraph evidence in this jurisdiction. Like the ill-starred Frye holding, the Chang decision has served to erect a solid wall of frozen precedent that stands as a judicial barrier to consideration of polygraphy on its own merits.

E. The Impact of Statutory Law

Although several sections of the Federal Rules of Evidence have been found relevant by courts assessing the issue of polygraph admissibility,[236] the Rules themselves reflect a discreet and well-bred ignorance of even the bare existence of this controversial mode of testimonial verification. Generally, state legislatures have been equally wary of entangling themselves in the web of conflicting judicial precedent; although California Senate Bill 119, introduced in 1973, is a creditable exception. Despite the fact that the bill was defeated in the California Assembly Committee on the Judiciary, it represents a thoughtful, objective, balanced approach to an admittedly complex judicial problem.[237]

However, a number of states have passed statutes addressed to collateral areas of concern. These include both licensing and limiting statutes. A total of sixteen states have passed legislation that prohibits or rigorously limits the use of the polygraph by business or industry either as a condition of pre-employment or of continued employment screening. These include Alaska, California, Connecticut, Delaware, Hawaii, Idaho, Maryland, Massachusetts, Michigan, Minnesota, Montana, New Jersey, Oregon, Pennsylvania, Rhode Island, Washington, and the District of Columbia. Though the majority of such statutes exempt government and law enforcement agencies from the stricture against the use of the device for personnel screening, and they are unanimous in allowing the use of polygraphy for official investigative purposes, private use of the machine is rigidly circumscribed. In several states, this ban is enforced by sharp-toothed penalties.[238]

Although the statutory language varies somewhat from state to state, as do the procedures for enforcement, all of the statutes reflect the same general intent; that no private employer may compel an employee to submit to a polygraph test in order either to obtain or to keep a job. In a few states it is a violation even to suggest to the employee that he do so.[239] Hawaii's statutory provisions are typical:

> 378-21 Unlawful. It shall be unlawful for a private employer or his agent, or an agent of a public employer to require an employee to submit to a polygraph or lie

detector test as a condition of employment or continued employment.

378-22 Penalty. Any person who unlawfully requires an employee to submit to polygraph or lie detector tests shall be fined not more than $1,000 or imprisoned not more than one year, or both.

The prohibitionary phrases may very slightly from state to state -- "request or suggest,"[240] "subject or cause,"[241] "solicit,"[242] or even "require, request or suggest,"[243] -- but in all of them the intent is unambiguous.[244]

In addition to limiting statutes, there has been a trend in recent years toward licensing statutes. Some twenty-four states have passed legislation making provision for licensing polygraph examiners. These include Alabama, Arizona, Arkansas, Florida, Georgia, Illinois, Iowa, Kentucky, Maine, Massachusetts, Michigan, Mississippi, Nevada, New Mexico, North Carolina, North Dakota, Oklahoma, Oregon, South Carolina, Tennessee, Texas, Utah, Vermont, and Virginia. In addition, the Department of Defense in 1974 issued a Directive requiring certification for all polygraph examiners employed by the DOD. All of the other Federal Agencies also have regulations on the use of the polygraph. Interestingly, only three states have passed both limiting and licensing statutes, Oregon, Massachusetts and Michigan.[245]

Unlike the near-unanimity of provision in the various limiting statutes, state licensing acts vary widely in their regulations and requirements. Romig, in his detailed comparative study of state licensing laws,[246] points out:

> Except for the amounts of fees, each of the . . . statutes cited a licensing and revocation authority, prescribed fees, had complaint-revocation-appeals channels, and required the issuance of a license certificate. Applicants were required unanimously to be free from court convictions. The statutes were not in common agreement in the remainder of the stated prerequisites.[247]

Included among the requirements that vary widely among the states are age, education, experience, formal polygraph training, internship period, and the qualifications of the licensing authority. Regarding this latter requirement, a number of states have stipulated that the applicant be approved by a polygraph examiner board; but at least four -- Arkansas, Georgia, Mississippi, and Texas -- do not require that any of the board members be qualified polygraph operators.

While the fact that there is little correspondence between polygraph-licensing and polygraph-limiting states emphasizes the deep disparity of judicial and legislative attitude toward polygraphy between the two groups, both the limiting and licensing statutes are favorable auguries. They reflect an increasing recognition of polygraphy as a science and a growing acceptance of the polygrapher as an accredited and reputable professional person. However, the wide variation in minimum licensing requirements among the states can lead to judicial confusion or uncertainty in attempting to establish the degree of examiner competence necessary to allow admission of polygraph evidence or of examiner testimony. Absent unanimous state agreement on uniform standards of training and competence for polygraph examiners,

the most reasonable solution would appear to be acceptance of a *minimum* standard of examiner competence as established by a recognized professional organization such as the American Polygraph Association. This is, in fact, the approach that has already been adopted by several courts.

In addition, the increasing legislative concern with use and possible abuse of the polygraph suggests that in some states at least the eventual shortcut through the tangled web of conflicting case law and judicial precedent entangling the issue of admissibility of polygraph evidence and examiner testimony may be by a legislative rather than a judicial route; and courts, compelled by prior decisions of their own state supreme court to continue to cling to the myth that the polygraph has not significantly increased in reliability during the past fifty-five years, may have their dilemma resolved for them.

IV. Quo Vadimus?

"Grammatici certant et adhuc sub judice lis est."

-- Horace.

Although optimists view Ridling, Zeiger, Juvenile, and one or two subsequent decisions as a clear indication that the bastions of judicial conservatism are effectively crumbling and that little remains to be done except to clear away the midden of broken and discarded precedent, it might yet be a trifle premature to essay, like Marlowe's Tamurlaine, to "ride in triumph through Persepholis." The route for the triumphal procession, unfortunately, still appears somewhat cluttered. It is difficult to ignore, for example, the fact that the majority of state jurisdictions either have not admitted or have failed to consider the admissibility of polygraph evidence and testimony; that even in the jurisdictions that have adopted the judicial posture of conceding theoretical admissibility under "the proper circumstances," the practical difficulties of establishing these "proper circumstances" can be heart-breakingly difficult; that the "proper discretion of the trial court" can still serve to bar admission of such evidence, often on capricious grounds; that federal courts preponderantly either will not admit polygraph testimony at all or, conceding theoretical admissibility under "proper circumstances," continue consistently to reject it in actual cases under consideration; that no U.S. appellate court has yet reversed a district court for barring polygraph evidence; that the U.S. Supreme Court has unfailingly refused certiorari on such cases; and that no attempts at passing enabling legislation to provide for admissibility of polygraph evidence has yet succeeded.

The issues posed by polygraphy are somewhat more complex and less amenable to simple resolution than those faced, for example, by the science of ballistics. This may be apprehended more clearly when we realize that despite the fact that ballistics evidence has for years been unequivocally accepted by the courts, it was totally rejected in 1923, the exact year of the Frye decision. In People v. Berkman,[248] the court said of ballistics:

> The evidence --- is clearly absurd, besides not being based on any known rule that would make it admissible. If the real

> facts were brought out, it would undoubtedly show that all Colt revolvers of the same model and the same caliber are rifled in precisely the same manner, and the statement that one can know that a certain bullet was fired out of a 32-caliber revolver, where there are hundreds and perhaps thousands of others rifled in precisely the same manner and of precisely the same character, is preposterous.[249]

To understand why ballistics has prospered while polygraphy has judicially floundered for over half a century, it is important to realize that though both disciplines may be included under the broad aegis of "scientific evidence," polygraph evidence poses problems of admissibility different in kind than those encountered by ballistics. These include formal evidentiary problems, Constitutional issues, and procedural difficulties; and they are far more complex and less amenable to simple resolution than such relatively clear-cut issues as judicially acceptable foundation evidence of the reliability and validity of polygraph test results. As one commentator prognosticates: "... judicial exclusion of lie detector evidence cannot be expected to end merely by increasing its accuracy."[250]

A. 'Sui Generis' Dilemma: Neither Fish Nor Fowl

> "The truth is rarely pure and never simple."
>
> -- Wilde

One of the major problems hampering admissibility of polygraph evidence is the judicial difficulty of determining precisely what sort of evidence it is. Is it substantive evidence going to the proof of an ultimate issue? Is it general character evidence, going solely toward the credibility of the witness? Or is it something in between? Is it "factual" evidence or "opinion" evidence, or a mixture of both? Does it go at any time toward proof of the matter asserted? If so, what, exactly, is the "matter" being asserted by the test results?

These are not simple questions, nor do ready solutions suggest themselves. Even those recent court decisions that have ventured to address them do not arrive at totally satisfactory conclusions. The Ridling court ruled, for example, that the test results could be deemed probative of the issue in the case. Inasmuch as it was a perjury case, the court noted, the question of whether or not the defendant was lying became a material issue.[251] However, the court suggested that in other cases, such as murder, polygraph evidence would be limited to proof of character.[252]

But wait. This tidy bifurcation, which seems so sweetly reasonable at first blush, leaves us with a vague feeling of unease. Granting that perjury involves lying, and the polygraph tests whether or not the defendant is lying, a problem remains. Perjury involves the charge that the accused was lying at some specific time, and in relation to some specified matter, in the past. The polygraph test does not measure this event directly; it merely enables the examiner to make an assessment about whether the subject is now lying about having been lying in the past. It tests not whether he lied, but whether he lied about having lied. Confusing, yes? But careful analysis will show that such evidence in the context of a perjury charge is no

different in kind than when applied to other issues, such as murder. In the former case, the examiner tries to determine whether the subject is lying about having lied; in the latter, he tests whether the subject is lying about having murdered someone. The proposed Ridling dichotomy, then, does not comfortably resolve the dilemma.

The alternative of treating all polygraph evidence as "character" evidence has suggested itself to a number of courts; but this erects problems of its own. Assuming that by "character evidence" we mean the test is "probative of truthfulness or untruthfulness,"[253] we encounter some formal evidentiary difficulties. For example, Rule 404 of the Federal Rules of Evidence provides that: "Evidence of a person's character or a trait of his character is not admissible for the purpose of proving that he acted in conformity therewith on a particular occasion, except ... evidence of a pertinent trait of his character offered by an accused, or by the prosecution to rebut the same ..." This would seem to admit polygraph results as character evidence, at least for or against the defendant. Even the assertion that polygraph results are "opinion" evidence is no serious barrier. Rule 405 provides that: "In all cases in which evidence of the character or a trait of character of a person is admissible, proof may be made ... by testimony in the form of an opinion ..."

So far, so good. But Rule 608 (a) appears to express an important limitation on this:

> Opinion and reputation evidence of character. The credibility of a witness may be attacked or supported by evidence in the form of opinion or reputation, but subject to these limitations: (1) the evidence may refer only to character for truthfulness or untruthfulness, and (2) evidence of truthful character is admissible only after the character of the witness for truthfulness has been attacked by opinion or reputation evidence or otherwise.

Applying this requirement rigorously, the court would be compelled to bar the introduction by the defendant of polygraph evidence as proof of "truthfulness" except in instances in which his character for truthfulness had been explicitly attacked by the prosecution. This would prevent introduction of the test results in support of the defendant's direct testimony and, should the prosecution fail to impugn his integrity and veracity during cross-examination, the results could not be offered subsequently. Further, if the defendant exercises his right not to testify at all, the likelihood of getting polygraph results admitted would be remote, unless the prosecution in presenting its case had directly attacked the defendant's character for truthfulness.

This apparent inconsistency in the FRE provisions between Rule 404 and 608 is not resolved by the FRE Commentary. The Committee Notes following 404 are silent on the issue of whether or not truthfulness is a "pertinent trait," suggesting that under the limitations posed in 608 it is not. And, indeed, under the "relevance" test of Rule 401, the notion that murder, rape, or heisting a filling station are acts "in conformity" with "character for ... untruthfulness" seems faintly absurd.

The "character evidence" approach does not prosper any better under common law limitations. McCormick notes: "A few courts permit proof of 'general good character' but the prevailing and more practical view limits the inquiry to the trait or traits involved in the crime on trial -- honesty in theft cases, peaceableness in murder, and the like."[254] Is the trait of "truthfulness" generally considered directly germane in this context? McCormick suggests that it is not:

> It is easy to confound the situation where the character is "put in issue" by proof of good reputation as evidence of innocence, and the distinct situation, with different rules, of the taking the stand by the accused as a witness. In the latter case, the prosecution may impeach his credibility by evidence of the bad reputation of the accused. Then the trait involved is veracity, and it is veracity-character at the time he testifies that we are interested in. Moreover, the accused cannot support his veracity-character as a witness until the prosecution has first attached it.[255]

Case law in many jurisdictions supports this rigorous limitation. In State v. Howland,[256] for example, the court ruled that the defendant, on trial for rape, was not entitled to introduce evidence to prove his good reputation for veracity in the absence of an explicit attack on his veracity by the prosecution.

The assessment of polygraph test results as general "character evidence," then, does not seem too productive; and our intuition suggests that this is sound. The polygraph does not assess the subject's "general character for truthfulness"; it merely enables some determination of whether or not he is telling the truth in a specific instance. And, too, the notion that such testimony could be limited in the minds of the jury to the "credibility" of the witness is questionable. The Zeiger court recognized this, declining to address the problem or limit the applicability of polygraph results, due to "... the inability of the jury to pass separately on two different issues without letting their determination of one affect the other."[257]

The solution is not simple. Our legal intuition is that when a qualified expert testifies, "On the basis of my interpretation of these polygraph results, the defendant is telling the truth when he says that he did not shoot the deceased," it is significantly probative of something; but that same intuition instructs us that it is probative not merely to a different degree but in some materially different way from such an assertion as, "On the basis of my ballistic examination of these two bullets, it is my expert opinion that they were not fired from the same weapon." Possibly the most reasonable solution is to recognize that the rules of evidence should conform to the needs of justice rather than the converse, and to make whatever modifications that are necessary in the rules to recognize explicitly the validity of polygraphy as a reliable science and to provide evidentiary guidelines for admissibility and appropriate evaluation of polygraph test data and supporting testimony.

B. The Right to Remain Silent

"The privilege ... is as broad as the mischief

against which it seeks to guard."

-- Counselman v. Hitchcock, 142 U.S. 547 (1892)

Is polygraph evidence ever violative of the defendant's Fifth Amendment rights? Is it ever even possible for such evidence to be violative of his rights? A number of courts have addressed this issue, either directly or peripherally, but they have not generally explored the full scope and implications of the question. The Ridling court suggested that it was not even an issue, since " ... the taking of the test itself is a waiver of the privilege." This would appear to be a sound and reasonable posture, though it leaves us with a faint, indefinable feeling of unease. However, it is not until the court posits the enthymeme that it is impossible to obtain valid polygraph results through coercion and that in the absence of coercion the privilege is not violated[258] that the alarm bells ring, and Miranda and Escobedo irresistibly suggest themselves.

The Supreme Court has recognized that compulsion need not be overt in order to violate the defendant's rights. As the court notes in Miranda, if the defendant has chosen to invoke his right to remain silent, "... any statement taken ... cannot be other than the product of compulsion."[259] It is readily conceivable that the psychological pressures of interrogation, or the defendant's imprudent decision in the absence of adequate legal counsel, might result in his submission to a polygraph examination in which his "cooperation" would be quite adequate for valid test purposes while falling far short of the intent and the strictures of the Miranda rule. The Zeiger court, though limiting its holding explicitly to cases in which admissibility of test results is actively sought by the defendant, recognized that "... admission of a test opposed by the defendant may involve constitutional question ..."[260] Yes, indeed it may.

The Ridling court also hypothesized that because the testimony of a polygraph examiner is based upon the subject's physiological and biological responses it cannot be considered "testimonial" in nature; rather, it is analogous to the taking of a blood sample or handwriting exemplar, or to the requirement to appear in a lineup.[261] However, the U.S. Supreme Court, in Schmerber v. California[262] and subsequent cases, suggests otherwise:

> To compel a person to submit to testing in which an effort will be made to determine his guilt or innocence on the basis of physiological responses, whether willed or not, is to evoke the spirit and history of the Fifth Amendment.[263]

Nor is the danger of subtly-compelled polygraph testimony the sole threat to the defendant's right to remain silent. His very silence itself may be invoked to violate the privilege against self-incrimination, as the Bowen court recognized,[264] and as the U.S. Supreme Court suggests in Doyle.[265] Admission of evidence or testimony that the defendant was asked to take a polygraph test and refused or, in the absence of admission of test results at the trial, even that he did take such an examination can have no other result than to suggest irresistibly to the jury that the defendant could not or did not "pass" such a test. And that particular abrogation of the defendant's privilege requires no "cooperation" on his part whatsoever.

However, the complex kinds and varieties of Constitutional hazards that the polygraph poses are not impossible of solution; nor should that solution be simply a blanket ban on testing and test admissibility. With polygraph results, as with signed confessions, the most effective safeguards are procedural: adequate legal representation and advice prior to interrogation or testing, a signed and witnessed waiver of privilege made under guidance of counsel prior to testing, selection of a polygraph examiner mutually acceptable to defense and prosecution, with procedures for independent verification testing in the event of disputed results and, certainly, an absolute judicial ban on any mention, no matter how indirect, either of a refusal to submit to testing or of the administration of any test not entered into evidence. Although this latter safeguard, as is discussed in the next section, may be only partially ameliorative with the increased use of polygraph evidence in the future, due to unwarranted inferences that the jury might make about the absence of polygraph testimony in a particular case, the hazard is no greater than that faced by the defendant who exercises his right to refuse to testify, with the consequent implication that he has something to conceal.

C. The Perils of Undue Process

> "History warns us that it is the customary fates of new truths to begin as heresies and to end as superstitions."
>
> -- Thomas Henry Huxley

The greatest danger to the judicial process offered by the medieval practice of trial by ordeal lay not alone in its capriciousness but in its focus solely upon the infallibility of divine judgment, to the exclusion of external factual inquiry. In a somewhat more sophisticated sense, an excessive reliance upon polygraph evidence might divert the modern judicial process into an analogous seductive byway. Clearly, it is far simplar to plug ones witnesses into a magic box and ask questions than to pursue the far more arduous path of gathering and assembling fragments of objective evidence into a mosaic of proof.

Then, too, the use of the polygraph has already become commonplace in the investigative phase of trial preparation. Police departments routinely employ it, even in those jurisdictions that erect judicial barriers against admissibility. Even the well-equipped Legal Aid agency allocates a portion of its budget for polygraphy.[266] Inevitably, then, the introduction of such evidence into the trial process will become in the future the general rule rather than the hard-won exception. Foundation testimony will become cursory; examiner qualifications will often simply be stipulated. The science of polygraphy itself will be enshrined in a suitable niche in the pantheon of Judicial Notice, ranking with such other arcane but canonized mysteries as ballistics and fingerprint identification.

In such a context, of course, polygraphic verification of the testimony not only of the defendant but of the key witnesses may become the norm. Its absence will be noted by the jury, regardless of the tact and delicacy with which the prosecution eschews mention of the omission. Thus the defendant's right to refuse such a test, precisely analogous to his right to refuse to

take the stand in his own defense, will be exercised at his peril. It will, at best, render his suspect; far likelier, it will hopelessly prejudice his cause.

The result could easily be, as one commentator observed, "... an actual transformation ... from the present judicial ... adversary fact-gathering process to an investigative one, even though superficially the common law trappings will remain."[267] The emphasis could shift from a judicial concern for facts to a preoccupation with truth. At first glance, this might seem to be an appropriate shift of emphasis; however, it must be remembered that what the polygraph assesses is not "truth" in the sense of a conclusion derived objectively from an accurate appraisal of factual data, but rather the subjective "truth" that is consistent with the perceptions and assumptions of the witness being tested. This can be, and often is, a powerful tool of justice, of course; but it can be dangerously misleading if indiscriminately employed.

An example should suffice. Take the case of a defendant on trial for murder. At the time the crime was committed, the defendant was hopelessly drunk. The following day, he has absolutely no memory of the events of the previous night. The state, however, has a key witness, a man who positively identifies the defendant as the one whom he saw strike the fatal blow. Routine polygraph testing will show that the witness is telling the "truth"; and it is possible that the defendant, especially if he has serious mental reservations about his own innocence, might show at least some of the physiological stigmata of guilt when questioned about the crime. On the basis of such testing, then, the defendant might easily be convicted.

However, it is perfectly possible that the key witness in our hypothetical case was telling the complete "truth" but was nonetheless totally wrong. The polygraph, in this context, measures only the subjective veracity of the witness, not his objective accuracy; but it lends to that subjective belief the superficial gloss of "scientific evidence." Eyewitness identifications are notoriously among the least reliable forms of evidence. Judicial history bristles with horror stories of innocent defendants convicted on the basis of erroneous eyewitness identifications, only to have the true culprit discovered often years later. And each of those eyewitnesses was speaking the "truth" as he perceived it.

A moment's reflection will reveal a score of such similar dangers that could result from the confusion between "fact" and "truth" in the judicial process. Other modes of scientific evidence -- ballistics, fingerprint identification, blood-type matching, and the like -- deal with objective facts: two bullets match or they do not; two fingerprints are identical or they are different; two blood samples are of the same blood-type or they are different. Such evidence may be extremely probative, and on the basis of it, the trier of fact may indeed infer the "truth" of guilt or innocence. The polygraph, however, addresses the "true-false" -- and, by inexorably associational link, the "innocent-guilty" -- dichotomy directly; and there may be circumstances, of which the sincere but erroneous eyewitness identification is only an example, in which the polygraphic "true-false" dichotomy is irrelevant to, or inconsistent with, the "factual-nonfactual" and, consequently, the "innocent-guilty" dichotomy.

This cautionary view is not intended to suggest that the polygraph is not an invaluable investigative and judicial tool; the more than fifty years of successful employment of the device as an effective method of inquiry bely such a notion. But it is important to remember that like other tools it is only an aid to, not a substitute for, the painstaking and often tedious steps of the judicial process. Like other innovative developments, it is susceptible to misuse; and such misuse is far likelier to come from uncritical enthusiasts and supporters than from the opponents of polygraphy. It has been suggested in this paper that the polygraph measures physiological phenomena which enable the experienced examiner to determine quite accurately whether or not the witness is telling the truth. Although the polygrapher would probably agree with this statement, it is not quite accurate. What it actually enables the polygrapher to determine is whether or not the witness believes that he is telling the truth; and that distinction, though slight, can be crucial in any of the myriad of circumstances in which either objective fact or legal responsibility may be utterly irrelevant to what the witness does or does not believe to be "true." As Forkosch aptly said: "Truth is the law, but facts are its basis."[268]

D. The Limitations of 'Truth'

"se non e vero, e molto ben trovato."

-- Anonymous

What, then should be the judicial role of this "truth" that the polygraph continues to measure with increasing accuracy? Undeniably it does have an important place in the judicial process. Although there are issues on which the witness's belief as to "truth" has no real bearing, there are others to which it is highly relevant. One of the foremost uses of the polygraph is as a perjury detector. It is an instrument ideally adapted to the detection of the deliberate liar. As Forkosch points out, "... the lie detector test ... deals with a person's intentional statements ..."[269]

In this capacity especially, it is useful not only in the courtroom but in the pre-judicial investigatory phases. Not infrequently cases are dismissed before they ever go to trial based, in part or wholly upon the results of polygraph examinations. Even in jurisdictions in which polygraph evidence is judicially inadmissible, the instrument is employed extensively at the investigative level. In Hawaii, for example, which has both a judicial ban on the admissibility of polygraph evidence and a legislative use-restriction statute, the Honolulu Police Department has three trained polygraph examiners.

On the evidentiary level, polygraph test results are relevant in several contexts other than those dealing with issues of credibility or direct perjury. An instance is the sometimes complex problem of burden of proof. In theory in our judicial system, the burden of proof rests upon the prosecution; and if it fails in that burden, the defendant need not prove or even say a thing in order to walk free from the court. In practice, however, this burden of proof is not always totally consistent with the burden of persuasion. An example is illustrative.

Several months ago, a young colleague of my acquaintance was shopping

in a local department store. Selecting a shirt from a pile of sale items, he thrust it under his arm and wandered over to another display, fully intending to pay for the shirt when he had completed his other selections. Some moments later, he glanced up from a necktie display, noted the time on the wall clock, and realized abruptly that he was late for a class that he was scheduled to teach. Completely forgetting the shirt clamped under his arm, he dashed from the store and started toward his car. Ten feet outside the door, he was detained by the store detective who had followed him, and he found himself under arrest on a shoplifting charge.

Taken to the manager's office, the young man tried to explain this absurd misunderstanding; but his perfectly reasonable explanation was disregarded. The store, in common with many other such enterprises, had suffered sharp losses from the depredations of shoplifters all of whom, when detected in the act, had perfectly reasonable explanations. The hapless young man was taken to the police station, booked, charged, and released on his own recognizance. Somewhat panicky, he sought my advice.

His legal position, of course, was perfectly clear -- and utterly hopeless. The State is obligated to prove every element of its case beyond a reasonable doubt; but this was a prima facie case. He was detained in possession of store property which he admittedly had removed from the store premises without consent and without having paid for it. He had only one theoretical defense: absence of mens rea. Unfortunately, however, the burden-of-proof theory falls short of aiding our young man in his dilemma. The law reasonably allows the State to make the inference that what one has done he has intended to do; thus, the burden of persuasion, as contrasted with the burden of proof, falls not on the State to demonstrate mens rea but on the young man to demonstate absence of mens rea. While the legal assumption is reasonable, the actuality of such a burden is imposingly difficult. The young man was willing, indeed even eager, to testify in court that he had no intention of stealing the shirt. Unfortunately, this is the plaintive assertion of every shoplifter who has been caught in flagrante delicto. The courts consistently and reasonably treat such testimonial evidence as being of doubtful probative value.

However, a polygraph examination would have been and has been in several cases of trial in petty courts, the perfect solution to our young man's percarious predicament. It is the ideal instrument for accurate determination of such evidentiary issues as mens rea. It is, in fact, the only reasonable access to the actual intention of the defendant in such a case, because it does not measure such detached and objective questions of fact as: did he remove the shirt from the premises? Rather, it gives access to the subjective, inner "truth" of the defendant's attitude or intention in relation to his own action. In this case, no one but the young man can attest with accuracy to what his own intention -- or lack of intention -- might have been; and he is under a severe handicap; he cannot be accepted as a disinterested witness in his own behalf.

Our young man's story lacks to obligatory happy ending, however. On my suggestion, and with the concurrence of his attorney, he attempted to persuade the prosecutor to approve a polygraph examination. The request was refused. He offered to undertake a polygraph examination with a private firm

at his own expense and submit the results to the prosecutor and to the store management. Both the manager and the prosecutor stated that they would not even look at the results of such a test, much less grant them any credence. The young man eventually was compelled to the bitter expedient of pleading guilty to the charge in exchange for a suspended sentence and six months' probation. His once charmingly naive faith in the efficacy and the rectitude of the American judicial system has been replaced with a disillusioned, brittle, sneering cynicism that is unbecoming in one so young.

It is in relation to judicial issues such as this -- mens rea, problems of subjective intent, problems of credibility and intentional deception -- that the polygraph can be employed most effectively. Many related applications suggest themselves. In a prosecution for rape, for example, the defendant almost invariably pleads the willingness of his victim. It was not, he will assert, a rape at all, but rather a seduction. Indeed, he will contend, it was really she who seduced him, then falsely accused him of rape, possibly in a jealous rage.

During the course and conduct of the typical rape trial, it usually appears to be the victim rather than the defendant who is on trial. Her behavior is scrutinized, her past probed, her morals questioned. Not uncommonly, the trauma of the trial rivals that of the rape. And with disheartening regularity, the rapist either is acquitted or given a token conviction on a lesser charge, such as simple assault, leaving the victim publicly branded and psychically scarred. Public prosecutors then deplore the reluctance of subsequent victims to prefer charges or to testify.

Admittedly such a defense is legal, and the instances of false accusations of rape by jealous, irate, or emotionally disturbed women does dictate a measure of circumspection in such cases. According to 1976 FBI statistics, 19% of the forcible rape cases were false complaints.[270] However, a ready solution is apparent. The polygraph is perfectly suited to this type of evidentiary problem. Even if the defendant refuses to consent to the test, administration of the polygraph examination to the victim is possible, and it would be equally probative of the issue in the case.

V. Conclusion

What may we conclude from this? That is not easy to say. Conventionally, a conclusion is supposed to bring all of the loose ends together into a neat, tidy knot; but that is not possible here. Although the Battle of the Windmill is far from over, its results are foregone. Conservative judiciary and liberal legislators to the contrary notwithstanding, the polygraph will become an accepted part of the arsenal of the judicial process. For better or for worse, it will alter the pattern of criminal and civil litigation in our courts. It is inescapable. As a French philosopher observed: "Nothing is so powerful as an idea whose time has come." The polygraph is an idea whose time is past due.

Like all new developments, polygraphy has inherent in it the dangers of misuse; and men of reason should view uncritical advocacy with the same disapprobation as unrestricted suppression. Ultimately, however, its effects can only be to improve the processes of justice, just as any tool that will facilitate the discovery of truth must lead to greater justice.

Notes

1. Genesis 3:24.
2. John 18:38.
3. J. Stephen, A History of the Criminal Law of England (1883) 1:442.
4. See J. Larson, Lying and Its Detection (1932) 65 ff. for a more detailed account of this and related modes of encouraging veracity.
5. Physical interrogation came to be known in this country as "the third degree," a euphemism the irony of which is heightened by the fact that the term derives from the Inquisition, which applied torture in varying levels of intensity, known as "degrees." By the time the inquisitor reached the "third degree," the victim customarily was either cooperative or dead.
6. The Chilean secret police have found the application of electric cattle prods to the breasts and genitals quite efficacious.
7. The distinction can be summed up succinctly by contrasting the underlying moral premises of the statesments: "If it's good it works," and "If it works, it's good."
8. See R. Ruark, Something of Value (1955) 530 ff. for a detailed description of the Kikuyu "liar's oath."
9. M. Forkosch, The Lie Detector and Mechnical Jurisprudence, 28 Okla L. Rev. 288, 299 (1975).
10. In ancient Greece, for example, one form of the oath was performed by placing the hand on ones own genitals and swearing.
11. See Ruark, loc. cit. (supra) for a detailed description of ritual sacrifice as an element of the Kikuyu "liar's oath."
12. See, e.g., FRE Rule 603.
13. See, e.g., FRE Rule 801 (d) (1) (A).
14. Maitland, Equity, Also the Forms of Action at Common Law (1909) 310, cited in Cound, et al., Civil Procedure (1974) 318.
15. Id.
16. Thayer, A Preliminary Treatise on Evidence at the Common Law 34 (1898), cited in Cound, op. cit. (supra) at 317.
17. Id.
18. Attributed to Napoleon Bonaparte.
19. Spade, Nothing But the Truth, unpublished monograph.
20. Thayer, loc. cit. (supra).
21. Hubbard, African Gamble (1937) 129-31, cited in Trovillo, A History of Lie Detection, 29 Am. J. Pol. Sci. 851-2.
22. LEA, Superstition and Force (3rd ed. 1878(252, cited in Cound, loc. cit. (supra.)
23. Hyde Relig. Vet. Persar. Cap XXIV (1760) 320-1, quoted by Lea, loc. cit. supra, who was cited by Trovillo, op. cit. 851.

24. Trovillo, op. cit., supra, 850.

25. Ruark, op. cit., supra, 31.

26. MacKay, Memoirs of Extraordinary Popular Delusions (1852) 2:266, cited in Trovillo, loc. cit., supra, 853.

27. Forkosch, op. cit., supra, 299.

28. Ali Ibrahim Khan, Asiatic Researches, I, 391-2, cited in Trovillo, op. cit., supra, 853.

29. The device of touching a red-hot iron to the tip of the tongue, for example, is almost certainly based on the behavioral characteristic of dryness of the mouth as a physiological manifestation of guilt-induced anxiety.

30. Trovillo, op. cit., supra, 849.

31. Id. at 855.

32. Clendening, The History of Certain Medical Instruments, 3 Annals of Int. Med. 176 (1931), cited in Trovillo, loc. cit. supra.

33. Id. at 856.

34. Galton, Psychometric Experiments, 2 Brain 162 (1879), cited by Trovillo, op. cit., supra, 866.

35. Munsterberg, On the Witness Stand (1933), cited in Trovillo, op. cit., supra, 867.

36. Duprat, Etude de Psychosociologie (2d ed. 1909), cited in Trovillo, loc. cit., supra.

37. Langfeld, Psychophysical Symptoms of Deception, Amer. J. Psychol. 15: 319-28, cited in Trovillo, op. cit., supra, 868.

38. Crossland, The Psychological Methods of Word Association and Reaction-Time as Tests of Deception, Univ. of Oregon Publ., Psychol. Series 1 (1) (1929), cited in Trovillo, loc. cit., supra.

39. These are largely idiosyncratic but nonetheless useful. One of my students used to preface his most egregious falsehoods with the statement, "To tell the truth ..." a phrase that he employed in no other circumstance. And one of my colleagues, during our Saturday night poker sessions, had the habit of rubbing the tip of his nose with his index finger whenever he was bluffing (the Pinocchio Syndrome, perhaps), an unconscious and habitual gesture that cost him several hundred dollars a year.

40. Clendening, op. cit., supra, cited by Trovillo, op. cit., supra, 856.

41. Erlanger, A New Instrument for Determining the Minimum and Maximum Blood Pressure in Man, 12 Johns Hopkins Hospital Rep. 53 (1904), cited in Trovillo, op. cit., supra, 857.

42. Lombroso, L'Homme Criminel (2d French ed., 1895) 336-46, cited in Inbau, Lie Detection and Criminal Interrogation (1942) 2.

43. Munsterberg, op. cit., supra, cited in Trovillo, op. cit., supra, 867.

44. See Marston, The Lie Detector Test (1938), for a full discussion of this research. See also Marston, Systolic Blood Pressure Symptoms of Deception, J. Exper. Psychol. 2 (2): 117 (1917).

45. Frye v. United States, 293 F. 1013 (D.C. Cir. 1923).

46. Trovillo, op. cit., supra, 870.

47. See Keeler, A Method for Detecting Deception, Am. J. Police Sci. 1(1): 38 (1930).

48. Described in Forkosch, The Lie Detector and the Courts, 16 N.Y. L. Rev. 202, 204 (1939).

49. People v. Kenny, 167 Misc. 51, 3 N.Y.S.2d 348 (Sup. Ct. Queen's County, 1938).

50. People v. Forte, 279 N.Y. 204, 18 N.E.2d 31 (1938).

51. Skolnick, Scientific Theory and Scientific Evidence: An Analysis of Lie Detection, 70 Y. L. J. 705 (1961).

52. Ferguson, The Polygraph in Private Industry, (1966) 77.

53. See Ferguson, op. cit., supra, 85 for a more detailed discussion of polygraph components.

54. This grossly oversimplified and probably misleading explanation would probably make the professional polygrapher rend his garments in despair. Those interested in a more accurate, detailed, and technical explanation of the psychophysiological phenomena measured by the polygraph should consult Ferguson, The Polygraph in Court (1973) 143 ff.

55. From a letter from Norman Ansley, Editor, Polygraph, dated March 19, 1978.

56. A brief, readable discussion of some of the various testing techniques may be found in Inbau, Lie Detection and Criminal Interrogation (3d rev. rev. 1953) 9 ff.

57. None of the authorities consulted indicated what to do if the right answer is "maybe."

58. Moenssens, Scientific Evidence in Criminal Cases (1973) 543-544.

59. Inbau, op. cit., supra, 23.

60. See 9 Willamette L. J. 54 (1973) for a more detailed discussion.

61. Presumably the same effect could be attained with a "No" test, although there does not appear to be any experimental data on this.

62. Keeler, Debunking the "Lie Detector", 25 J. Criminal L. and Crim. (1): 153 (1934).

63. According to a letter from Walter F. Atwood, dated March 11, 1978, the following institutions are currently accredited by A.P.A.: American Institute of Polygraph Technology and Applied Psychology, Dearborn, Mich.; Backster School of Lie Detection, San Diego, Calif.; Chicago Professional Polygraph Center, Chicago, Ill.; Israeli Polygraph School, Police Headquarters, Jerusalem, Israel; Keeler Polygraph Institute, Chicago, Ill.; Los Angeles Institute of Polygraphy, Inc., Los Angeles, Calif.; Maryland Institute of Criminal Justice, Severna Park, Maryland; Munford Institute of Polygraphy, Augusta, Georgia; Polygraph Personnel Research Laboratory and School for Lie Detection, Philadelphia, Pa.; Reid College of Detection of Deception, Chicago, Ill.; Southwest School of Polygraph, Houston, Texas; U.S. Army Polygraph School, Ft. McClellan, Alabama; University of Baltimore, Baltimore, Maryland; Virginia School of Polygraph, Norfolk,

Virginia; Zonn Institute of Polygraph, Inc., Atlanta, Ga.; and Zonn Institute of Polygraph, Inc., Miami, Florida.

64. For a discussion of the various factors affecting test results, see Inbau, op. cit., supra, 64 ff.; Ferguson, The Polygraph in Private Industry (1966) 95 ff.; Ferguson, The Polygraph in Court (1973) 202ff.

65. See Ferguson, The Polygraph in Court (1973) 252.

66. See Inbau, op. cit., supra, 66.

67. Or even outright disbelief. The claim was made during his foundation testimony for People v. Kenny.

68. Inbau, op. cit., supra, 110-112.

69. Lykken, The GSR in the Detection of Guilt, 43 J. Appl. Psychol. 385-388 (1959).

70. Davidson, Validity of the Guilty Knowledge Technique: The Effects of Motivation, 52 J. Appl. Psychol. 62-65 (1968).

71. Kuipers, The Polygraph Technique: A Selective Analysis, 20 Drake L. R. 330 (1971).

72. I.e., they have been engaged in polygraph testing for more than one year.

73. I.e., they have been engaged in polygraph testing for six months or less.

74. See Horvath, The Reliability of Polygraph Examiner Diagnosis of Truth and Deception, 62 J. C. L. 276 (1971) for a complete account of this experiment.

75. Ferguson, The Polygraph in Court (1973) 23.

76. See, e.g., Buckout, Eyewitness Testimony, 231 Scientific American, 23 (1974).

77. 3 Wigmore, Evidence § 875 at 642 n. 1.

78. Wickers, The Polygraph Truth Test and the Laws of Evidence, 22 Tenn. L. Rev. 723 (1953).

79. See Wigmore, Evidence § 999, at 949, n. 3.

80. 293 F. 1013 (D.C. Cir. 1923).

81. See note 44, supra.

82. 293 F. at 1014.

83. 293 F. at 1014.

84. See N. C. L. Rev. 51:903, n. 26.

85. 210 Wis. 651, 246 N.W. 314 (1933).

86. Id. at 317.

86.5 See Inbau, Fred E. Detection of Deception Technique Admitted as Evidence, 26 J. of the American Institute of Criminal Law and Criminology (1935) 262.

87. 167 Misc. 51, 3 N.Y.S.2d 348 (Sup. Ct. Queen's County, 1938).

88. Id. at 351.

89. 279 N.Y. 204, 18 N.E.2d 31 (1938).
90. Id. at 206, 18 N.E.2d at 32.
91. 300 Mich. 562, 2 N.W.2d 503 (1942).
92. 354 Mo. 181, 188 S.W.2d 43 (1945).
93. Id. at 51.
94. 69 N.E.2d 336 (1946).
95. Id. at 338.
96. 163 Kans. 622, 185 P.2d 147 (1947).
97. Id. at 150.
98. 151 Neb. 368, 37 N.W.2d 593 (1949).
99. Id. at 597.
100. 98 Cal. App. 2d 124, 219 P.2d 70 (1950) (cert. denied).
101. 77 N.D. 860, 46 N.W.2d 508 (1950).
102. 94 Okla. Crim. 45, 230 P.2d 495 (1951).
103. Id. at 498.
104. 331 Mich. 606, 50 N.W.2d 172 (1951).
105. Id. at 174.
106. 63 So. 2d 339 (1953).
107. Id. at 341.
108. 99 Ohio App. 329, 118 N.E.2d 216 (1954).
109. Id. at 219.
110. 343 Mich. 348, 72 N.W.2d 269 (1955).
111. See Harman, The Role of the Polygraph in Our Judicial System, 20 S.C.L. Rev. 809-810 (1968) for a more detailed discussion of this pivotal case.
112. 48 Cal. 2d 737, 312 P.2d 665 (1957).
113. 200 Va. 233, 105 S.E.2d 152 (1958).
114. 179 F. Supp. 278 (S.D.N.Y. 1959).
115. Id. at 279-280.
116. 68 N.M. 406, 461 P.2d 919 (1961).
117. 67 N.J. Super. 483, 171 A.2d 124 (1961).
118. 254 N.C. 704, 120 S.E.2d 169 (1961).
119. 27 Ill. 2d 302, 189 N.E.2d 260 (1963).
120. Cf. Blackmon v. Brent, 97 Ill. App.2d 438, 240 N.E.2d 255 (1968) and People v. Nichols, 42 Ill. 2d 91, 245 N.E.2d 771 (1969).
121. 346 Mass. 266, 191 N.E.2d 479 (1963).
122. Id. at 270, N.E.2d at 481.

123. 339 F. 2d 895 (8th Cir. 1965).

124. See note 119, supra.

125. 74 Ill. App.2d 301, 220 N.E.2d 251 (1966).

126. See, e.g., Frasco, Polygraphic Evidence, The Case for Admissibility Upon Stipulation of the Parties, 9 Tulsa L.J. 261 (1973).

127. 38 Ill. 2d 616, 233 N.E.2d 403 (1968).

128. 413 F.2d 796 (10th Cir. 1969).

129. Id. at 803.

130. 25 N.Y.2d 511, 255 N.E.2d 696, 307 N.Y.S.2d 430 (1969).

131. Id. at 517, N.E.2d 699, N.Y.S.2d 434.

132. 324 F.Supp. 339 (D. Ariz. 1970).

133. Id. at 341.

134. Id.

135. Id. at 342.

136. 348 F. Supp. 1377 (S.D. Cal.), aff'd, 470 F.2d 1367 (9th Cir.), cert. denied, 412 U.S. 90 (1973).

137. Id. at 1384. See Tarlow, Admissibility of Polygraph Evidence in 1975: An Aid in Determining Credibility in a Perjury-Plagued System 26 Hastings L.J. 927-929 (1975) for a detailed and insightful discussion of DeBetham.

138. Id. at 1389.

139. 470 F.2d 1368.

140. 356 F. Supp. 1363 (C.D. Cal. 1973).

141. Id. at 1367.

142. 472 F.2d 111 (9th Cir. 1973).

143. 502 F.2d 726 (9th Cir. 1974).

144. See Tarlow, op. cit., supra, n. 164 at 950, for a discussion of "discretion" in this context.

145. 361 F. Supp. 510 (D.Md. 1973).

146. Id. at 512.

147. Id.

148. Id.

149. Id. at 513.

150. Id.

151. Id. See Tarlow, op. cit., supra, 957-969 for an exhaustive analysis of Wilson.

152. Tarlow, op. cit., supra, 953.

153. See, e.g., the holding in United States v. Urquidez, 356 F. Supp. 1363 (C.D. Cal. 1973) at pages 38-39, supra.

154. 85 Cal. App. 2d 686, 193 P.2d 937 (1948).

155. Id. at 942.

156. See, e.g., LeFevre v. State, 242 Wis. 416, 8 N.W.2d 288 (1943), in which defendant, on trial for murder, entered into an agreement with the prosecution to submit to lie detector tests, with the stipulation that they would be entered into evidence regardless of the results. The defendant submitted to tests administered by two different experts, both of whom concluded that he was telling the truth. At the trial, defendant proffered the results, the state objected, and the trial court excluded the evidence. On appeal, the appellate court ruled the exclusion to be proper without discussion.

157. 252 Iowa 19, 104 N.W.2d 568 (1960).

158. 91 Ariz. 274, 371 P.2d 894 (1962).

159. Id. at P.2d 900.

160. (1) That the county attorney, defendant, and his counsel all sign a written stipulation providing for defendant's submission to the test and for subsequent admission at trial of the graphs and examiner's opinion thereon on behalf of either defendant or the state.

(2) That not withstanding the stipulation the admissibility of the test results is subject to the discretion of the trial judge , i.e., if the trial judge is not convinced that the examiner is qualified or that the test was conducted under proper conditions he may refuse to accept such evidence.

(3) That if the graphs and examiner's opinions are offered in evidence the opposing party shall have the right to cross-examine the examiner respecting:

(a) the examiner's qualifications and training;
(b) the conditions under which the test was administered;
(c) the limitations of and possibilities for error in the technique of polygraphic interrogation; and
(d) at the discretion of the trial judge, any other matter deemed pertinent to the inquiry.

(4) That if such evidence is admitted the trial judge should instruct the jury that the examiner's testimony does not tend to prove or disprove any element of the crime . . . but at most tends only to indicate that at the time of the examination the defendant was not telling the truth. Further, the jury members should be instructed that it is for them to determine what corroborative weight and effect such testimony should be given. (Id. at P.2d 900-901).

161. 188 So.2d24 (1966).

162. 228 So.2d 421 (1969).

163. 216 N.W.2d 504 (1974).

163.5 530 F.2d 286 (1976).

164. 476 P.2d 474 (1970).

165. See, e.g., Tarlow, Op. cit., supra. at note 137, 955.

166. See, e.g., FRASCO, op. cit., supra at note 126, n. 57 at 261.

167. 476 P.2d at 480.

168. Id., at 479.

169. The data are based largely on a preliminary rough draft of "A Guide to the Admissibility of Polygraph Results," by Norman Ansley, Editor, APA Journal. In his letter of March 19, 1978, Mr. Ansley cautioned me, "...the Guide ... was put together hastily for a seminar. It has one or two errors ..." In this, and the following summary data, I have tried to cross-check, verify, and update Mr. Ansley's material. Any egregious errors are probably mine and not his.

170. Id.

171. Pukalis v. State, 476 P.2d 474, 480 (1970).

172. Stone v. Sharp, 331 Mich. 608, 50 N.W.2d 174 (1951).

173. See note 169.

174. See Appendix I.

175. See, e.g., United States v. Wainwright, 413 F.2d 796 (10th Cir. 1969).

176. See, e.g., United States v. Massey, 5 USCMA 514, 18 CMR 138 (1955); United States v. Moore, 30 CMR 901 (1960); United States v. Hansford, 46 CMR 670 (1972).

177. See, e.g., Bowen Transportation, Inc., 61 LA 549 (1973).

178. No. A176965 (Super. Ct. Los Angeles County, Cal. Nov. 6, 1972), 12 Crim. L. Rptr. 2133 (1972).

179. Id., at 2134.

180. See Tarlow, op. cit., supra at note 137, 929-930.

181. 350 F.Supp. 685 (D.D.C. 1972).

182. Reid and Inbau, Truth and Deception (1966).

183. Like People v. Davis (see 33-34, supra), Zeiger was a meticulously-planned and executed assault upon the bastion of the outmoded Frye precedent, conducted by Frederick Barnett, partner of outspoken polygraph advocate F. Lee Bailey. Tarlow, op. cit., supra, suggests that the appellate reversal in this case is not actually a ruling that polygraph evidence is inadmissible. See his discussion, n. 72 at 931.

184. 350 F.Supp. at 690.

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

186. See the result of this study in Barnett, How Does a Jury View Polygraph Results, 2:4 Polygraph 275 (1972).

187. 350 F.Supp. 90 (E.D. Mich. 1972).

188. Id. at 93.

189. Id. at 94.

190. Id.

191. Id. at 95.

192. Id.

193. Id.

194. Id. at 96.

195. Id.

196. Id.

197. Id. at 97.

198. See, e.g., U. S. v. Wilson, 361 F.Supp. 510 (D. Md. 1973).

199. 350 F.Supp. at 97.

200. Id.

201. Id. at 98.

202. Id.

203. Id.

204. Id. at 99.

205. Id.

206. The evidence of polygraph experts pertaining to the polygraph examination of the defendant and their opinions will be admitted subject to the following terms and conditions:

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

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

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

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

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

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

In the event the defendant declines to participate or cooperate in the test, none of the polygraph evidence will be admitted. Id. at 99.

207. 313 N.E.2d 120 (Mass. 1974).

208. 346 Mass. 266, 191 N.E.2d 479 (1963).

209. 313 N.E.2d at 124.

210. Id. at 126.

211. See note 206, supra.

212. 313 N.E.2d at 126.

213. 86 N.M. 176, 521 P.2d 138 (1974).

214. 88 N.M. 184, 539 P.2d 204 (1975).

215. 68 N.M. 406, 362 P.2d 788 (1961).

216. 80 N.M. 786, 461 P.2d 919 (1969).

217. 46 Haw. 22, 374 P.2d 5 (1962).

218. 160 Cal.App.2d 174, 324 P.2d 923, 925-926.

219. 374 P.2d at 12.

220. 324 F.Supp. 339 (D. Ariz. 1970).

221. Id. at 341.

222. Id.

223. 426 U.S. 610 (1976).

224. 374 P.2d at 11.

225. Id. at 12.

226. Id. at 11.

227. 85 Cal.App.2d 686, 193 P.2d 937 (1948).

228. 252 Iowa 19, 104N.W.2d 568 (1960).

229. 91 Ariz. 274, 371 P.2d 894 (1962).

230. 374 P.2d at 11.

231. 371 P.2d at 900.

232. 374 P.2d, n. 3 at 11.

233. Id. at 11.

234. Id. at 12.

235. Id. at 12-13.

236. See, e.g., U.S. v. Ridling, 350 F.Supp. at 98-99.

237. See Appendix II.

238. See, e.g., Alaska's statute, Ch. 3, Art. 3 (1964), imposing a penalty of $1,000 and/or one year in jail; Delaware's statute, Ch. 7, Title 19 (1966), imposing a fine of $500 and/or 90 days in jail; Pennsylvania's P.L. 782, Sec. 666.1 (1969), imposing a fine of $500 and/or one year in jail.

239. See, e.g., Alaska: request or suggest; Delaware: require, request or suggest; New Jersey: influence, request or require.

240. Alaska.

241. Rhode Island.

242. Minnesota.

243. Delaware.

244. See Romig, State Laws and the Polygraph in 1975, Polygraph 4:2:95 (1975) for a detailed discussion of these statutes.

245. C.f. Oregon's Ch. 249 (1963) and Ch. 608 (1975).

246. op. cit., supra.

247. Id. at 101.

248. 307 Ill. 492, 139 N.E. 91 (1923).

249. Id. at 501-2, 139 N.E. at 94.

250. Altarescue, Problems Remaining for the "Generally Accepted" Polygraph, 53 Boston U. L. Rev. 387 (1973).

251. U.S. v. Ridling, 350 F.Supp. at 98.

252. Id.

253. FRE 608 (b).

254. McCormick, Evidence (Cleary ed. 1972) 455.

255. Id., n. 66 at 455.

256. 157 Kan. 11, 138 P.2d 424 (1943).

257. 8 Stan. L. Rev. 456 (1956).

258. 350 F.Supp. at 97.

259. Miranda v. Arizona, 348 U.S. 436 (1966).

260. 350 F.Supp., n. 33 at 692.

261. 350 F.Supp. at 97.

262. 384 U.S. 7575 (1966).

263. Id. at 761.

264. 324 F.Supp. at 341.

265. 426 U.S. 610 (1976).

266. See Guidelines for Legal Defense Systems in the United States, Report of the National Study Commission on Defense Services, Final Report, (1976), 334.

267. Forkosch, The Lie Detector and Mechanical Jurisprudence, 28 Okla. L. Rev. 288-289.

268. Id. at 290.

269. Id. at 298.

270. Crime in the United States 1976, U.S. Department of Justice, 1977, p. 16.

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THE OBJECTIVE ANALYSIS OF GSR IN THE DETECTION OF DECEPTION

AN ANALYSIS OF GSR AMPLITUDES IN TERMS OF RANK SCORES

By

Akihiro Suzuki, Shoichi Watanabe, Kazuo Ohnishi, Kazunobu Matsumo, Nasana Arusuma

Problems

In the field of polygraph examinations, it is common that the polygram is evaluated by means of visual inspection based on examiner's experience and the response patterns given in the textbooks.(Inamura et al, 1965; Reid and Inbau, 1966). Based on the data obtained from the field examination, high validity and reliability were reported on this method of evaluation (Bersh, 1969; Hikita, 1971; Suzuki et al, 1973). However, if the analysis process cannot be fully explained despite its high validity and reliability, it is still "an art but not a laboratory science" (Woodworth & Scholosburg, 1954, p. 191).

Bersh (1969) says that each of the extra forms of information gotten from the interview, the case file, the investigation, is a potential source which may have significant influence upon the examiner's judgement. This view may be supported by examiners using direct questioning methods such as CQT, GQT and ZOT, because these examiners discuss the questions with their examinees, and remedy the questions, depending upon the preceding charts, in order to enhance or decrease the responses to the relevant and the control questions.

Those who advocate scientific examination may say that even though a situation is understood, it is not palatable if there are obstacles in making a third person understand. At this state, a completely objective analysis is impossible; however, one should take the attitude of working toward that goal in order to make progress in polygraph examination (Orlansky, 1962).

Two types of objective analysis of charts may be considered. The first is to collect as many charts as possible and separate the criminal from the innocent and further separate systematically by patterns of responses. A judgement can be made by comparing with the standard charts atlas (Suzuki, 1973). A great quantity of charts is required for this method. If the types of patterns, degrees of deviation, indices and series are taken into consideration, the collection can become quite voluminous. However, this method may be effective in respiration or a plus wave response when an emotional reaction is not as simple as the amplitude shown by the GSR.

The other type is the method of gauging responses. For example, a measurement of frequency (heart beat), amplitude (GSR) and duration (pulse wave) is taken. At the present time, measurements are taken manually except for heart beats. Several papers have been reported on this method. Although, most of these papers are not directly aimed to develop the objective analysis but are aimed to examine the relative effectiveness of indices

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or are adopted as a tentative objective dependent measure of subjects' motivation (Thackray & Orne, 1968; Cutrow et al., 1972) and stimulus quality (Gustafson & Orne, 1965; Suzuki et al., 1970), but those methods are epochal ones. Among these reports, Lykken (1960) and Ben Shakhar et al. (1970) purposely treated the problem. But further study is needed on the situational differences between the field and the laboratory (Abrams, 1970) and the number of questions presented in order to apply these methods to the data obtained from field examinations. Since most of the measurement analysis of charts is performed manually, it requires a great amount of time. The use of a computer would eliminate this problem.

This report is a study of the possibility of objective analysis of charts, and to compare the accuracy of visual inspection and objective analysis. The results may provide a valuable basis for the development of an analyzer, and the understanding of the visual inspection process may be an aid for the beginner in this field.

Charts Used

A sufficient study has not been made on the effect of differences in psychological pressure or motivation on lie detection. Therefore, an analysis of charts obtained from actual cases was made to find its application value.

In actual cases, it is difficult to confirm the analyzed results by other independent evidence. When only those charts which have been confirmed are used, an analysis is made only on easy-to-analyze-charts, creating a different degree of analytic difficulty from other actual case charts. Therefore, charts from actual cases based on a card test were used in our study. Charts, which came from Osaka Prefectural Police Headquarters, were the results of card tests given during the actual examinations conducted after 1 September 1971. The cut-off period was when the 30th subject completed the examination. The equipment used was Takei's TRP-1 polygraph and the tests were administered separately by three examiners.

All card tests were conducted before the actual examination. Examinees were shown numbers 20, 30, 40, 50, 60 and 70 and were instructed to select one of them and write the selected number on a piece of paper. Questions on these six numbers were given so that each examinee answered negatively. They were given 4 series of tests while changing the order of numbers. The change in the order of numbers was the same for all examinees.

Examinees consisted of 21 males and 9 females, all of whom were suspected of theft except for one murder and two traffic violations.

Analytic Methods

(1) Subjective analysis - 26 examiners were selected from experienced examiners. These examiners had conducted from 280 to 4,500 examinations for an average of 1,254 examinations. The thirty card test charts were reproduced and sent to them. Telling an incorrect result of the card test to a suspect is critical in an actual case. In order to avoid examiners from taking this experiment too lightly or to homogonize attitude of examiners toward their judgements, they were instructed to analyze these card tests as

actual cases. We asked them to indicate only one critical question response in each chart and not to provide a multiple choice. With respect to the time consumed in making analysis and the number of inclusive judgements, instructions were not given.

(2) Objective analysis - Respiration, GSR and pulse wave were used as indices in the subjective analysis, but in the objective analysis, only the GSR was used. The GSR responses were ranked according to amplitude with the largest as 1, next largest as 2, etc., to 6. When two equal amplitudes were noted, they were given an average rank, for example, when the GSR amplitudes of items 50 and 30 were equally largest, a rank of $(1+2)/2=1.5$ was given. When no responses were noted in a series, an average rank of $(1+2+3+4+5+6)/6=3.5$ was given each item. When the GSR amplitude was less than 2mm, it was treated the same as no response.

After the ranking of GSR amplitudes was completed, the ranking of each item was summed and averaged (mean rank score). For example, if the GSR amplitude in the 1st series was ranked 2, 4 in the 2nd series, 1st in the 3rd series and 4th series, an average rank of $(2+4+1+1)/4=2.0$ was given.

Results

Table 1 shows both subjective and objective analysis results of each chart. The (1) column of the table gives the order of presentation of the charts when objective analysis was made. The column (2) gives the numbers selected by the examinees and used as critical question. The frequency of correct subjective judgement of 26 examinees is shown in column (3). There seems to be a wide range between those correctly interpreted by all examiners and those not interpretable. An analysis of card test is more difficult than the peak of tension test because the examiners do not know the critical question beforehand. The fact that procedures in our experiment were identical, the analysis became that much more difficult (Suzuki et al, 1973), therefore, we cannot dispute the validity of PQT test from the results obtained here. When a critical question cannot be correctly identified, it is either impossible to analyze or erroneously analyzed, and we cannot say that all interpretations other than those positively identified were wrong.

The mean rank scores of critical questions by objective analysis are shown in column (4). It shows that there is no rank score to a critical question; larger than a chance expected value of 3.50.

The mean rank scores of 5 non-critical and critical questions of the same chart are ranked again, the results of the re-ranked scores of critical questions are given in column (5). This column shows that re-ranked 1 are 23 charts (76.6%), re-ranked 1.5 are 3 charts (when average rank score of critical question is equal to average rank score of other non-critical question), re-ranked 2 are 4 charts (13.3%), thus showing that the re-rank score for critical question ranked only between 1 and 2, and none beyond.

An average correct subjective judgement of each examiner was 13.3 charts (44.3%) and 23 charts (76.6%) for objective analysis by using re-rank score 1 of each series as a correct analysis. The rate of correct judgements from objective analysis was significantly higher than subjective judgement - ($X^2=12.15$, $p < 0.001$, $df=1$).

TABLE 1: Results of subjective and objective analysis

Order of the Presentation of Charts	Number Selected By the Examinee	Frequency of Correct Subjective Judgement	Mean Rank Scores of Objective Analysis	Re-Ranked Score of Critical Question	Difference in Mean Rank Score From 2nd Ranking	
11	50	26	1.000	1	1.750	
3	20	25	2.500	1.5	0.	*
1	20	24	1.500	1	0.500	
10	70	24	1.000	1	2.500	
17	30	23	1.500	1	1.000	
21	50	23	1.250	1	2.125	
26	20	23	1.000	1	2.250	
27	60	23	1.250	1	2.250	
15	40	19	1.750	1	0.500	
22	70	19	1.625	1	0.875	
24	50	17	1.750	1	0.750	*
25	70	16	1.875	1	1.125	
19	20	14	2.750	1.5	0.	*
8	30	8	1.000	1	2.500	
5	30	7	1.500	1	2.000	
18	70	6	2.000	1	0.750	
4	20	5	2.250	1	0.750	
9	70	5	2.750	1.5	0.	
29	40	5	2.250	1	1.000	
2	50	4	2.875	2	-0.500	**
7	30	4	2.750	1	0.250	
20	50	3	2.125	1	1.000	
30	60	3	2.500	1	0.250	
23	40	2	2.500	1	0.250	
12	40	1	2.750	2	-0.750	**
13	60	1	2.750	1	0.250	
28	30	1	3.500	2	-0.500	**
6	20	0	2.500	1	0.875	
14	60	0	2.500	1	0.250	
16	30	0	3.250	2	-0.250	

* Remarkable respiration responses noted at critical question
** Difference in mean rank score from 1st ranking

Figure 1 shows distribution of mean rank score and difference of 1st and 2nd mean rank score of re-ranked 1 items. As shown in this figure, the lowest mean rank score in each series having mean rank score of less than 2.249 and those having a difference of over 0.756 between 1st and 2nd lowest

ranking were all critical items.

The number of correct subjective analysis and mean rank scores of objective analysis given in Table 1 or the numbers given alongside of white circles on Figure 1 seems to have a high correlation. Rank scores were then given to the results of subjective analysis according to the number of correct analysis and also to the results of objective analysis according to the smallest mean rank scores of critical questions in order to calculate the Spearman's rank correlation coefficient. The result of Y sb = 0.75 was obtained. Thus, there is a high correlation between the results of subjective analysis of three indices and objective analysis of the GSR.

In many cases, responses to the first question are left out in the analysis of POT charts because of the orienting response. However, in the card test procedure, the first question has a chance of being the critical question. The GSR of all question items were analyzed. Table 2 shows the mean rank score of each item including critical item by series. The order of question items were shown in the order given during the examination. It is presumed that the high frequency of critical question tends to lower the average rank scores in Table 2, but the observed frequencies of critical questions in each item was so uniformly distributed that it could be ignored.

The average mean rank scores for the first questions in the first series shows 2.2 in Table 2. It shows a 1.3 difference from the chance expected rank of 3.5 which indicates that orienting response component is contained. However, the averaged mean rank scores to the first items in the 2-4 series show 3.3, 3.5, and 3.7. Since little differences were observed between the chance expected rank and the obtained average mean ranks, it could be said that there were hardly any orienting response components in response to the first questions in series 2, 3, and 4.

It is needless to say that physiological responses are habituated with repeated stimulus. To take up the fluctuation of absolute value of response is necessary in observing the habituation to stimulus. Instead of doing so, a count of rank score 1.0 of critical question in each series was made in order to investigate the habituation of critical response. The results showed that it appeared 13 times in the first, 13 in the second, 13 in the third, and 12 in the fourth series. The number of rank score 1.0 to the critical question slightly decreased with repetition of stimuli.

Discussion

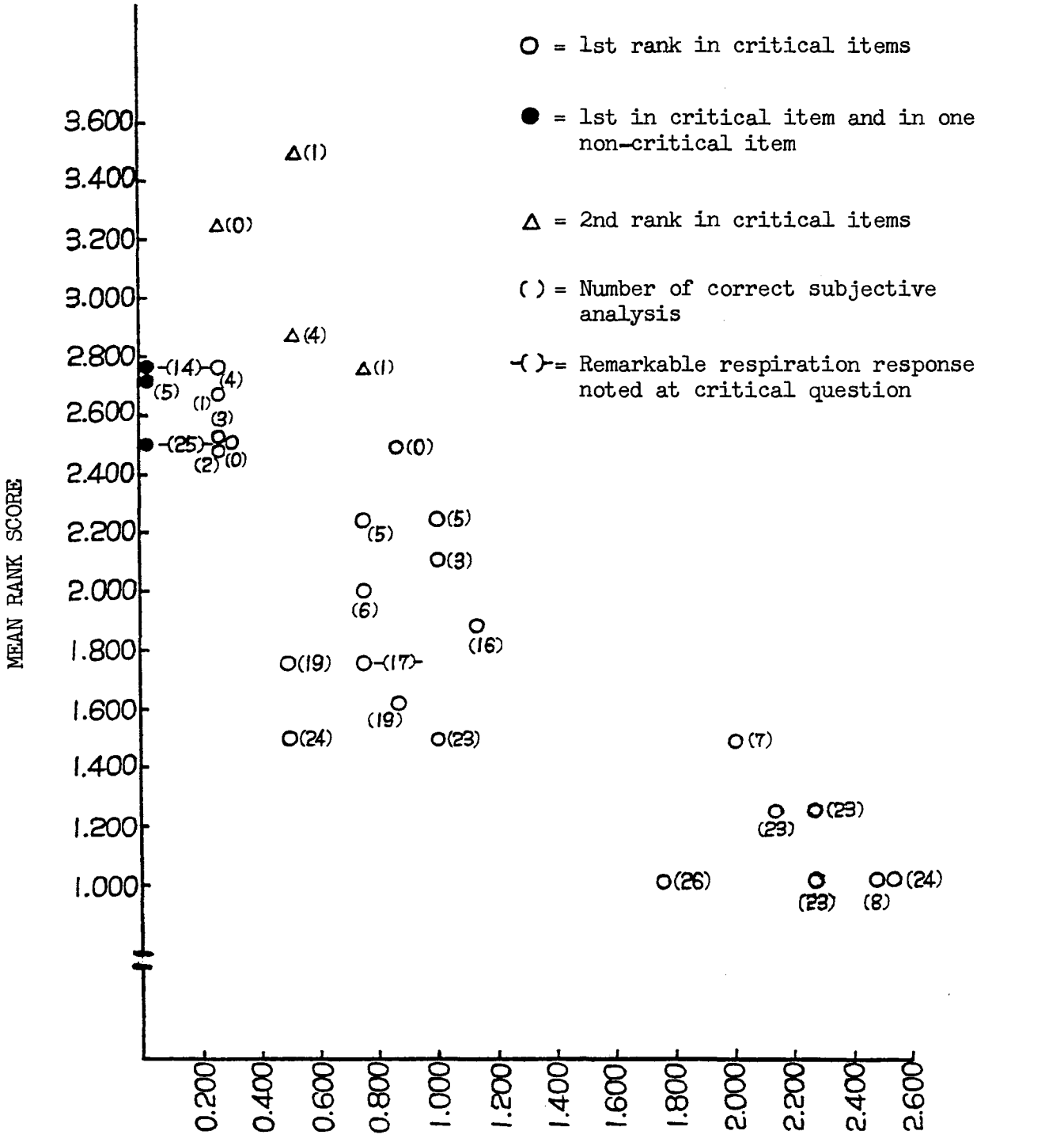
In order to attain an effective objective analysis of physiological changes, a theoretical and empirical explanation of the mechanisms between emotions associated with deception and physiological responses are necessary.

A POT decision is made by comparing the physiological responses to critical and non-critical questions; therefore a knowledge of variation of the physiological patterns to stimuli are also needed for the purpose.

The variations of respiration and pulse wave pattern accompanying deception and already known; however, classification of recorded patterns

Figure 1

Distribution of mean rank score of first ranked score in series



Difference between 1st and 2nd in Mean Rank Score (see Table 1, Col. 6).

TABLE 2: Order of question presentation and averaged mean rank score

	Order of question presentation					
1st Series	30	20	50	70	60	40
mean rank score	2.2	3.9	3.3	3.6	4.2	3.7
2nd Series	60	30	70	40	20	50
mean rank score	3.2	3.6	3.3	3.4	3.7	3.6
3rd Series	70	50	40	60	30	20
mean rank score	3.5	3.2	3.5	3.3	3.5	3.8
4th Series	40	60	20	50	70	30
mean rank score	3.7	3.7	3.2	3.6	3.3	3.3

according to the intensity of emotional reaction is still sufficient. For example, in suppression and increasing in amplitude response of respiration, a problem of which wave form is regarded as more strong is not yet available. The solution to this problem is not easy because not only are physiological response patterns reflected by the absolute intensity, but also the degree of skew or deviation. Therefore, at present, to objectively estimate the intensity of emotions from response patterns are almost impossible unless an index of easily measured simple patterns can be adopted. A highly complicated analysis of this type is conducted in the visual inspection chart analysis, but in performing an objective analysis, it is necessary to measure changes of amplitudes, cycles, duration, etc., of each index separately and perform a one-dimensional analysis. After the correlation and weight between these various analysis factors has been calculated, a formula taking these various factors into consideration should be contrived.

Compared to responses of respiration and pulse wave, analysis of the GSR is rather simple because the amplitude is regarded as the best measure among the methods of treatment. However, the condenser circuit or CR coupled amplifier used at our field test does not guarantee a linearity of electric resistance of skin and amplitude; therefore, the ranking of GSR amplitude was used as a measure in our equipment.

In our experiment using the lowest mean rank score within the series, the rate of correct judgement was 76.6% which is higher than the chance expected rate, but it is not high enough for practical use.

Table 3 shows the frequency of mean rank score of critical questions and non-critical questions. In contrast to the non-critical question with no mean rank score of less than 1.99, the critical question showed 13 (13/30 = 43.3%) scores of less than 1.99. When there was no mean rank score of over 3.80 in the critical question, non-critical showed 74 (74/150 = 49.3%). Since 56.6% of the critical questions and 40.6% of the non-critical questions have mean rank scores ranging from 2.00 to 3.79, the interpretable rate using 2.00 or 3.79 as a critical point in the judgement would become quite low. A critical point may be fixed, according to the purpose of the examination (for example in the case of pre-employment screening for an intelligence bureau, false negative is strictly eliminated; therefore, 3.79 is used as a

critical point). In the examination of criminal investigation, a decision must be made so that the innocent is not convicted.

In the case of the lowest re-ranked score, indicating the critical is used as a criterion of judgement, the rate of correct interpretation would be 76% but the misjudgement would be 24%. However, when the critical point of 1.99 is used as another criterion, a misjudgement of innocent will not occur, but the rate of uninterpretable charts will increase. In order to solve these contradictory problems, an attempt using variables of the difference between 1st and 2nd average rank scores of a series, mean rank scores and re-ranked scores were made. The result is shown in Figure 1. The questions satisfied below mentioned either or both conditions were 18 (60%) and were all critical questions. That is: (1) re-ranked score is first and the difference between 1st and 2nd mean rank score is more than 9.756, (2) re-ranked score is 1st and mean rank score is less than 2.251.

The above method lowered 16% of correct interpretation, as compared to the method using the criterion of mean rank score of 1 or not, but the rate of false positive dropped from 24% to zero. The rate of correct interpretation improved 17% to the method using only the mean rank score of 1.99 as a cut-off point.

In the report of actual examination, the result of judgement is categorized as positive, maybe positive, negative and inconclusive when we set up the criterion that -- those which satisfied the above two conditions are classed as positive, those with re-ranked scores within 2nd with mean rank score between 2.251 and 3.79, with a difference of 0 - 0.750 between 1st and 2nd ranking as maybe positive, mean rank score over 3.80 as negative, and others as inconclusive, there seems to be some applicability for this method to the field examinations.

However, every caution must be taken in application of the method to the actual cases and a judgement by GSR alone would contradict the concept of polygraph recordings. For further development, a study on the data of confirmed positive and negative charts of POT and the effect of question items and series on the cut-off point will be needed.

As shown in Table 2, the GSR to the first question of the first series clearly shows a component orienting response. Among the charts, some showed very weak GSR responses and 5 showed no response at all. It is presumed that the use of irrelevant questions at the start of a series, use of appropriate charts only, etc., would improve the accuracy of analysis. In comparison of the critical and non-critical responses habituation of critical responses within four series was not noted.

A correlation between the number of correct subjective interpretation and mean rank score was 0.75. Although the subjective analysis may have a high rate of correct interpretation, its power of persuasion would be weak unless the analysis method is clearcut. As far as various sample response patterns are concerned, they are exhibited in many text books and reports (e.g, Yoneda et al, 1959; Imamura et al, 1960; Imamura et al, 1965; Ohnishi et al, 1965; Reid & Inbau, 1966). However, especially in cases of POT, a process of making judgements on the charts obtained from repeated use of

the same question list is not clear; and how such judgements are done depends upon each examiner's experience. From the result of high correlation between subjective and objective analysis, it can be assumed that process of subjective analysis resembles, but is not necessarily identical, with that of the mean rank score analysis process.

A value of mean rank scores depends upon the consistency of responses throughout the entire series and is not effected by incidental response. The result of objective analysis suggests that, at visual inspection, larger incidental responses should not be the point aimed at, but a consistency in the occurrence of responses to a certain item should be aimed at to improve the accuracy of interpretation.

TABLE 3: Distribution of mean rank score of critical and non-critical items

Mean rank score	Non-critical items	Critical items
1.00 - 1.19		4
1.20 - 1.39		2
1.40 - 1.59		3
1.60 - 1.79		3
1.80 - 1.99		1
2.00 - 2.19	1	2
2.20 - 2.39	3	2
2.40 - 2.59	4	5
2.60 - 2.79	8	5
2.80 - 2.99	1	1
3.00 - 3.19	12	0
3.20 - 3.39	18	0
3.40 - 3.59	14	1
3.60 - 3.79	15	1
3.80 - 3.99	8	
4.00 - 4.19	22	
4.20 - 4.39	15	
4.40 - 4.59	11	
4.60 - 4.79	7	
4.80 - 4.99	3	
5.00 - 5.19	6	
5.20 - 5.39	1	
5.40 - 5.59	1	
Total:	150	30

Summary

In the field of application of the detection of deception, although sufficient validity and reliability of the test have been reported, interpretation of charts are subjective and its process is not necessarily clear.

The present study is an attempt to develop an objective method of GSR interpretation and also to analyze and clarify the ordinary process of subjective GSR interpretations.

Materials used in this study consisted of thirty "card test" charts which obtained prior to each routine field examination conducted by three examiners.

Subjective analysis was conducted by twenty-six examiners who were shown each chart and asked to point out which is most likely to be the critical one on each chart. For the purpose of objective analysis, the responses to within each series of questions were ranked from 1 - 6 according to the amplitude of GSR. The ranks of the items taken from the same questionnaire were summed across questions and calculated mean ranks such that for each subject there were 6 mean ranks.

Results were as follows:

(1) 23 (76.6%) of the items which produced the minimal sum of ranks within a subject were critical items.

(2) The mean ranks of items less than 1.99 were all critical items. Proportion of critical items of which mean ranks less than above mentioned cut-off point were 43.3% (13 items). Meanwhile, mean number of items detected correctly by 26 examiners' subjective analysis was 13.3 items (44.3%).

(3) The critical items which sufficed the following (1) and/or (2) conditions were 18 items (60%): (1) the items with less than 2.250 of mean rank and also were minimal in ranking within the questionnaire, (2) larger than 0.875 of difference of mean ranks between minimal items and second ones within the questionnaire and also were minimal in ranking within the questionnaire.

(4) The rank correlation between number of correct detections which were interpreted subjectively and values of mean ranks on critical items on each chart was 0.75. The finding suggested the fact that process of subjective interpretations were similar to the objective one which was mentioned here.

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THE RELEVANT-CONNECTED CONTROL

By

James Wygant

Although polygraph instrumentation has remained basically the same for about half of a century now, there have been countless changes in methodology. For the most part, those changes have been intended simply to increase the likelihood of the examiner being able to accurately discriminate between someone telling the truth and someone lying. Of particular concern have been false positives, test subjects who are telling the truth but are identified as being deceptive. The control question technique introduced to polygraph examinations by John Reid offered a substantial improvement in test accuracy in general; and since then other techniques have been advanced specifically to distinguish the so-called "guilt complex responder."

Although the term "guilt complex responder" is suggestive of a type of pervasive personality disorder -- that is, someone who responds defensively to probing questions by anyone about anything -- experience suggests that there are few, if any, test subjects who fit that type completely. However, there are certainly innocent persons who will produce defensive responses in conversation or sympathetic arousal in testing when questioned about certain types of behavior or about certain persons or businesses; just as there are persons who will response defensively when questioned in certain kinds of environments or by certain kinds of interrogators. Although properly formulated control questions can cancel out much of this interference, what we must accept is that there are occasional test subjects who will respond excessively to relevant questions because they are fearful, intimated or embarrassed, even though the examiner's interaction with them has been above reproach. They are truthful test subjects who produce greater responses to the relevant questions than to the controls.

Frequently such sensitivity to a particular issue can be traced to some past unrevealed association with the victim. There is a fear of being regarded as guilty solely because of known accessibility to the victim.

The author has had the rare experience of obtaining verified false positive results from a subject who, in many ways, might typify the subject for whom polygraph testing produces a special challenge. This subject was a 23-year-old white male who was grossly overweight (his weight was estimated to be over 400 pounds). This type of physical anomaly should serve as an alert to possible accompanying mental or emotional aberrations. In fact, in pre-test interview it was evident that this subject was of slightly higher than average intelligence but appeared to be somewhat emotionally immature. He expressed resentment at his brother's success in business but was dependent upon his brother for everyday needs. With the family's persuasion, the brother had given this subject a job and shared a house with him. The suspected crime was murder. The brother had disappeared without a trace, completely contrary to past behavior. The test subject had been interrogated at length by the police and had told them he thought his brother was buried behind the business. To the examiner he described this statement as

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a "hunch". In any event, the police hired a back hoe, dug up the ground behind the business and found nothing suspicious. The subject had been tested on a murder issue by a police examiner who reported indications of deception, although not sufficient to reach a conclusive determination.

In this subsequent examination, the subject appeared to be at ease during pre-test conversation and expressed more than usual interest in the test procedures. Review of the questions did not disclose any apparent sensitivity, with the possible exception that the subject made inconsequential admissions to the controls, which were then excluded.

This subject produced conclusively deceptive charts on the issue of fatally injuring his brother the last time they had been together. He produced conclusively truthful results on the issue of when that last time together had been, and inconclusive results on the issue of whether he had gotten any of the $3,000 the brother had drawn from the bank the day before he disappeared.

Several months later, the brother phoned his stock broker from a new residence in another state. The police intercepted a pre-arranged second call and the brother's identity was verified by voice recordings played later for the family. His story was that he had simply gotten fed up and left and had no intention of returning. The murder test was verified as inaccurate, a false positive.

Control questions used in this test were standard: between specified ages did he remember ever hurting anyone and did he remember ever being so mad at someone he wanted them dead. Although they produced some response, they obviously did not work well enough to even cause inconclusive results.

In a subsequent test on another subject, the examiner discerned the potential for the same kind of false positive results. A woman who had been married for 23 years was suspected of killing her husband. He had been suffering from cancer for 16 years and she alleged that in a fit of despondency over his deteriorating condition he had shot himself in the head while she was in the next room. The pathologist who performed the autopsy said that the angle of entry was from almost directly behind, in the pathologist's opinion a position difficult or impossible for the deceased to assume. The only suspected motive of the wife was mercy killing.

This subject produced conclusively truthful results and the investigation was dropped. In this examination, impressive results were obtained from a control question containing almost all of the elements of the relevant questions: Before (date of death), do you remember ever considering helping (husband's name) end his life? This was a strong relevant-connected control.

Tests on two different subjects relating to two different issues can not be cross-compared indiscriminately, but at least these examinations illustrate a number of important points.

1) The standard control questions used with the male subject were inadequate for testing him on the issue of fatally injuring his brother;

2) the male subject was capable of producing accurate results on another issue (the time he had last seen his brother) which did not relate so strongly to their personal relationship;

3) the female subject responded more strongly to the relevant-connected control than she did to two other standard controls;

4) even if the female had shot her husband, her responses to the relevant-connected control -- asking only if she had previously considered it -- could not be expected to be as great as to a question asking if she had actually done it.

Although relevant-connected controls will not lend themselves to every examination, if used carefully they should produce strong responses from subjects who are answering relevant questions truthfully but remain responsive because those are the only questions referenced to the victim.

The aim of relevant-connected controls is simply to get the test subject to notice those controls. If they, like the relevant questions, are referenced to the victim then the test subject should not be able to claim any disadvantage in responding to what he thought were "the important questions." With relevant-connected controls the test subject has an opportunity to regard all of the questions as important; and he is then left to form his own set on either the relevants or the controls according to the certainty and truthfulness of his answers.

There are certain safeguards that ought to be followed:

1) A relevant-connected control should never overlap the occurence of the relevant issue. If it does, it becomes a weak relevant question rather than a control.

2) It should ask the subject whether he ever considered or actually accomplished the same or similar behavior to that specified in the relevant questions, except that the subject should not be asked about having actually accomplished similar acts with respect to the present victim. In a theft case, for example, in which there existed a series of undiscovered thefts from the business-victim, a control asking if the subject had stolen from the victim before the present theft could produce a false negative result (a deceptive subject appearing truthful).

3) If specific names and dates are used in the relevant questions, they should be incorporated into the controls as much as possible. Just the sound of them being spoken has an impact, even if they are contained in exclusive phrases such as "before that -- incident" or "without regard to that -- incident." Telling a test subject to disregard something has about the same effect as a judge instructing a jury to ignore a statement they've just heard in court.

4) Restrict usage to cases in which the subject is acquainted with the victim. If the subject has not admitted to knowing the victim it would be confusing to attempt to refer to an alleged stranger in the controls.

The following questions are examples of relevant-connected controls for different kinds of crimes. For illustration, random names and dates have been inserted in the questions, but in an actual test these would correspond to the facts defining the relevant issue.

THEFT CASES:

Before you worked for Acme, do you remember ever stealing anything from an employer?

Before last week's theft, do you remember ever considering stealing anything from Acme?

ASSAULT CASES:

Excluding Joe's complaint, do you remember ever doing anything excessive or unreasonable in a dispute?

MURDER CASES:

Without regard to Anita, do you remember ever being so mad at someone you wanted them dead?

Before Anita's death, do you remember ever being seriously angry with her?

RAPE CASES - SUSPECTS:

Before the incident reported by Virginia, did you ever even consider forcing her to submit to you?

RAPE CASES - VICTIMS:

Without regard to Percy, do you remember ever teasing a man sexually?

These sample questions correspond to general categories of crimes that have victims, whether they are persons or businesses. Victimless crimes, such as drug abuse or prostitution, derive no advantage from this technique because there is no sensitivity to overcome with respect to past association with an identified victim.

The "guilt complex" that occasuionally is exhibited in cases involving previous acquaintance must often be nothing more than the subject's fear of being regarded as guilty by virtue of previous association. That fear can not be eliminated from an examination with certainty, but the examiner can balance his questions so that the subject is caused to exhibit the same fear with regard to both the control and relevant questions. This is the true value of relevant-connected controls. Balancing the fear of guilt from past association has the effect of cancelling it out; and the examiner can more confidently presume that his subject's responses are based solely upon his truthfulness, or lack of it.

PEAK OF TENSION - A BIBLIOGRAPHY

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Norman Ansley

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A CROSS ANALYSIS BETWEEN RELEVANT QUESTIONS AND A GENERALIZED INTENT TO ANSWER TRUTHFULLY QUESTION

By

Dan L. Hilliard

I. Introduction

This study consisted of a spot analysis of two questions in each of 233 polygraph charts. The analysis involved a comparison between a relevant question in each chart and the question, "Do you intend to answer my questions truthfully?" (AT) There were three separate segments in the study which was broken down as follows:

In Segment 1, the reactions recorded in 166 pre-employment questions, where admissions were made confirming the deceptive indicators, were compared with the reactions noted to the question, "Do you intend to answer my questions truthfully?" (AT)

In Segment 2, the reactions noted to the "Did you" question in 38 specific charts were compared with reactions noted to "AT". (In this segment, all test subjects were known to have been truthful.)

In Segment 3, 29 reactions to admitted lies on specific questions were compared with the reactions noted to 29 questions of intent to answer truthfully.

II. Purpose of the Study

The study began out of basic curiosity to see if there was any consistent relationship between the question of truthful intent and a relevant admission. Each parameter (pneumo, GSR & Cardio) was treated separately with no weight given when reactions in one or more of the parameters were extreme. During the analysis, it began to seem possible that the intent to answer truthfully question might be used like a control or as an aid in the test analysis.

III. Description of Method Used and Chart Selection

The 166 pre-employment charts were taken from a group of files to be thrown out after a required two-year storage. No attempt was made to select any particular group of charts, although only those questions were used where there were admissions of consequence. If there was only doubt that a subject just might have failed to recall a minor problem, the chart was discarded and not included in the study. For consistency, only the first chart was analyzed. The admission may have been made after the first, second or later chart, but the reaction in the first test was used (provided it was a significant admission and probably not the result of an unintentional oversight.)

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The 38 specific charts which were analyzed came from tests conducted on bank employees who were suspected of taking about $5,000 over a period of several weeks. After all tests had been completed, a customer was suspected who subsequently admitted all the thefts during a pre-test interview. Thus all of the employees tested in this case were innocent.

The third segment of 29 tests, were from a group of charts which were being thrown out and were tests where significant admissions had been made to specific relevant questions. The admissions made were in several different areas but almost all involved theft. In all charts, the first relevant admission was used for comparison, regardless of whether or not there were multiple admissions.

Generally acceptable criteria for deception were used for reaction comparisons with one rather major exception. No attempt was made to examine secondary relief patterns such as deep breaths or relief in cardio pressure unless these reactions were present before the next question (the one after the admitted deception) was asked. This may account for some of the cases in the pneumo component where no comparisons were possible.

Where reactions were equal, no comparison was made in GSR, cardio, or pneumo. As long as a reaction was visibly more significant, it was considered and not put into the no comparison category. No measurement devices such as rulers were used although graph markings on the charts were used for assistance. A GSR response was considered more significant if visibly it was a greater response. In other words, the GSR response was not discounted just because it was not four times as great as the comparative response.

The population from which these samples were taken is probably atypical. All subjects resided in the Dallas metropolitan area. There are caucasians, Mexican Americans, and blacks within the sample, but their relative percentages are not similar to those in the U.S. population as a whole. Age distribution is also skewed toward the lower end of the scale.

All charts selected contained a minimum of three acceptable tracings (pneumo, GSR, and cardio). The tests were administered by four examiners all operating out of one group of offices, and while various question sequences were used for specifics, almost all pre-employment tests had the same sequence through the first major reaction. After a significant reaction, the testing sequence could be modified by the examiner at his or her discretion. The charts always had the question, "Do you intend to answer my questions truthfully?", in the second position. Even on specific issues, this question was not modified to exclude control questions (as is the case in the Backster Zone).

Results

Table I lists the results of the first segment of the study. Attention is invited to the fact that those questions listed under NC (No Comparison Possible) are not necessarily questions where there was no reaction noted. If both reactions were equal, no comparison (NC) was deemed possible. There may have been limited or very negligible reactions, however.

TABLE I

STATISTICS FOR ADMITTED DECEPTION IN PRE-EMPLOYMENT CHARTS

166 Total Reactions (TR) pairs were compared for all parameters.

	AT Responses where AT (Do you intend to Answer my Questions Truthfully?) was judged greater	A Admission reaction was judged greater	NC No Comparison Possible	TC Total Reactions where comparison was possible
PNEUMO	17 % of TR = 10.2 % of TC = 12.7	117 % of TR = 70.5 % of TC = 87.3	32 % of TR = 19.3	134 % of TR = 80.7
GSR	31 % of TR = 18.7 % of TC = 20.8	118 % of TR = 71.1 % of TC = 79.2	17 % of TR = 10.2	149 % of TR = 89.8
CARDIO	24 % of TR = 14.5 % of TC = 15.0	136 % of TR = 81.9 % of TC = 85.0	6 % of TR = 3.6	160 % of TR = 94.4

TABLE II

These subjects were the 38 bank employees who were all found to be innocent of an approximate $5,000 embezzlement. To provide consistency between all segments of analysis, only one question (The Did You Question) in the first chart was compared with the question, "Do you intend to answer my questions truthfully?"

TABLE II

STATISTICS WHERE TRUTHFULNESS WAS KNOWN ON A SPECIFIC ISSUE

TR = 38 pairs compared:

	AT greater	A greater	NC	TC
PNEUMO	24 % of TR = 63.2 % of TC = 70.6	10 % of TR = 26.3 % of TC = 29.4	4 % of TR = 10.5	34 % of TR = 89.5
GSR	25 % of TR = 65.8 % of TC = 69.4	11 % of TR = 28.9 % of TC = 30.6	2 % of TR = 5.3	36 % of TR = 94.7
CARDIO	24 % of TR = 63.2 % of TC = 64.9	13 % of TR = 34.2 % of TC = 35.1	1 % of TR = 2.6	37 % of TR = 97.4

TABLE III

These were subjects who were tested on specific issues. All subjects made significant admissions. The first relevant admission made, on the first test chart, was compared with AT.

TABLE III

STATISTICS WHERE THERE WERE ADMITTED LIES ON SPECIFIC ISSUES
TR = 29 pairs compared:

	AT greater	A greater	NC	TC
PNEUMO	4 % of TR = 13.8 % of TC = 19.0	17 % of TR = 58.6 % of TC = 80.9	4 % of TR = 13.8	21 % of TR = 86.2
GSR	6 % of TR = 20.7 % of TC = 23.1	20 % of TR = 69 % of TC = 76.9	3 % of TR = 10.3	26 % of TR = 89.7
CARDIO	0 % of TR = 0 % of TC = 0	24 % of TR = 82.8 % of TC = 100.0	5 % of TR = 17.2	24 % of TR = 82.8

Discussion of the Results and Conclusions

A cursory analysis of the data suggests "AT" might be used as a control or as an analysis tool. From a more practical standpoint, sole dependence upon AT as a control would seem to involve an unnecessary risk. In those instances where a subject insists that the examiner stick solely to the issue, without asking questions outside the main area of concern, AT might offer the only opportunity for effective cross analysis. The sample used was relatively small and the demographic bias has been mentioned. Hopefully, other examiners in the field will use their own cases to verify or refute the data presented here. The study could be expanded in other geographical areas and with enough data it is possible that such a cross analysis method might provide one more tool to the examiner in detecting deception or truth. This study is not meant to advocate use of AT as the only control or as the primary control. In pre-employment screening, however, some examiners have difficulty finding a control question that is never too hot nor too mild, and such an analysis technique (if statistically sound) could prove useful.

As has been previously noted, there were several limitations put on this study. These limitations were employed for two reasons:

1. To keep the statistical data as simple as possible.

2. To eliminate as much subjective bias as possible.

Undoubtedly there was still some subjective error in the study, but the

subjective bias was probably more than offset by the elimination of some very important analysis techniques. There was no attempt made to account for the extreme reaction (i.e., a cardio reaction at a relevant may have been very intense but supported by pneumo and GSR responses which were less significant than the reactions at AT). Relief patterns at following questions were not considered at all. Some such patterns are so intense that an indication of deception might be justified on their presence alone. Another limitation involves the non-emotional subject. A chart containing responses only at AT and the relevant issue might easily justify a decision of deception indicated, particularly if there was other supporting evidence of the subject's diminished response capability.

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POLYGRAPH REVIEW

By

Norman Ansley

How would you score on a licensing examination or the APA entrance examination? In most of our reviews a score of 9 or 10 is excellent. In the case of ethics and principles of practice, a perfect score is the minimum (unless you are the victim of poor question formulation where you know the answer but don't understand the question). The APA Code of Ethics and the Standards and Principles of Practice are located in the front of your APA Membership Directory. The answers to these specific questions are located on page 77.

1. An applicant for membership in the APA who has been convicted of a crime of moral turpitude is:

   a. Disqualified for membership if the crime took place in the past 10 years or since his 18th birthday.

   b. Disqualified if the crime was a felony, but not a misdemeanor.

   c. Absolutely disqualified.

2. An examiner may not testify about the charts of another examiner unless he is:

   a. Thoroughly familiar with the techniques and procedures used by the other examiner.

   b. Formally trained in the techniques and procedures used by the other examiner.

   c. Has experience in the techniques and procedures used by the other examiner.

3. During a screening examination for private employment you have specific reactions to relevant questions. You must:

   a. Afford the examinee an opportunity to explain and eliminate these reactions.

   b. Tell the examinee about any reaction that you intend to ask questions about, or intend to report to the prospective employer.

   c. Tell the examinee that he did not pass the test and that he knows the questions that he was not truthful about.

4. In regard to the polygraph instrument, the APA:

   a. Has recommendations, but no specific standards.

4.

b. Requires a permanent recording from a cardio and pneumo channel.

c. Requires a permanent recording from a cardio, pneumo, and galvanic skin response channel.

5. Before every polygraph examination the examiner must tell the examinee:

a. Of the rights of every American citizen against self-incrimination and invasion of privacy.

b. Of the Fifth Amendment and the Miranda warning.

c. That he may leave any time he wants to.

6. T F Although you may call a subject not deceptive on the basis of one chart, it takes at least two charts before you can call him deceptive.

7. T F Although you are quite sure that a subject is unfit for testing, you owe it to him to at least attempt an examination.

8. T F Conducting a private polygraph examination for the exclusive use of the defense attorney is an example of an examination conducted to circumvent the law.

9. T F Although false and misleading advertisements relating to the polygraph profession are certainly unethical, they are not specifically mentioned in the Code of Ethics of the APA.

10. T F The Code of Ethics specifically requires members to support scientific research in the polygraph field.

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BOOK REVIEWS

Hughes, Dorothy B.: Erle Stanley Gardner: The Case of the Real Perry Mason. William Morrow & Company, 105 Madison Avenue, New York, New York 10016. $15.00.

Erle Stanley Gardner, "Uncle Erle" to many APA members, became the most widely read American writer of all time. All of his novels combined, of which there were one hundred and thirty-one, have sold more than 310 million in all editions. They have been translated into twenty-seven languages. He wrote eighty-two full-length Perry Mason novels plus many other novels and short stories, some published under pseudonyms. There were twenty-nine mysteries under the pseudonym A. A. Fair, featuring Bertha Cool and Donald Lam, nine mysteries featuring the D.A., Doug Selby, seven non-series mysteries, four collections of novelettes and short stories, thirteen non-fiction accounts of exploring Baja California, the American desert and the Sacramento Delta, two non-fiction books concerning crime, and almost countless short stories for the pulps and slicks. A complete bibliography of his works appears here in Dorothy Hughes' biography.

Hughes takes the reader through Gardner's childhood, his twenty-year career as a practicing attorney, his family life, his early years as a writer, and his adventures in deserts and mountains. She describes Gardner as a hard-headed businessman and lawyer who also gave generously of his time to the Court of Last Resort which often resulted in the release of men wrongly convicted. It is through his work in the Court of Last Resort, and the continuation of that effort in the APA as the Case Review Committee that many examiners have come to know of the work of Gardner. Gardner thoroughly believed in the use of the polygraph, and said so in many of his speeches and serious writings.

The author, Dorothy Hughes, is a capable writer, an author of a number of novels and a mystery critic of the Los Angeles Times. The book is thoroughly readable and enjoyable.

Cleary, Alan: Instrumentation for Psychology. John Wiley & Sons, One Wiley Drive, Somerset, New Jersey 08873. 319 pp. illustrated, tables, index, glossary, bibliography.

This work is for graduate and upper division undergraduate students in psychology and biology. It provides a comprehensive introduction to the principles and practical utilization of psychological instruments. It is an excellent reference work, and would be a very useful text for advanced polygraph courses. Examiners who want to know more about advanced psychological instrumentation will enjoy reading this well prepared book.

The book begins with a discussion of the application of instrumentation in psychology and gives an introduction to digital logic before proceeding to the more technical chapters on programming, instrumentation methods, sensors, data recording, and other equipment. Psychophysiological applications are well covered and the book ends with a chapter on computers, their use and languages.

Fear, Richard A.: The Evaluation Interview. McGraw-Hill Book Company, 1221 Avenue of the Americas, New York, New York 10020. 334 pp. 1978, 2nd ed. revised, $14.50.

Richard A. Fear is a personnel consultant for large companies and operates Interview Training Services. In this work he gives suggestions for interviewing minorities and new guidelines for interviewing women applicants for executive positions. Fear emphasizes methods for evaluating an applicant's abilities without giving additional aptitude tests, a particularly meaningful technique because of current EEP restrictions on written tests.

Fear presents eight specific techniques that are designed to establish rapport with the applicant thus helping them to share the relevant portions of their life histories. The book has three features: an interview guide which provides tested questions to use during the session, an interview rating form for recording the information, and samples of actual reports written by experienced interviewers.

A useful book for those engaged in pre-employment examinations.

Argyle, Michael and Mark Cook: Gaze and Mutual Gaze. Cambridge University Press, 32 East 57th Street, New York, New York 10022. 210 pp., illus., tables, bibliography, 1976. $19.50.

This is probably the only book on this fascinating subject. It will be of interest to all polygraph examiners, psychologists and other social scientists.

Looking at others, and being looked at by them, is of central importance in social behavior. We use our eyes to study the behavior and appearance of others, and we look particularly in the region of the eyes. This is familiar and obvious, but until recently there was little scientific research or theoretical analysis available.

Here the authors describe the production and perception of different patterns of gaze and mutual gaze, their evolution in animals and their development in children, the linkage between gaze and speech, deviant patterns of gaze in psychiatric cases, and also cross-cultural differences. The authors hold that gaze is one of the principal non-verbal signals, and one that can be under deliberate control.

Journal of Security Administration and Private Police

A new publication, the Journal of Security Administration and Private Police has appeared. It fills a definite void in the police literature field. The founder and Editor is Norman R. Bottom, Jr., Ph.D., C.P.P., who is in the Department of Criminal Justice at Northern Michigan University, Marquette, Michigan 49855. Associate Editors are Dr. Robert E. Bagby of Eastern Kentucky University, Derald D. Hunt of Golden West College, Hayes C. Larkin of the Community College of Baltimore, Dr. Merlyn D. Moore of Sam Houston State University and Fred Rayne of Miami, Florida.

A B S T R A C T S

Polygraph Career

Alex Kacen, "Polygraph Examiners: The Truth Will Out," Occupational Outlook Quarterly, Fall 1978, pp. 18-20.

This short article brought us over one hundred requests for information, about half from professional vocational counselors. The article describes the nature of polygraph services and employment, gives salary ranges, lists our approved schools and their addresses, and lists the states in which an examiner needs a license. The majority of the information is based on a survey of the directors of the APA accredited schools. Without listing them, he mentioned that there are other schools, and named three organizations which may accredit them. The article is favorable and provides adequate information for those who want more information about a career in our field.

Psychopathology and Detection

William M. Waid, Martin T. Orne, and Stuart K. Wilson, "Effects of Level of Socialization on Electrondermal Detection of Deception," Psychophysiology, Volume 16, Number 1, January 1979, pp. 15-22.

Fifteen college students attempted to deceive a professional polygraph examiner, while 15 others who had nothing to hide also submitted to the examination. The examiner was blind as to whether each subject was deceptive or truthful. Using the skin conductance response (SCR), significant discrimination was made between deceptive and truthful subjects with both "guilty person" and "guilty knowledge" polygraph tests. On both types of test, however, subjects who were not detected were significantly less socialized (Socialization Scale of the California Psychological Inventory) than those who were detected. This reduced susceptibility to detection was mediated by a reduced SCR to deception among low-socialization subjects. Among innocent subjects the highly socialized were more responsive electrodermally throughout the test, leading some of them to be misclassified as deceptive on at least one test. Implications of the results for both detection of deception and the construct of socialization are discussed. [Authors' abstract].

Hydration Artifacts in Electrodermal Recording

Robert S. Bundy and Steven M. Mangan, "Electrodermal Indices of Stress and Cognition: Possible Hydration Artifacts," Psychophysiology, Volume 16, Number 1, January 1979, pp. 30-33.

The study was designed to examine the relationship between electrodermal frequency (EF) and skin conductance level (SCL) in a paradigm that has previously demonstrated that these measures can operate independently. Electrodermal activity was recorded during 3 10-min periods. All subjects rested during the first and last periods. Half of the subjects rested during the second period, and half were in a shock-threat condition. Between the

second and third periods a fresh electrode set was applied, and the subjects either inflated a balloon, operated a pursuit rotor, or were interviewed. Both measures were low for the rest periods and high during the shock-threat condition except during the last rest period when SC was unexpectedly high, thus replicating previous research. However, application of new electrodes in the last period demonstrated that this high SCL was due to a time dependent effect, probably hydration, and was not due to the differential effects of stress, and cognitive activity on the two electrodermal measures. [Authors' abstract].

Skin Conductance and Skin Resistance Recording

Wolfram Boucsein and Georg Hoffmann, "A Direct Comparison of the Skin Conductance and Skin Resistance Methods," Psychophysiology, Volume 16, Number 1, January 1979, pp. 66-70.

The purpose of the present study was a direct comparison between simultaneous recordings of skin conductance and skin resistance. Sixty male students received a series of 30 white noise stimuli, while measures were taken continuously from four sites on the palmar surfaces of the fingers. Evaluations were made for response amplitudes, recovery, and for an approximation area measure. Magnitude of reactions and reliabilities were compared using ANOVA procedures. Behavioral concordances were estimated as correlations with the subjects' ratings of stimulus intensities.

Conductance and resistance measures do not differ in amplitude, in area, or in strength of their reliabilities and behavioral concordances. No differences in any respect are found between sites. Skin conductance yields significantly ($p < .01$) shorter recovery times than skin resistance, which is discussed in terms of membrane permeability change. [Author's abstract].

Verbal Stimuli and Orienting Response in SCR

David A. T. Siddle, Chris Kyriacou, Peter A. Heron, and William A. Matthews, "Effects of Changes in Verbal Stimuli on the Skin Conductance Response Component of the Orienting Response," Psychophysiology, Volume 16, Number 1, January 1979, pp. 34-40.

This paper presents three experiments which were designed to investigate the effects of changes in verbal stimulus meaning on magnitude of the skin conductance response (SCR) component of the orienting response (OR). In Experiments 1 and 2, subjects received 12 visual presentations of a single word stimulus followed by a test trial involving change. The results of Experiment 1 ($N = 48$) indicated that a test stimulus which constituted change in meaning and taxonomic category induced larger responses than did a change in meaning alone, which in turn induced larger responses than did a control condition of no change. Experiment 2 ($N = 64$) investigated the effects of both semantic and acoustic changes and the results indicated that only semantic changes resulted in test trial SCRs which were larger than those in the control condition. Experiment 3 ($N = 48$) investigated the effects on SCR magnitude of within- and between-taxonomic category shifts following habituation training with 4 examples of the category. In

this case, only the between-category change resulted in SCRs which were larger than those in the control condition of no change. The results of all three experiments were interpreted as support for Sokolov's (1963) claim that the meaning of verbal stimuli is encoded during habituation. Moreover, the results of Experiment 1 indicate that responsiveness on a change trial is a positive function of the among of change, while the results of Experiment 3 suggest that when a number of examples of a word class are employed during habituation, the semantic characteristics of that class are encoded.

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