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SELECTED ABSTRACTS OF NONVERBAL DECEPTION FOR POLYGRAPH EXAMINERS

By

Murlene McKinnon and Norman Ansley

The ability to detect deception has long been a concern of persons in the law enforcement field. Methods for its detection go back hundreds of years to a time when Africans, who were thought to have committed a transgression against society, were commanded to drink a poison potion. If the accused vomited the potion he was judged innocent and hopefully, he lived. If he expired he was judged guilty. One is relieved to consider the safeguards of a trial by peers and the right to legal representation.

Law enforcement does not have a monopoly on the desire to detect deception. Psychologists and psychiatrists have concentrated on this area for some time in an effort to give more successful aid to those they counsel and treat. Discussions with several of these practitioners indicate their desire to get in touch with the side of the mind and the state of the emotions which often are not within the immediate awareness of the patient.

The communications profession also interests itself in the detection of deception. How, after all, does one detect the lies of a human if not through his or her communication system? Whether we examine the paralinguistic cues of the voice or the kinesic cues of the body, our major concern remains human communication.

One would think that with three very dedicated and interested professions concentrating on the detection of deception that there would have been, by this time, some meeting of the minds and melding of the findings. Generally speaking, that has not been the case. Law enforcement, because it has utilized the reading of nonverbal indicators (*i.e.*, voice, gestures, facial expression, posture and body movement, eye movement, and other body characteristics) in a day-to-day practicum, has gathered most of its information by observation. There has been little research to support observational findings and certainly no controlled experiments. In fact, much of the reading of nonverbal behavior has been done on the basis of intuitive impressions. However, perhaps because the law enforcer deals in high stakes (*i.e.*, the lives of others as well as his or her own), the opportunity is there to practice and refine his craft almost daily. Because he has been exposed to basic human normal and abnormal psychology in the real world, the practicing, conscientious interviewer generally reads his or her subjects with surprising insight.

Dr. Murlene E. McKinnon is Associate Professor of Speech-Communications at Delta College in Michigan. She is currently completing a two-year pilot study on nonverbal deception indicators, the preliminary results of which are forthcoming. Dr. McKinnon has been a consultant to federal and state law enforcement agencies for the past six years. Her academic training is in African History and Speech-Communications.

Mr. Norman Ansley is Editor of APA Publications, an elected member of the Board of Directors of the American Polygraph Association, and Manager of a major Federal polygraph program. He has been a polygraph examiner since 1950.

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There are four qualifiers necessary to consider when reading nonverbal deception. You must read the subject against the population; read the subject against their own behavior; read clusters of behavior, not single events; and read repetitions of the behavior. Polygraph examiners have an excellent opportunity to read nonverbal deception in the pretest interview by comparing the responses to the discussion of the relevant questions with the responses that occur to the discussion of the control questions. In addition, behavioral responses to the psychological probes may be compared with the responses made to the questioning about factual and non-controversial background information.

The psychologists and psychiatrists have concentrated on detection of deception for improved interview procedures and more successful psychological analysis. In addition to several case study approaches, these professions have been involved in controlled research experiments. Particularly notable is Professor Paul Ekman, active in this field since the 1950s. His book, Unmasking the Face (1975), subtitled A Guide to Recognizing Emotions From Facial Expressions, is unparalleled in the study of the face. As a professor who has conducted much of his research outside the confines of the laboratory (as well as within it), Ekman has made highly significant contributions. His deception/leakage construct, one basis for the examination of nonverbal deception, is only one of these contributions.

While these two professions have been examining nonverbal communication, the communication people have not loitered. Nonverbal behavior has been discussed and examined for a number of years by communications professors and their students. Working in the realm of controlled research experiments, these professionals have also made their contributions in courtroom practice and procedures (see Gerald Miller, et al., "...And nothing but the truth": How well can observers detect deceptive testimony? in Perspectives in Law and Psychology. Plenum, expected in 1981). Miller's interest in witness credibility constitutes a significant contribution to the meeting of the law enforcement and communication arenas.

Another communication professor, Mark Knapp, at State University of New York at New Paltz, has recently written an article, ("Telling It Like It Isn't: A Review of Theory and Research in Deceptive Communications," Human Communication, volume 5, 1979), which endeavors to examine the state of the art in deception detection. This article is extremely valuable for its breadth of coverage, although Bella DePaulo and Robert Rosenthal's recent work is conspicuously absent.

We are concerned that the contributions (both valuable and less valuable) of all three fields be recognized. We are concerned that they be viewed as a whole, a body of related materials that indicate progress as well as misconceptions to be further researched.

Paul Ekman expresses concern that law enforcement and intelligence agencies not misuse his research on nonverbal behavior (APA Monitor, September/October, 1980). That is our concern as well. However, since law enforcement has in the past, does now, and will continue to use nonverbal indicators, we advocate that such usage have its basis in informed research rather than in intuitive impressions. We therefore advocate ongoing examination of the reliability and validity of nonverbal deception indicators, further replication of past research, and additional field

The right of physicians, psychiatrists, and psychologists to utilize nonverbal indicators to improve their interpretations of interpersonal interaction in order to help their clients is not only well recognized, it is seldom questioned. The training of actors and actresses in the use of nonverbal self knowledge so that they may better ply their craft finds acceptance as well. There is no legitimate reason why law enforcement and intelligence professionals, already highly trained in observation and further carefully trained in the reading and limitations of nonverbal, should not use nonverbal behavior indicators to better perform their job of identifying wrong-doers and eliminating those falsely accused or suspected. Ekman's concern is not unfounded; there are always persons who will misuse information in whatever professional capacity, but at least we can insure that that misuse not be the result of ignorance.

It is in this spirit and with this intent that we give you a representative sample of some of the more important material from the three areas. We show you what is available and promise you a supplement in the near future.

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GLOSSARY

Adaptors: Nonverbal behaviors thought to develop in childhood. They are thought to be adaptive efforts to satisfy needs, perform bodily actions, manage emotions, develop social contacts, and perform instrumental actions.

Self-adaptors: Manipulations of one's own body.

Alter-adaptors: Interpersonal relations movements used to establish or dis-establish contact with others.

Object-adaptors: Manipulation of objects, thought to have arisen from the performance of an instrumental task.

Affect: An emotion or feeling expressed in the face.

Affect blend: When the face conveys multiple emotions.

Deception: As used by Ekman, indicates that a lie is taking place, but no specific information is involved.

Emblems: Nonverbal acts which have a specific verbal meaning known to most members of a cultural group.

Illustrators: Nonverbal acts intimately linked with verbal utterances and generally used to describe.

Indicators: Clusters of nonverbal behavior which show or indicate thoughts or feelings.

Leakage: The revealing of specific information or feeling.

Microexpressions: Those fleeting facial expressions generally thought to be 1/5th or 1/50th of a second in length and thought to betray "true" feelings.

ABSTRACTS

Addison, M.E., and Jones, J.H. Non-Verbal Communication. Lesson Plan, U.S. Naval Investigative Service, 1979.

Addison and Jones are also responsible for a paper presented at the Maryland Polygraph Association Seminar in 1979, but since this is the more complete material, it has been chosen for review.

The authors note, "Experts believe that fifty percent of all communications are non-verbal," but, in actuality, communications experts will establish that nearly 80% of what we say comes across nonverbally. The authors point out that the interrogator's words, how he says them, and his nonverbal behavior are the stimuli which induce a response in the subject and comment that the subject's gestures are "primarily unconscious and frequently uncontrollable movements." Further, they suggest that because movement is more difficult to control than speech, it can be more accurately evaluated. Obviously, it is wise to remember that the interrogator's movements can also be evaluated.

Four categories of nonverbal behavior indicative of specific meaning are mentioned: gestures which prepare for action; gestures of interruption; gestures which show openness and acceptance; and gestures of defense, avoidance, and assurance seeking. It would have been useful had the authors followed through by assigning the behaviors they then list to these categories. Instead, they mention areas of body behavior (*i.e.*, the head; eyes; mouth; arms; hands; feet; and miscellaneous), indicate some specific behaviors in each, and make a few comments on some of them.

The authors wind up their paper by observing that "no single behavior standing alone proves anything. Several gestures together can indicate a possible attempt on the individual's part to withhold the truth."

This is a valuable article which hits at the tip of the iceberg in nonverbal behavior, and could go a lot further. The authors are probably appropriately cautious.

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Archer, Dane, and Akert, Robin. How Well Do You Read Body Language. Psychology Today, October 1977, 68-69, 72, 119-120.

Archer and Akert maintain that while people are fluent in performing the "scripts" of nonverbal performances, most are nonverbally illiterate in the sense that they would not be able to explain how they know the meaning of our actions.

Concerned with utilizing a "naturalistic method" of studying nonverbal interpretation, Archer and Akert (University of California, Santa Cruz) developed the SIT (Social Interpretations Task) to determine whether nonverbal clues could be judged better than verbal clues in social situations. They used twenty scenes, thirty to sixty seconds in length each, which were natural and unrehearsed. They then composed a multiple-choice interpretative question for each of the scenes. Rather than the emotional or attitude oriented questions of similar research, these questions sought objective verifiable answers. First, 76 university students were asked to judge only transcripts of dialogue. Second, 370 students were shown a complete videotape and made judgments. The two groups were then compared for accuracy.

In this article, Archer and Akert report 5 sample transcripts of scenes, the questions asked, and the verbal and nonverbal results. Watchers of videotape (*i.e.*, readers of nonverbal behavior) are consistently more accurate at making judgments than transcript (*i.e.*, verbal) readers only. While transcript readers averaged 5.5 correct answers (chance expectation was 6), nonverbal readers had a mean of 8.8 for sixteen questions.

The authors conclude, "Our research shows that words alone provide a poor basis for making judgments about other people. ...The most accurate judges of other people attend to their nonverbal performances and not merely to what they say."

Arther, Richard O. "Observing Gestures." Journal of Polygraph Science, September-October 1979, 14(2): 1-4; November-December 1979, 14(3): 1-4; January-February 1980, 14(4): 1-4.

In three issues of the Journal of Polygraph Science, Arther has summarized 28 years of systematic observations made from thousands of cases. Beginning with his work with John E. Reid in 1952, Arther has developed a thorough, systematic approach to observing gestures. He has, in his writing and teaching, expressed a meaning or meanings attributable to each of the gestures. He considers the resulting analysis to be highly accurate. Arther stated:

Sometimes observing and comparing gestures can be even more valid and reliable than is the polygraph! This is because over half the liars attempt to control their test emotions or 'beat the lie detector' by various strategms. On the other hand, other than by smiling and trying to talk in a normal voice, less than one out of a thousand liars attempt to control their other pre-test gestures.

Thus, the correct observation of gestures will give me a pre-test opinion that has at least the same validity (correctness/accuracy) as the polygraph itself. That is, approximately 96% correct, 3% indefinite, and 1% maximum possible error.

Arther recommended that the examiner should blend the pre-test opinion and the chart analysis opinion into one final opinion as to the person's truthfulness. Arther listed nearly 200 specific things to look for, and a meaning for each one. Some meanings are general. For example, the "red-ant-hill" sitter indicates extreme tension. However, if the subject uses certain phrases or words, there is a high probability that a lie will follow. Among these are "honestly," "believe me," "I swear to God," and "To tell you the real truth." When a person is left alone for the very first time, strong indications of lying include an attempt or actually damaging the polygraph instrument (100%) never looking at the instrument (95%), stares straight ahead (80%), or sits in a very tense position, and looks worried (95% are lying).

Arther briefly mentioned that there are groups of gestures, and noted that each of the gestures in a cluster are almost always in total agreement. However, he did not list examples. He also told the reader that smiling is the most misleading of all gestures. To tell if the smile is genuine, the subject should be left alone and observed through the mirror. Liars, stated Arther, immediately stop smiling when left alone.

Arther's publication is the most thorough of several of the lists of gestures and their meanings, that have come from the polygraph field. The others, notably those of Marcy, James, North, and Addison are in general agreement with Arther, varying more in emphasis. All of these lists are meant for instruction and application, and are not presented as the products of research. There is also much more detail on the behavior related to deception than truthfulness, yet some do comment on the appearance of the truthful person. In this respect, Arther stated:

Truthful person: Over-all gestures are free, easy, away from the body, and the body reacts as an integrated unit. His gestures are in agreement with each other in that they are consistent and are in harmony with each other.

In contrast, Arther described the general actions of those who are not truthful:

Liar: Over-all gestures are usually cramped, jerky, close to the body, and the body is not reacting as an integrated unit. The gestures are often contradictory, e.g., smiling while the rest of the body shows tenseness.

It should be noted that Arther's work is based on extensive personal observation, not validated research, and one would want to compare and verify his list with validated materials.

Selected Abstracts of Nonverbal Deception for Polygraph Examiners

Arther, Richard O., and Caputo, Rudolph R. Interrogation for Investigators. New York: William C. Copp & Associates, 1959.

As the entire book is about interrogation, the authors mention non-verbal indications of deception only occasionally. However, in one interesting paragraph they instruct the interrogator on how to convey his attitude in a nonverbal way, along with the probable response:

As you enter the room, the cool customer will often make some disparaging remark, such as, 'What do you want?' or 'You ain't got nothin on me.' But from the time you enter the room, you continue to look at him without moving or changing your slight-smile expression and, of course, you say nothing. In most cases you will see the suspect begin to shift around in his chair, cross and re-cross his legs, look away, and make a remark, such as, 'Come off it, what do you want!'

A more significant discussion of nonverbal deception comes in a chapter on the nervous suspect. In this chapter the authors list the signs of guilty persons, which are said to be distinct from the general nervousness of innocent suspects: (1) continually flicking imaginary lint from his clothing, (2) continually gulping and swallowing, (3) continually licking his lips, (4) crossing and recrossing of the legs, (5) moves around so much he appears to be seated on an ant hill (particularly after being asked an important question about the crime), (6) slow in answering questions (mental blocks), taking up to five seconds often accompanied by a blank and unseeing stare, (7) looking downward with one hand on forehead, (8) voice is high pitched, cracking, or trembling, (9) small beads of perspiration around his hairline, and (10) hands either very hot or very cold, very wet or very dry, very white or very red.

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

Since much past research in lying has been designed to examine positive cues as they covered negative emotions, DePaulo and Rosenthal determined to study both positive and negative feedback. Using Ekman and Friesen's operational definitions (1969), they identified leakage accuracy as pinpointing specific concealed information or underlying affect, and deception accuracy as recognizing that deceit is or is not happening.

While being video-taped, twenty men and twenty women were asked to describe: (1) someone they liked, (2) someone they disliked, (3) someone they felt ambivalent toward (strong feelings of like and dislike), (4) someone they felt indifferent about (no strong feelings of like and dislike), (5) someone they liked as though they disliked him or her, and (6) someone they disliked as though they liked him or her. They later returned to serve as human lie detectors, viewing other person's tapes, but not their own.

Deception accuracy was significantly more accurate than chance, while leakage accuracy was significantly worse than chance. Thus, though

observers were successful when detecting deception, this did not correlate with their ability to read underlying affect.

Conversely, however, persons whose deceptions were easily detected, also tended to leak their true affect. Where leakage was accurately read, the ability to read leaked positive and negative cues was strongly related.

Speakers were equally likely to be caught lying or displaying leakage by both sexes. Both sexes of observers also read leakage equally well, but skill at reading womens' deceptiveness was not significantly correlated with the skill at reading mens'.

Finally, just because a person was a successful liar, did not mean he or she was a successful detector or reader.

The authors also discuss hamming and Machiavellianism in relation to lies, mention some methodological considerations in their study, and suggest some future research.

DePaulo, Bella M., Rosenthal, Robert, et al. Decoding Discrepant Nonverbal Cues. Journal of Personality and Social Psychology, 1978, 36, 313-323.

The researchers of this article [from the Profile of Nonverbal Sensitivity (PONS test)] the Nonverbal Discrepancy Test, a test designed to indicate accuracy in decoding of discrepant auditory and visual nonverbal cues.

Much past research has indicated that the video mode is dominant (for observers) when cues are discrepant. However, as cues move towards deceptiveness, observers tend to weigh audio information more heavily in judging truthfulness. Research has also indicated (Ekman and Friesen, particularly) that body and voice give more accurate informational clues than does the more easily controlled face.

In the first test sample, the researchers had individual groups of subjects evaluate an audio-video sample, a video sample, or an audio sample to ascertain which modality was more influential in judgments of discrepant nonverbal cues. The subjects were more influenced by video cues. In the second study, junior high, high school, and college groups evaluated the full audio-video test. Once again, video primacy occurred. The researchers then analyzed the primacy of the video cues relative to different channels (face/body), sex, and affect (positive/dominant). They found that video primacy was greater for face paired with audio than when body was paired with audio, that video primacy was strong in judgments of facial positivity than in body dominance, and that women showed slightly more video primacy and facial primacy than men. They also showed more video primacy in their positivity ratings than in their dominance ratings.

Finally, as scenes became very discrepant, the audio channel was attended more by the observers than was the video. The researchers suggest a future concern is whether people who pay more heed to video than audio cues are also more accurate in judging video information.

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Dibner, Andrew S. Cue-Counting: A Measure of Anxiety in Interviews. Journal of Consulting Psychology, 1956, 20, 475-477.

The author, working from transcripts of initial psychological interviews, developed eleven speech characteristics which he believed to be related to situational anxiety. The subjects were 39 hospitalized patients who were diagnosed as having psychoneurosis, character disorder, or psychosomatic reaction.

Analysis by the author and two assistants indicated that speech disturbances measured by cue scales are related to situational anxiety and not to anxiety as a personality trait; and that some of the speech variables represent emotionally involved and disorganized verbal behavior. An incomplete sentence or the breaking in of a new thought, for example, was seen to be a direct instance of disorganization, while a repetition or modification of words and phrases was seen as defense against or an attempt to control disorganization. Moreover, the author believed that these anxiety indicators were not subject to the person's awareness because they did not correlate with the patient's own report of anxiety.

The indicators the author selected for his analysis were (1) unfinished sentences, (2) interrupted sentences, (3) stuttering and unfinished words, (4) "I don't know" said when inappropriate and not in answer to a question, (5) sighing or deep breath, (6) laughing of any kind, including a chuckle, (7) change in voice volume, (8) asking the interviewer to repeat a question, even though he heard it, (9) blocking, where there is a groping for the proper expression or unusual hesitation, (10) breaking in with a new thought, generally breaking into another sentence, and (11) repeating words and phrases.

Donovan, W., and Leavitt, L.A. Heart Rate and Skin Conductance Correlates of Viewing Direct and Averted Gaze. Paper presented at the Annual Meeting of the Society for Psychophysiological Research, San Diego, 1976.

Direct and averted gaze is important in non-verbal deception, but whether or not the gaze or non-gaze is important by itself is unknown. In this regard, Donovan and Leavitt explored skin conductance and heart rate responses to direct gaze and averted gaze. They employed 24 males and 24 females to look at 12 ten-second images of an adult face on a video monitor. Six conditions offered eye contact, the other six conditions made it impossible.

Based on their analysis of the electrodermal and heart rate data which followed presentation of these slides, they concluded that "gaze behavior could not be predicted on the basis of a direct-averted gaze dichotomy." Although this research is limited, it supports the theory that gaze cannot be differentiated from gaze aversion by measures of physiological arousal absent a meaningful purpose to the behavior, as in deception.

Ekman, Paul, and Friesen, Wallace. Nonverbal Leakage and Clues to Deception. Psychiatry, 1969, 32, 88-106.

Ekman, a professor of medical psychology, and Friesen were both research specialists at the Langeley Porter Neuropsychiatric Institute in California when this article was published. Probably two of the more prolific researchers in nonverbal deception, they emphasize in this article how some nonverbal acts should be treated as significant evidence of deceptive performance and false information.

They define alter-deception as concealing information from another; self-deception as concealing information from one's self or ego; deception as lying in progress--but not what the lie is; and leakage as betrayal of that withheld information. Further they indicate that to be successful the liar must either inhibit (cut off communication entirely), or simulate (substitute), other feelings and messages. Most often, the person will do both.

The authors warn that deceptive interactions are distinguishable from other forms of social interaction by: (1) saliency - where the attempt to deceive is an important and conscious concern of the liar and/or the detector (Ekman and Friesen do not regard deception as salient unless the stakes are high); (2) adoption of deceptive and detective roles - a primary deceiver and a primary detector; and (3) collaboration or antagonism - where an implied or explicit agreement exists about the discovery or maintenance of deception. Antagonism refers to a situation where the liar wishes to maintain deception while the detector wishes to discover.

Ekman and Friesen deal primarily with deception through the vehicle of the face, hands/arms, and feet/legs. They discuss the sending capacities of each and the significance of external and internal feedback in the deceiver's attempts to suppress or change his nonverbal behavior. The authors discuss seven affect or emotional displays in the face, and mention briefly how rules governing facial display are based on culture, role, age, sex, etc. They also discuss adaptor behaviors or movements which young people learn "to satisfy self or bodily needs, to perform bodily actions, to manage emotions, to manage or maintain prototypic interpersonal contacts, and to learn instrumental activities." These behaviors appear as fragments in adults and are triggered by something to which they respond in their current environment. Categorized with different names by other researchers, the hand movements are noted as (1) self adaptors - which are behaviors learned to manage needs and are used to block or aid sensory input; aid ingestion and excretion; groom and cleanse the body; aid or block speech; and indulge in autoerotic behavior, (2) alter-adaptors - which are other directed behaviors used to attack or defend; give and take, and establish closeness or effect withdrawal, and (3) object-adaptors - which are movements learned to perform instrumental tasks such as writing or driving.

Based on experiments where films of psychiatric patients were shown to one of two groups of naive observers (with one group viewing the head only, and the other the hands, arms, feet, and legs, only) Ekman and Friesen believe that the hands, arms, feet, and legs will be the best indicators of deception and leakage, and those who view them as opposed to the face will more easily detect deception. They believe that the face, while more closely watched by the detector, is also more closely monitored by

the deceiver, and thus a confusing item to read during deception.

In addition, the authors give three explanations of why a person might not succeed in deception. They are: a conscious desire to be found out; secondary guilty which impedes his ability to conceal; and the deceiver cannot monitor and hide those behaviors about which he normally has little or no internal or external feedback.

Ekman, Paul, and Friesen, Wallace. Hand Movements. The Journal of Communication, 1972, 22, 353-374.

Although this article specifically discusses the hands, Ekman and Friesen subscribe to a comprehensive approach to reading nonverbal behavior. They believe a study of just one type of behavior may provide an incomplete picture because activities may have equivalent or substitute functions. Additionally, they study an individual's behavior when he or she is alone and less inhibited or socially controlled.

When first assessing body movements the authors measured the frequency and duration of a nonverbal act, *i.e.*, a movement within any body area(s) which has visual integrity and is visually distinctive from another act. They classified acts on the basis of origin (how the behavior became part of the person's performance), coding - (how the act and its meaning corresponded), and usage - (the regular and consistent circumstances surrounding the occurrence of a nonverbal act).

Finally they distinguished three types of hand movements:

1) Emblems - a direct verbal translation with a precise meaning known to members of a specific group or culture. They occur without conversation.

2) Illustrators - directly related to voice, phrasing, content, etc. and many support or contradict the message. Illustrators generally increase when there is a communication difficulty on the part of the speaker. Both emblems and illustrators are intentional and in the sender's awareness.

3) Adaptors - movements learned early in life for satisfaction of self or body needs, performance of certain bodily actions, management of emotions, development of interpersonal contacts, and learning of instrumental activities. As in other writings, the authors break the adaptors into self, alter, and object (see "Nonverbal Leakage and Clues to Deception") and maintain that self-adaptors generally increase with psychological discomfort or anxiety.

The authors believe that specific types of self-adaptors are related to specific feelings and attitudes, *i.e.*, picking or squeezing the body equates to self aggression or aggression towards another temporarily direct to the self. Covering the eye with the hand equates to preventing input, avoiding being seen, or shame. Self-adaptors are to include movements where the hand rubs, picks, scratches, grooms, massages, plays, covers, supports, holds, or squeezes another body part.

In pilot studies with student nurses, Ekman and Friesen found that a movement they call the hand shrug emblem, where the hands rotate upward at the wrists as if to indicate helplessness, increased from honest interview situations (mean of 13.1) to deceptive interview situations (mean of 23.5).

They hypothesized that illustrators would decrease in deception. Their study showed that illustrators (as a % of total activity) were 23.9% in the honest interview and 14.7% in the deceptive.

Ekman and Friesen also expected self and object adaptors to increase in the deceptive interview, but this did not happen. However, face play adaptors did increase from .33 in the honest session to 2.6 in the deceptive (a difference statistically significant beyond the .01 level).

The authors further hypothesized that observers who saw only the body would tend to judge subjects with many self-adaptors as deceptive and those with fewer as honest. This was the case.

Although the authors did not discuss it, they point out that their distinction between emblems, illustrators, and adaptors applies to the face and legs, as well.

Ekman, Paul and Friesen, Wallace. Detecting Deception From the Body or Face. Journal of Personality and Social Psychology, 1974, 29, 288-298.

Ekman and Friesen report the testing of two hypotheses concerning nonverbal deception. In their 1969 research they proposed that in deception (where a nonverbal act suggested deception but did not indicate what it was) and in leakage (where a nonverbal act revealed a hidden message) the body, more than the face, was a source of clues.

Student nurses who viewed pleasant and unpleasant films were required to be honest and then deceptive about their feelings in interviews. In being deceptive, they were asked not only to conceal negative feelings, but also to simulate pleasant affect. Videotapes were made of each interview, one showing a close-up view of the entire face, a second showing a head-on view of the body. Then two tasks (A and B) were employed. In both, observers were to judge if a behavior sample was more honest or more deceptive, but in Task B, observers first viewed a sample of non-deceptive behavior before they judged an unidentified sample, while in Task A they had no prior familiarity with a subject's nonverbal behavior.

The first hypothesis, which maintained that people are more likely to control facial behavior than bodily behavior during deception, because they are more aware of facial behavior, was supported by the results found when asking each subject to list what she thought she should do to be a successful deceiver. Of twenty-one subjects, seventeen mentioned facial control.

A second hypothesis, that in judging deceptive behavior, more accurate judgments would be made from the body than from the face, but that in judging honest behavior little difference would exist in accuracy of judgment between the face and the body, was partially supported. In Task B,

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where there was a prior honest sample of behavior, the accuracy of reading the body's deceptive behavior was significantly higher than accurately reading facial deception. Though a similar trend existed in judging honest behavior, it was not significant.

In addition, Ekman and Friesen had more highly trained facial analysts observe the deceptive and nondeceptive samples and found that on the basis of microexpression they could judge the facial behavior accurately in most of the samples. Thus we have tentative proof that trained observers can accurately detect deception from facial behavior while others cannot, an obvious advantage for the interviewer - who is trained in non-verbal communication.

Ekman, Paul, Friesen, Wallace, and Scherer, Klaus. Body Movement and Voice Pitch in Deceptive Interaction. Semiotica, 1976, 16, 23-27.

In this preliminary report of findings, the researchers had wanted to ascertain the relationship between communication channels by (1) examining how body movement and acoustic measures corresponded, and by (2) examining relationships among observer inferred information based on exposure to the body and face in the visual channel and the voice and speech in the auditory channel. They also wished to know what behavioral components in each channel explained the observers' judgments.

Using sixteen student nurses who had seen a pleasant nature film and a realistic film on burns and amputations, the researchers instructed them to respond honestly in an interview about the nature film and deceptively about the other. Hand movement, in the form of illustrators (accompanying speech), shrugs (emblems of hand rotation at the wrist thought to transmit uncertainty or inability), and adaptors (hand contact with some other body part) and pitch (fundamental frequency) were measured. During deception there was a significant decrease in illustrators, a trend for shrug increase, and an increase in pitch. Adaptors did not change.

A separate group of observers judged behavior from (1) the body (no face), (2) the face, (3) content filtered speech, and (4) unaltered speech. With regard to filtered and non-filtered speech there were no differences in rating honest and deceptive behavior. Face observers reacted more positively as the person moved from honesty to deception, judging the subject as more sincere, more sociable, and more relaxed. Body observers, however, became more negative in behavior judgments as they viewed deception. Based on observation of all four channels, there were significant correlations on two aspects of interpersonal behavior, sociability and dominance.

Measuring behavior rather than observer ratings, the researchers found a negative correlation between pitch and illustrators (i.e., as pitch rose, thought to be indicating stress, illustrators decreased).

Finally, in answering how well measurements of behavior accounted for observer judgments in the deceptive interview, the researchers found: (1) illustrators correlated with observers rating the body as sociable, (2) shrugs and short adaptors did not correlate with observers ratings of the body, (3) long adaptors (over 2 seconds) correlated with impressions of awkwardness and tenseness, and (4) low pitch (filtered) was associated

with sociability, relaxation, and calmness. (These results are also noted in a popular magazine article, "Face Muscles Talk Every Language," Psychology Today, September 1975).

Freedman, Norbert; Blass, Thomas; Rifkin, Arthur, and Quitkin, Frederic. Body Movements and the Verbal Encoding of Aggressive Affect. Journal of Personality and Social Psychology, 1973, 26, 72-85.

Although not related directly to nonverbal deception, the article is applicable because of the probable relationship of aggressive affect and deception.

The authors say that all hand movements are either focused on an object, or on the body, and the difference must be observed in context with the social situation. In an interview, object-focused movements of the hands, generally pointing away from the body, are used to punctuate, qualify, or illustrate the speech, while the body-focused behavior, particularly hand to hand motions, is a form of movement which is continuous in nature and split off from speech. The object focused movements appear embedded in focused movements occur with less complex language structure and with a verbal product that is punctuated by silences. These observations suggest that movements during an interview may point to the relative difficulty in articulating and encoding thought into speech. It also appears that when movements are phased in with rhythm and content of speech they facilitate coding, but when there is a lack of congruence, the movements may interfere with the process of verbal representation.

With respect to body focused movements, the hands are often involved in some form of stimulation of the body or its adornments. The movements bear no relationship to rhythm or content of speech, and the movements generally continuous in nature. The exception is with discrete acts of short duration, such as stroking the chin, pulling a skirt, or touching the eye.

In an experiment involving highly structured cold and warm interviews of 24 college females, the authors tested their observations by analyzing the audio and video portions of TV tapes of the interviews, with a complex scoring system.

The authors stated that there appeared to be convincing evidence that object-focused (speech primacy) gestures are part of a context in which overtly hostile thoughts are readily encoded, while hand motions are part of a context in which covertly hostile thoughts predominate. If true, the observation has practical utility to interviewers. However, the limited research suggests that while movement and hostility themes are correlated, they are not redundant sources of information. Rather, gestures appear to be instrumental in paving the way for the encoding of the hostile promptings. Kinetic expressions, say the authors, may help the person to build up to a pitch so that the stirred affect can be articulated, or, the movement may be employed to mollify and soften the impact of hostile strivings if these are felt to be too intense. Their experiment revealed that individuals high in object-focused movements revealed more overt hostility in their verbal associations than did those low in object-focused

movements; and individuals high in body-focused activity (Ekman's self-adaptors) expressed more covert hostility than did those who were low in body-focused movements. The authors noted an envelope of kinetic behavior surrounding hostile phrases; and with covert aggressive expressions the verbal clauses were surrounded by a continuous string of hand motions. The presence of this envelope of kinetic behavior suggests that gestural behaviors are not necessarily expressive of affect but constitute activities preparing for and anticipating the as yet un verbalized expression; or, they may indicate the kinetic mobilization for the repression or suppression of what must remain silent.

The authors made one additional observation about aggression. At moments of intense rage, man is likely to be immobilized, and the most frightening person is not one who gesticulates, but one who is immobile.

Hocking, John. Detecting Deceptive Communication from Verbal, Visual, and Paralinguistic Cues: An Exploratory Experiment. Unpublished doctoral dissertation, Michigan State University, 1976.

Hocking uses an experimental research setting to determine the verbal and nonverbal behaviors used by observers in detecting deception. He was concerned with detecting true or false statements about emotional affect (i.e., the emotional feeling of persons as they viewed stressful slides), with detecting true or false statements about factual content, and with giving observers additional judging categories of information to be read both in isolation and in combination.

Hocking created a condition of high saliency (where deceiving became important) and videotaped sixteen subjects, half of whom made true and false statements about an observed event and the other half of whom made true or false statements about emotionally stressful slides which they had viewed. Viewers saw:

- 1) close-up of head; shot of body; shot of both
- 2) color or black and white tape
- 3) audio and visual or visual only.

With regard to factual events, observers were able to make more accurate judgments of truth and deception in head-only observations than in body only or the combination of both. Visual observation was less accurate than audio-visual, audio-only, or transcript. However, the fact that both audio and transcript were high in accuracy suggests that verbal content or words were the reason, rather than voice cues.

In terms of emotional feelings or affect states, body-only observers were most accurate, with the combination next, and head-only observers last. This replicated the Ekman and Friesen findings (1974). There was no difference between audio-visual and visual observers.

Color observers for the head-only condition had higher accuracy than black-and-white, but the reasons need more exploration. As to confidence level of observers, the audio-visual condition exceeded the visual; the head-only exceeded the combination of head-and-body, with body coming last; transcript and audio-only gave more confidence than visual-only.

Hocking, John E., Miller, Gerald R., and Fontes, Norman E. Videotape in the Courtroom - Witness Deception. Trial, 1978, 14, 51-55.

This article was one of a series in Trial about the advantages and disadvantages of using videotape in the courtroom, for individual depositions, and for taping entire trials for presentation to jurors. The authors reviewed some of the studies on jury decision making (without citing the articles), and concluded that existing evidence indicates that when untrained observers rely on nonverbal information they are unable to distinguish between lying and telling the truth; that there are no firm, replicated findings which justify generalizations about behaviors that are correlated with deception; and that the only study which compared the accuracy in detecting lies from those who watched videotape and those who watched live presentations, found no significant differences. The authors speculate that lying behavior is highly idiosyncratic; and that the visual element of witness testimony probably contributes much less to a juror's ability to detect deception than is generally believed. The authors believe that it is the content of what the witness says that determines what the juror thinks, and that videotape does not affect the comprehension of content adversely. Indeed, the authors state that the juror, not knowing the witness, should not be basing important decisions on subtle nonverbal cues, the meanings of which are, they say, "unclear even to 'experts' on nonverbal behavior."

Holmes, Raymond E. Pre-Polygraph Interviewing. Paper presented at the Annual Seminar of the International Society for the Detection of Deception, Chicago, 1952. 14pp.

In one of the better papers to come out of the polygraph field, Holmes presents a detailed analysis of the kinds of responses that may be observed, in groupings that are physiologically related. He notes that posture and movement may reflect organic as well as emotional factors. He is also practical in his advice.

Finally, it is to be noted that the significance of behavior is not inferred from any single aspect (such as quality of movement) taken separately but from the total pattern of activity exhibited by the organism, including verbal content, voice characteristics, posture, movement, overt signs of physiological change, and so on. It is important also to note changes in the pattern with time. Such changes provide cues regarding the shifts in emotional state and flow of ideas experienced by the subject. While often there is a direct correlation between what is being expressed in verbal content, voice characteristics and movement, occasionally the relationship is inverse, that is, feelings which the subject inhibits at the verbal level find expression in bodily activity.

Holmes' paper gives the reader an extensive list of areas of the body and groups of behavior patterns to look for. Unlike other papers, the author does not tie behavior to deception, per se. Instead, he was discussing anxiety, emotional expression, and responses, in terms that polygraph examiners would understand in relation to the psychological test that they administer. The paper has excellent detail in describing what is to be observed and noted. For example, in voice, Holmes lists

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intensity, pitch, timing (including rate, rhythm, and pauses in inflection); mentions the culture and class characteristics, organs emphasized such as lips, throat, tongue; and in the quality of the voice lists precision, slurring, infantile, and effeminate characteristics. Under speech disturbances he mentions slips of the tongue, blocks and mispronunciations, omissions, and discontinuities in thought. Some of his groupings are interesting and unusual. For example, he sees gestures in regard to locus; as peripheral, medial, central or integrated. In terms of direction, he groups them by vertical plane, transverse plane, and lateral plane. The author is quite aware that, in contrast to other body areas, the face is often controlled, and any difference between what the person's face discloses and what the rest of the body is revealing, is worth noting.

Holmes, Warren D. Manifestations of Guilt. Paper presented to the Keeler Polygraph Institute Alumni Association Third Annual Seminar, Chicago, Illinois, June 1966.

Most of the paper is about the psychology of lying. There are only two brief items on nonverbal behavior. When discussing liars who practice dissociation, Holmes states the suspect will have "a distant look in his eye and a vacant expression." The suspect will appear to be preoccupied and will lack a desire to enter into the spirit of the conversation. He becomes animated only when discussing something other than the crime. He may be sullen, staring into space for long periods of time. Holmes said that those liars who project their hostility toward the examiner, police, and others will pretend to be incensed, but become quite docile after confessing.

Horvath, Frank S. Verbal and Nonverbal Clues to Truth and Deception During Polygraph Examinations. Journal of Police Science and Administration, 1973, 1, 138-152.

The author studied clues to truth and deception in one hundred verified polygraph examinations to determine whether or not the behavior of truthful subjects differed from that of lying subjects. Fifty of the subjects were truthful, and fifty were deceptive. All were verified cases and no inconclusive polygraph cases were included.

In his study of elicited responses obtained from each of several structured questions which were routinely asked during each pretest interview, Horvath found that the expected responses of liars and truth-tellers were fulfilled in these real cases at about chance levels. Of the 510 questions asked of truthful subjects during the structured pretest set of questions, 394 (77%) of the responses were as expected, where chance was 50%. The discrimination was not as high among the deceptive. Among them, the expected reply as received from 30% (66%). The pretest interview in these polygraph examinations, which were conducted at the offices of John E. Reid & Associates, was highly structured, and part of the pretest interview also involved recording nonverbal indicators during the period when the elicited questions were being reviewed. However, the nonverbal clues involve general subjective judgments, made and recorded by the examiner. The notes were in conformity with the earlier research of Reid and Arther (1953) in which there are nine categories of nonverbal clues to

be recorded. Such notations were found in 96 of the 100 cases selected for Horvath's study. For the typical liar, nonverbal clue descriptors were "liar's appearance," "untalkative," "poor eye contact," "evasive answers," "nervous bodily movements," "nervous facial movements," "scared," "over friendly," and "uncooperative". The results of Horvath's study tend to support the thesis of Reid and Arther. The results are in the table below:

Subject Category	Typical Truth-teller	Typical Liar
Truthful subjects n = 47	94% n = 44	6% n = 3
Lying subjects n = 49	18% n = 9	82% n = 40

Horvath concluded that "behavioral data can be a source of useful information in the ultimate diagnosis of truth and deception. This conclusion does not mean, however, that behavioral data are substantial enough to replace the interpretation of polygraph recordings."

James, Earl W. Nonverbal Cues in Polygraph Pre-Test Interviews. Unpublished Manuscript. Lansing, revised 1979, 11pp.

Earl James, former chief examiner for the Michigan State Police, reports a study of 100 polygraph cases with fifty verified deceptive and fifty verified truthful. Four police examiners, trained to observe behavior at the National Training Center of Polygraph Science, conducted the exams and marked nonverbal behavioral cues on pre-test interview sheets.

In evaluation of subjects later verified as truthful, examiners were correct 80% of the time, incorrect 10% of the time, and undecided 10% of the time. For subjects verified as deceptive, examiners were correct 63% of the time, incorrect 24% of the time, and undecided 8%. Based on his study, James concluded that examiners are more apt to be correct in their evaluations of the truthful, that examiners appear to have a tendency to note behavior they believe to be deceptive more often than they note behavior believed to be nondeceptive, and that the following behaviors are indicative of deception in the polygraph pre-test interview:

- 1) Dry mouth - recorded 14 times more in deception than in nondeception.
- 2) Slow in agreeing to take examination - over 5 times more in deception.
- 3) Hesitation in question response - 5 times more in deception.
- 4) Vague discussion of the issue - 10 times more in deception.
- 5) Poor eye contact - 5 times more in deception.
- 6) Hand to head - 12 times more in deception.
- 7) Frequent interruption of examiner - 6 times more in deception.
- 8) Look at watch - 6 times more in deception.
- 9) Groom or adjust clothing - 8 times more in deception.
- 10) Crossed arms - 3 times more in deception.
- 11) Crossed legs - 2 times more in deception.
- 12) Feet under chair - 3 times more in deception.
- 13) Tapping fingers - 2 times more in deception.

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The author also noted that relaxed behavior, leaning forward in the polygraph chair, and fair eye contact were displayed equally by deceptive and nondeceptive.

James warned that the deceptive cues must be interpreted in clusters rather than alone, and must be read in the context of the event, of the time of occurrence in the pre-test, and of the verbal discussion. James also pointed out that if deceptive cues appear only in response to control questions, they are a strong indicator of truth.

The author went on to discuss some indicators of nondeceptiveness, mentioned the studies of Reid and Arther, and Horvath (see their articles reviewed here), warned that behavioral cues ought not be weighted equally by an evaluator, and suggested that further research should produce a nonverbal behavior evaluation sheet to be incorporated into or used in conjunction with the pretest interview forms.

James' article is one of the best in the law enforcement area on nonverbal deception.

Kay, Forest E. Detecting Deception During the Criminal Interview. Police Chief, May 1979, 56-57.

This is a review of previously published material, with emphasis on the works of Ekman and Friesen, to which the author has added quotations from others in the field to produce a synthesis that is useful to the reader who is totally unfamiliar with deception in nonverbal communication. There is no new material. An opening attack on the polygraph technique as a means of detecting deception is stated without support, and is out of place in the article.

Kraut, Robert E. Verbal and Nonverbal Cues in the Perception of Lying. Journal of Personality and Social Psychology, 1978, 36, 380-391.

Kraut conducted two studies. In the first, five male actors lied or told the truth in simulated job interviews. Forty-one observers were moderately accurate in judging truth telling. When the subjects were truthful they gave longer, more plausible answers and employed shorter hesitations before those answers. Observers used plausibility and shorter hesitation as accurate judgment factors. In addition, they used concreteness and consistency of answers, and nonverbal behavior where the actor smiled less, shifted posture less, and groomed himself more, as judgment factors; their use appeared unrelated to the actual truth of the answer and therefore did not increase accuracy. Plausibility was the single best predictor of an answer's truth and an observer's judgment of its truth. Finally, actors were consistently successful or unsuccessful as liars across various observers.

In the second study, content and nonverbal style were experimentally manipulated to test observer belief and disbelief under two conditions: 1) the ulterior motive role (*i.e.*, making a self-serving statement) and 2) uncontrollable nonverbal cues (*i.e.*, a nonfluency, in this case a long hesitation prior to answering a question). A female job applicant was viewed as lying when her responses were self-serving. The long hesitation

acted as an amplifier for verbal content, that is, observers became more suspicious of a prior self-serving answer and more accepting of a prior forthright one.

In the final discussion, Kraut commented that it is important to read nonverbal behavior in context. He suggested that cues can be thought of as either performance (i.e., when a subject fails to control a behavior as in Ekman and Friesen's leakage and deceptive cues) or as motivational (i.e., situations or contexts where deception is likely). He clarified motivational cues as originating in social norms which provide the standard against which the person's particular performance is judged (e.g., police-citizen encounters or presidential debates).

Kuhlman, Merlin S. Nonverbal Communications in Interrogations. FBI Law Enforcement Bulletin, 49(11), 6-9.

The author, a Special Agent in the U.S. Army Criminal Investigation Command, argued that nonverbal communication can be more truthful, meaningful, and expressive than spoken communication. He suggested that the interrogator obtains feedback from facial expressions, but noted that facial expressions can change instantly, sometimes even at a rate imperceptible to the human eye. He also noted that facial tics may be indicative of lying. The face is particularly useful in reading general emotions of shock, surprise, sorrow, and even sincerity. Eye contact, or the lack of it, may indicate the degree of sincerity. The direct and observable physical manifestations of lying, stated Kuhlman, include perspiration flow, flushing or paleness of the skin, of the mouth made apparent by licking of the lips or blurred speech, stuttering, darting eye movements, and rigidity of the body.

The hands, he observed, play with each other, or the fists are clenched. One may also observe a cold clammy sweat in the palms of the hands. Other indicators include the use of the hands in picking fingernails or scratching. All of these were seen as possible indications of lying.

However, the author warned against misreading these nonverbal signs in the case of those suspects who are mentally disturbed. He warned of false confessions from those who may say what they think the investigator wants to hear. The disturbed may exhibit negative and withdrawn behavior, unusual twitches and unnatural poses, show fixed eye focus or staring, exhibit rapidly changing moods, speak without inflection, and appear to have poor organizing in their thought processes. These, Kuhlman felt, were not related to truth or lying.

The author reminded the interrogator that the suspect is reading the interrogator's behavior. He warned against nonverbal signs of agreement which may encourage the suspect to cling to his false statement, delaying or preventing a confession. Equally dangerous are continuing signs of disbelief at everything the suspect says. The nonverbal communication of the interrogation must be deliberate and controlled, and used with the verbal statements to get the confession.

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Landis, Carney. Studies of Emotional Reactions. II. General Behavior and Facial Expression. Journal of Comparative Psychology, 1924, 4, 447-509.

The author conducted 16 experiments on each of 25 subjects to determine the characteristics of facial responses to a variety of situations. The stimuli varied from popular music to cutting off the head of a live rat. The total time spent with each subject was about three hours. Landis' purpose was to describe, analyze, and classify the general behavior of normal individuals, with especial reference to facial and head reactions, verbal reactions, and sex differences during a controlled series of situations designed to arouse emotional response. His subjects were 12 women, 12 men, and one boy. Facial and head reactions were photographed. Lines were made on the faces with burnt cork that corresponded with selected muscles, and facilitated analysis of the photographs.

Objective analysis of the following responses were attempted:

1. head movements
2. frontalis (wrinkled brow, transverse)
3. corrugators (wrinkles between the eyebrows)
4. upper orbicular oculis (wrinkles over the upper eyelid)
5. lower orbicular oculis (wrinkles beneath and at the side of each eye)
6. nasalis (flaring of the nostrils)
7. quadratus labii superioris, caput angulare (raises corners of the mouth to a "scornful curl")
8. zygomaticus (raises corners of mouth upward and outward for a smile)
9. risorius (draws corners of mouth directly back for a broad grin)
10. lips open
11. lips pursed or compressed (involves risorius or mentalis muscles)
12. mentalis (with quadratus labii inferior gives contraction or wrinkling of chin, and usually a protruding lower lip)
13. triangularis (depresses or drags down corners of the mouth, negates the zygomatic and quadrates)
14. eye closed (closure or partial closure)
15. eyes wide (wide opening due to contraction of the pars palpebralis m. orbicular oculi, an "expressive" reaction)
16. eyes up (rolling upward of the eyeball, an "expressive" reaction)
17. biting lower lip or biting lips
18. chin back (chin rests on larynx)

Subjective notes were made on the following:

1. tension
2. relaxation
3. absence or degree of smile, grin or laughter
4. expressiveness

For the first eighteen responses, Landis analyzed the magnitude of a response on a scale of 0 to 3, in which 0 = absent, 1 = slight, 2 = moderate, and 3 = full or extreme. Frequency of responses was expressed in percentages.

In addition to the photographs, there were the subjective notes of the experimenter, and notes on the verbal response, if any. There were also physiological recordings made during the testing, involving discontinuous measurement of systolic and diastolic blood pressure and continuous measurement of respiration, the latter analyzed with Burt's inspiration-expiration ratio method.

Truth and Falsehood

The fourth in the sequence of sixteen experiments involved truth and falsehood. The experiment was conducted as follows:

The method here used was practically the same as that used by Burt ('21b) in his Series III of his study of inspiration-expiration ratios. Briefly this consisted of presenting the subject with two sheets of paper, face down, marked respectively T and L. The following instructions were then read to the subject. "Here are two papers, one marked T, the other L. Choose either the T or the L and then place the paper you did not choose to one side. If you choose L you will find points of circumstantial evidence attaching you to some crime. You are to invent a lie which will clear you to these charges on a cross-examination which I will make. If you choose T you will find an alibi provided for this crime. All you have to do is familiarize yourself with the story and tell the truth on examination. Try to deceive me on the L and to tell the truth in an unexcited way on the T. We shall do this twice. The second time choose to do the opposite thing from what you did the first time. I will leave the room for five minutes while you make up your lie or familiarize yourself with the alibi." On cross-examination which was made from questions previously prepared, the experimenter stated his questions in a slow, clear, matter-of-fact way, pausing between each question so that the blood pressure and the inspiration-expiration ratios might be obtained.

Landis said that unlike other experiments, this one produced very little useful data. Three items were identified as possibly significant, and all related to telling the truth. The head position was back in 20%, the eyes were up in 13%, and there was a lack of upper and lower orbicularis. With respect to the head position, Landis cautioned that the movement could have been related to the fact that it was necessary for the subject to tilt his head back in order to look the experimenter in the face. He noted that the head back also happened during 6 of 37 falsehoods (16%). In future research, Landis suggested that the subject should be required to lie about something more real, and be subjected to a more searching cross-examination.

Nonetheless, Landis made some general observations worthy of note. Using an objective ranking of expressiveness, including head movements, the lie situation was sixth in rank of expressiveness (in terms of relative stimulation value of each of the situations), while the truth telling was 14th. In a total weighted score of expressiveness, falsehood outranked truth telling by 38%.

Of over 900 photographs taken during the experiments, only 3 pictures showed asymmetrical expressions, and all three were from a subject who had

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an extensive scar near one corner of his mouth. In regard to sex differences, men showed more expressive reactions than did the women. However, there was no sex difference in the variety of facial expressions; no facial pattern or reaction which was predominantly masculine or feminine; and no expression or group of expressions which typified any situation in the experiment. What did appear, was that some individuals habitually used certain muscle groups, and almost never used other groups; suggesting individual mannerisms or habitual reactions.

Link, Frederick C. Behavior Analysis in Interrogations. Military Police Law Enforcement Journal, Winter 1976-1977, 3, 16-19.

The author put meaningful behavior in three classes: spontaneous verbal statements, prompted verbal responses, and nonverbal behavior or body language. The nonverbal behavior was reported to be expressed through overall body positions and gestures made as the result of stress and other factors. Photographs illustrated five typical poses, accompanied by a column in which a general meaning was given for each of five body positions. When gestures were made by the suspects in response to specific questions or discussion of a sensitive area, they were reported to be indicative of deception or unwillingness to cooperate. Behavior was said to be significant when it appeared as responses, such as breaking eye contact, covering the mouth to impede speech, scratching the head, drumming fingers or tapping the feet, swinging legs, crossing and uncrossing the legs, and crossing the arms over the abdomen. The author noted that this was only a short list of a very large number of such gestures.

In voice, changes in speed of speech, changes in voice pitch, and hesitant or unnaturally quick answers were reported as significant. General behavior of untruthful persons included excessive respect, requests to hurry the interview; and complaints about room temperature, being interviewed, and the waste of time.

The author cautioned that just as one swallow does not make a summer, neither does a single verbal response or gesture clearly indicate a state of mind. It is the clusters of behavior that have meaning, and are useful in guiding the interrogation.

Maier, Richard A., and Lavrakas, Paul J. Lying Behavior and Evaluation of Lies. Perceptual and Motor Skills, 1976, 42, 575-581.

During the course of five studies undertaken by these authors to ascertain attitudes toward lying, they found some unrelated but interesting results:

- a. The GSR did not consistently differentiate between honest and dishonest role players.
- b. Persons generally could identify correctly honesty from dishonesty in a tape recording, and females showed marginal superiority over males in their guessing.
- c. Where groups were compared with individuals in judging honesty in role playing, groups were harsher judges.

The value of this article lies in its reference to the tape recording, because it alerts the interrogator to the importance of voice.

Marcy, Lynn P. Clinical Behavior Observations. Unpublished manuscript, April 1979. 18pp.

Marcy gave detailed rules on what to look for, and exactly how to interpret the meaning of over a hundred different forms of behavior. He gave very precise descriptions of the physical gestures, particularly those which are indicative of deception. The author also listed behavior symptoms which he stated to be indicative of truthfulness.

Marcy noted that less than one percent of the subjects attempt to control their gestures during the pretest interview. Marcy cautioned that an opinion based on the summary of observations made during the pretest interview is tentative, may be wrong, but is part of the diagnostic process. He noted that the final evaluation must be supported by the polygraph charts. Because the pretest interview of a polygraph test is highly structured, Marcy suggested that behavior be evaluated in connection with each specific event during the pretest.

Physiologically, Marcy divided the gestures into those of the head (eyebrows, eyes, mouth, face), elbows, hands, feet, and the whole body position and its movements.

Marcy also listed vocal gestures, which include delays, loss of memory, mental blocks, excessive use of words and phrases claiming innocence, and changes in rate of speech.

There is also a long list of items to watch for at the time of arrival, what the subject does while alone in the polygraph room, and what interpretation to give to interruptions, complaints, excuses, the use of certain kinds of common phrases, and even yawning. The author was precise about the meaning that is to be given to each form of behavior.

Unfortunately, there is not any mention of the research or experience from which this wealth of material is drawn. As with the published works of other practitioners, the reader is left to presume that this is the tabulated wisdom collected by the author and his associates from their years of experience.

McClintock, Charles, and Hunt, Ray. Nonverbal Indicators of Affect and Deception in an Interview Setting. Journal of Applied Social Psychology, 1975, 5, 54-67.

The basic idea presented here is that a small number of relatively gross nonverbal behaviors may discriminate among general emotional states and deceptive behavior.

Eye contact, for example, functions as an intensifier of affect. However, while the common belief has been that averted eyes signal lying behavior, this does not seem to be the case in intentional, spontaneous deception.

The authors believe the smile increases in interviews which necessitate unpleasant involvement.

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While descriptive gestures (Ekman and Friesen's illustrator category) normally show pleasant involvement and subject familiarity, self-manipulative gestures (Ekman and Friesen's self-adaptors) show discomfort, tension, and unpleasant affect. They appear to increase during unpleasant involvement and deception questions.

Finally, McClintock and Hunt noted that a distinctive feature of deception is seemingly calm facial affect with active hands, arms, feet and legs.

It is interesting to note that this information offers support for much of the direct observation done in interview settings.

Mullenix, Philip A., and Reid, John E. The Pretest Interview and Its Role in the Detection of Deception. Polygraph, 1980, 9, 74-85.

In writing about the highly structured pretest interview employed in the Reid Control Question Test, the authors described behavior provoking questions which elicit verbal and behavioral response patterns characteristic of the subject's guilt or innocence. The authors said that purposeful deception creates exceptional internal anxiety while truthful answers do not produce this anxiety. They have observed in their extensive polygraph practice that truthful answers are usually quickly offered and unaccompanied by uncertain or anxious gestures of the body. To the direct inquiry, "Did you do it?" the innocent subject will give an immediate, unequivocal denial, accompanied by an alert posture and direct eye contact. However, the untruthful will give a weak denial or one with qualifications; accompanied by a shifting in his chair, crossing of his legs, or a seeking of something to manipulate with his hands. He will often divert his eyes at the moment of his answer.

The authors described the typical verbal and physical responses of innocent and guilty subjects to each of their standard behavior provoking questions, but warned the examiner to be alert for exceptions, particularly with meek or forgiving persons.

On the topic of note taking, they suggested a blend of notes on the verbal and behavioral responses, avoiding so much detail that it will interfere with the examiner's ability to visually observe the behavior symptoms that are characteristic of the subject's internal anxieties. The authors warned that in the absence of clusters of behavior symptoms, observations are of no diagnostic significance.

Nichols, K.A., and Champness, B.G. Eye Gaze and the GSR. Journal of Experimental Social Psychology, 1971, 7, 623-626.

The researchers hypothesized that the frequency and amplitude of the galvanic skin response tracings shown by a subject gazing at another's eyes (EC = eye contact) would be greater than in periods of unreciprocated gaze (UG).

They viewed EC as a complex stimulus and identified three separate subdivisions: 1) making eye contact, 2) holding eye contact for a

"normal" length of time (i.e., less than a stare), and 3) holding eye contact beyond this point.

The findings validated the hypothesis in that EC as a complex stimulus did produce significantly greater frequency and amplitude in the GSR.

Nizer, Louis. How to Tell a Liar. In Reflections Without Mirrors: An Autobiography of the Mind. Garden City: Doubleday and Co., 1978.

Nizer gave a brief discussion and listing of his psychological insights into the lying of witnesses. He suggested the following:

1) Where the subject's hand covers the mouth on a given topic, it may be an innocent gesture. However, if the subject changes the topic, then returns to it, and the gesture reappears, Nizer assume a vulnerability.

2) He considered scissor legs shift in the seated position, during discussion of a given topic, to be a nervous gesture which should be watched.

3) Eyes may reflect fear or confusion, but Nizer mistrusts the emphatic assertion made with doubtful eyes.

4) When persons testify in a certain vocal range and then increase decibels in undue emphasis, he considered this a signal of a possible lie.

5) Instant amnesia, (e.g., answering readily and then responding to one question with eyes to the heavens and then to his lawyer and finally saying "I don't remember," Nizer considered to be lying.

6) He considered quarrelsomeness, where the witness claims tricks or harrassment by the cross-examiner as deceit. Nizer suggested the lawyer will protest if this is the case.

7) Negative statements or partial denials which appear to be complete and later are clarified, he considered to be signs of deceit.

8) Nizer believed that if the witness admits a faulty memory on a date or whatever, that this is all right. However, if the witness says he didn't mean what he said or that it was misinterpreted, than a dishonesty is revealed.

9) Did he look and sound truthful? Was he sincere?

10) Nizer also used a rule of probability - that is, if testimony does not accord with common experience it is probably false. However, he warned that if the witness is unstable, the bizarre becomes normal.

While Nizer mentioned all these verbal and nonverbal cues, he also reminded his reader that, "Cross-examination is still the best scapel to excise the truth from the brain."

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North, Richard L. Observations of Persons to be Examined Prior to Testing. Michigan State Police Inter-Office Correspondence, January 4, 1968. 5pp.

This is a list of observations of the behavior of criminal suspects who were sitting in the polygraph examination room prior to the examiner entering the room. They were allowed to sit for several minutes and were observed through a mirror. The paper reported on the observation of 48 suspects, of which 23 were reported as deceptive on the polygraph test. Of the 23, 12 (52%) confessed. There were 21 who were reported nondeceptive, two reported inconclusive, one who refused the test after entering the room, and one who confessed before the test. The categories were consistent in terminology for those forms of behavior that were tabulated regularly. There are some items that appeared only a few times, or just once. Although the paper did not tabulate the results, we have done so in the following tables:

TABLE I

Behaviors Observed - Frequency

	Deceptive	Truthful	Others
Looked at instrument	17	17	2
Concerned, or thinking	10	1	
Showed no concern, relaxed	0	14	1
Looked around the room	3	10	
Combed hair or primped	3	6	
Appeared very nervous	1	1	
Yawned	2	1	
Crossed legs	8	4	
Folded arms	5	0	
Tapped hands or fingers	3	2	
Drummed feet	1	0	
Picked lint	1	1	
Dry mouth (licked lips)	2	0	
Looked at floor	4	4	
Looked at ceiling	4	0	
Looked behind door	1	0	
Looked in corner of room	1	1	
Looked on top of lamp	1	0	
Felt heart (chest)	1	2	
Talked to self	1	0	
Chewed fingernails	2	0	
Pulled up socks	1	0	
Looked at hands	1	0	
Whistled	0	1	
Smiled	0	1	
Shook head (negative)	1	0	
Read material	0	2	

One of the unique aspects of this study is that the nonverbal behavior is not in the presence of another person, but alone, in the anticipation of a polygraph examination about a criminal offense. While some anxiety is always present before every polygraph examination, the issue here was whether or not the behavior of those suspects who planned to be

deceptive was in any way different from those who were going to be truthful.

The author made only some general comments about behavior; comments which do not appear to be entirely related to the study, and may be in part related to what takes place during the examination rather than limited to the period when the suspect is alone before the test. The author stated that fist makers, and those with their arms and legs crossed only once indicate defiance. He stated that those who engage in blessings, excessive talkers, heart feelers, hand cleaners, nail biters, and those who cross their legs a number of times are included to confess at about the rate of 75%. He noted that those who bite their nails will confess at the rate of 80% to 95%; and so will those who feel their heart and engage in prayers. However, arson suspects do not confess at that high rate, but do so more often when their behavior includes feeling the heart.

The table suggests that those who show great concern or appear to be in deep thought before the examination are acting in a manner that is significantly indicative of planned deception. Those who looked around the room and showed no concern, or were relaxed, were engaging in behavior which was significant in its relation to truthful polygraph results. Looking at the polygraph was common to both groups. The other forms of behavior were not reported in sufficient frequency to determine their significance. More observation of this kind might demonstrate the value of the other forms of behavior.

Reid, John E., and Arther, Richard O. Behavior Symptoms of Lie Detector Subjects. Journal of Criminal Law, Criminology and Police Science, 1953, 44, 104-108.

Reporting on the behavior of suspects in criminal cases of which 486 were subsequently verified as guilty (by confession) and 323 were verified as innocent (by the confession of others), the authors found that the behavior symptoms of the guilty and the innocent were found to differ widely in some responses. They cautioned that no specific behavior, even though highly typical, should be considered proof of guilt or innocence.

Behavior symptoms of the guilty included the following: None of the 486 suspects personally requested the polygraph test. Guilty subjects often postponed tests, and were often late for their appointments or did not show up on the date of the original appointment. In the examining room they were worried and highly nervous, manifested by acting aggressive, having a bitter attitude, appearing to be in a shocked condition, experiencing mental blocks, being evasive, having an extremely dry mouth, and moving about. They emphasized their nervousness or mentioned a physical defect which they did not have, and claimed they were religious.

During and after testing, they asked after the first chart how it came out, they complained of pain from the instrument, and about 20% attempted to distort the polygraph charts by movement. They would say the test was taking too long, and some would claim they had another appointment. They left as soon as possible.

Behavior symptoms of the innocent included the following: They often requested the examination, they mentioned their nervousness but did not do

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so again after assurance that it made no difference, and they were straightforward in discussing the case. They were completely cooperative, and not one of the 323 verified innocent subjects attempted to distort the test. Innocent subjects were sincere, and polite, but unlike some of the guilty, they were not too friendly, or solicitious.

Some behavior symptoms were not significant in separating the guilty and innocent, and appeared frequently among both groups. Anger occurred with members of both groups, although the innocent tended to relax while the guilty became argumentative and abusive. Impertinence, which appears more often among the teenage suspects, was common to both groups. Being quiet during the interview was not significant, and neither was an interest in the polygraph instrument. Half humorous comments were made by both guilty and innocent.

In the nonverbal field, the guilty revealed themselves primarily in aggressive and nervous activity, excessive movement, avoiding eye contact, dry mouth, continual signing or yawning, mental blocks, and deliberate attempts to distort the charts. Innocent nonverbal behavior was significant only in the absence of the deceptive behavior. There were no nonverbal positive indicators of truth.

The authors advised that these observations should be used to guide the interview and application of the test procedures, and not for the purpose of determining truth or deception.

Romatowski, Chester S. Nonverbal Communication Behavior (Gestures). Department of State Police, Michigan, 1979.

Lieutenant Romatowski provided a brief, insightful outline regarding nonverbal behavior likely to be seen in untruthful persons in the polygraph pre-test. He pointed out that gestures are the external response to the internal emotional change and as such are the result of a stimulus. They should serve as an aid, but not a substitute for interrogative skill, both because gestures may vary with the person displaying them and also because one views others from his own psychological set.

Romatowski commented that while truth-tellers are generally direct, deceptive persons tend to be evasive. He suggested four basic areas for making judgments: 1) first impression, 2) behavioral feedback to Miranda, 3) behavioral feedback on background data, and 4) feedback on completion of the permission form.

After a few notes on the history of nonverbal behaviors, the writer treated physical areas as follows: head (eyebrows, eyes, mouth, and lips), face flush, elbows, hands, feet, and a few miscellaneous items. He also mentioned vocal gestures (i.e., repeats and rephrasings, inability to recall, hesitations, and rate and volume changes). Also noted are phrases such as, "Honestly," "Truthfully," "I swear to God," and others of that nature.

As a wrap-up, Romatowski listed seven signs of a probable liar, including refusing the exam, becoming ill on the exam day, contacting an attorney before being accused, and implying no loss has occurred when he or

she has knowledge of one. Romatowski concluded by stating that the more pressure there is, the more likely the person will be to respond by gesture.

Rosenthal, Robert, and DePaulo, Bella. Sex Differences in Eavesdropping on Nonverbal Cues. Journal of Personality and Social Psychology, 1979, 37, 273-285.

Rosenthal and DePaulo, in three separate studies, investigated the hypothesis that women are more interpersonally accommodating than men. They based their work on the theory that women are superior to men in the decoding of nonverbal cues.

Study one hypothesized that women's advantage over men in accurately decoding visual cues would be smaller for cues of very brief exposure as compared to cues of longer duration. Comparing the results of a 1978 study of ordinary speech cues, the researchers found that women's decoding advantage decreased from 41% to 7%.

Study two utilized five measures of nonverbal cue sensitivity ranging from face (least leakage/most easily controlled), through body, tone, and brief exposures, to discrepancies (discrepant voice tone paired with face or body movements - most leakage/least easily controlled). Results indicated that as channels became more leaky and less easily controlled, men were increasingly more accurate than women in decoding nonverbal cues. Further sections of study two showed a trend for women who were more skilled at eavesdropping (i.e., interpreting accurately the less controlled cues) to be perceived as having less successful social outcomes. Also, women were more biased to read visual cues than voice tone. It appeared that as women matured they focused more on the "good" in nonverbal cues, attended more to the controlled cues, and avoided using their greater skill at decoding the less controllable nonverbal cues.

In study three, videotapes of persons describing persons they: 1) liked, 2) disliked, 3) were ambivalent toward, 4) were indifferent about, 5) liked-as though they disliked & 6) disliked as though they liked, were shown to 20 male and 20 female decoders. They were to read liking, disliking, ambivalence, discrepancy, tension, and deception. Females consistently rated all tapes as significantly less tense, significantly less ambivalent, and significantly less discrepant. With regard to liking and disliking, women were significantly more accurate than men. However, women were also likely to interpret deceptive encodings as the deceiver wanted them interpreted (i.e., dislike-when video showed the person describing like as dislike and like-when video showed the person describing dislike as like).

Rosenthal and DePaulo generalize from their findings that women often politely read what they are supposed to, rather than what is true. In addition, the researchers find women more open in sending nonverbal cues. Thus, for both reasons, women tend to be more interpersonally accommodating.

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Shekel, Yair, and Cohen, Akiva. Detection of Deception by Facial Cues During Polygraph Interrogation: A Pilot Study. In Israel Nachshon [ed.] Scientific Interrogation in Criminal Investigation. Selected Papers - First National Conference on the Scientific Interrogation in the Criminal Investigation. Bar Ilan University, Ramat-Gan, Israel, November 1976.

A pilot study aimed at determining the usefulness of employing facial cues as an added parameter in the polygraph interrogation was conducted. Two groups of judges were used: Professional polygraph personnel and graduate students in a seminar on nonverbal communication. Their task was to watch videotaped segments of facial responses given under actual interrogations conducted at the Israel Police Polygraph Laboratory and to ascertain whether or not the suspects were lying. Two types of tasks were used: real interrogations concerning suspected criminal involvement and a card test. The judges in both groups indicated their responses on five point scales, ranging from "definitely lying" through "impossible to tell" to "definitely truthful".

In the real interrogation task, the polygraph personnel obtained correct responses, as compared with the independent assessment of the interrogator, on 27.3% of the cases (chance level: 20%; $p < .10$), whereas the students gave only 21.1% correct responses, a result not significantly better than chance. In the card test, where the chance level was 14.3% (seven cards used), the polygraph personnel obtained correct judgments in 41.1% of the trials ($p < .01$), whereas the students' success rate was only 11.1%.

Despite the small sample of judges and suspected criminals, it seems that the polygraph personnel managed to make better-than-chance judgments. In addition to needed replications, research should be conducted to determine why the polygraph personnel succeeded, and whether or not the use of this procedure in polygraph interrogation is feasible.

Streeter, Lynn A.; Krauss, Robert M.; Geller, Valerie; Olson, Christopher; and Apple, William. Pitch Changes During Attempted Deception. Journal of Personality and Social Psychology, 1977, 35, 345-350.

The researchers conducted two studies on speech samples from thirty-two male college students.

The first experiment utilized an interview situation where interviewees were asked five questions on four topic areas (values, politics, religion, and personal future). The interviewees were instructed to be deceptive on two topics and these were counter-balanced across interview dyads. Half the interviews were conducted face-to-face, the other half via intercom. A second manipulated variable, arousal versus non-arousal, was used. Half the interviewees were told that the ability to deceive was a general social skill highly correlated with intelligence. Results showed the fundamental voice frequency to be significantly higher for lies over truth and greater for aroused subjects than non-aroused. Despite this finding, which supports previous research, the authors note that while listeners cite gaze aversion, nervousness, and facial shielding as cues to deception, they do not mention pitch.

A second study created a condition where subjects heard a sixty-four segment audiotape from the first experiment. One form was regular speech; a second form content filtered (*i.e.*, unintelligible speech, but distinguishable paralinguistic clues such as loudness, intonation, tempo, length and pitch). In content filtered speech the judges' ratings were negatively correlated with fundamental frequency (*i.e.*, as pitch rose, truthfulness decreased). In the unfiltered speech there was no correlation between frequency and truth. Judges more accurately detected truth from falsehood in intercom samples of unfiltered speech than in content filtered speech. However, the opposite was true for face-to-face, that is the judges more easily distinguished truth and falsehood in content filtered speech. Finally, aroused interviewees were more detectable for truth versus deception in the intercom interview while those unaroused were more detectable in face-to-face.

The authors warn that the results should not be overgeneralized in terms of their practical implications, commenting that pitch may vary as a function of the experimental condition and therefore be subject to similar problems encountered in psychophysiological based methods.

Van de Creek, Leon, and Watkins, John T. Responses to Incongruent Verbal and Nonverbal Emotional Cues. The Journal of Communication, 1972, 22, 311-316.

The authors state that although nonverbal behavior is believed to be a richer source of information than verbal, they have found that responders are more influenced by one or the other behavior based on their own personal preference.

When responders are presented with conflicting verbal and nonverbal cues about the degree of stress a person is experiencing, the responders may differ reliably in their assessment of that stress.

The authors thus identify three types of responders. Nonverbal responders react primarily to stress in the nonverbal mode, but are also sensitive to it in the verbal. Verbal responders generally respond only to verbal cues. A third group is sensitive only to stress cues, but have no mode of preference (*i.e.*, verbal or nonverbal).

Obviously, polygraph examiners should be aware of where their primary reactions arise.

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STUDIES ON SKIN-BLOOD FLOW AS AN INDEX OF LIE DETECTION

By

Kazunoba Yamaoka and Akihiro Suzuki

Abstract

The measure of skin blood-flow by thermoelectric effect was used to study the effectiveness of skin-blood flow as an index of lie detection. The card tests were conducted on 13 subjects and skin blood flow change, SPR and SRR were simultaneously recorded during the test. The detection rate by the skin-blood flow was inferior to SPR and was neither superior nor inferior to SRR. Many tests under various testing conditions will have to be made to confirm the effectiveness of the skin-blood flow reaction as a lie detection index.

Introduction

The close relationship between emotion and physiological reactions of the circulatory system is well known. The blood pressure pulse responses are regarded in lie detection technology as an important index, together with respiration and the SRR. Unlike respiration and the SSR, these blood pressure-pulse responses cannot be controlled intentionally by the testees and there has not been any criticism against over sensitiveness of electrodermogram. Many polygraph examiners highly praise the use of the blood pressure-pulse response as an index of the lie detection test. However, the problem concerning this index is due to discomfort of cuff pressure applied to the testee. Kugelmass and Liebllich (1966) criticized that the cuff pressure suppresses the manifestation of electrodermogram and they proved through certain facts that there are some doubts in the effectiveness of this method as an index. Some examiners have begun to voice their views of removing this pressure in conducting the polygraph test.

In order to resolve this problem, some attempts regarding circulatory measurement without cuff pressure were carried out. For example, Ellson *et al.* (1952) made studies on physiological reactions of the circulatory system such as the heart beat, pulse rate of the finger tips, etc., as a part of systematic research on lie detection. These studies proved that the lie detection by such circulatory responses is effective. Suzuki (1965) made a study on the plethysmograph and made a comparison with the pulse wave responses used in polygraph testing. The results showed that the plethysmograph is effective as an index of lie detection test.

The response with which this study deals is the change in skin blood flow. It is a widely accepted phenomena that a visible sign such as

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blushing or paleness of the face shows the relationship of emotion to the blood flow. This physiological response has not been used as an index for measuring emotion up to recent days because the measurement has been technologically difficult. Recently, a research group at the Medical Department of Chiba University developed a measuring device and a measuring method. Many results confirming the fact have been obtained (Hagiwara, *et al.*, 1966, 1968 a, b; Hakuno, 1966). This experiment was conducted to study the effectiveness of the skin-blood flow changes as an index of lie detection test based on the technique developed by Chiba University. A plate type element using thermoelectric effect was used to measure the changes in skin-blood flow. This method is simple to operate, does not cause any discomfort to the subject, does not interfere with muscle blood flow and is able to measure a true localized blood flow (Hagiwara 1968 a). The objective of this experiment was to study the possibility of using the measurement of changes in skin-blood flow using the thermoelectric effect method as an index.

Method

Thirteen volunteers from this Institute were used in the experiment. This group was made up of 7 females and 6 males ranging in age from 18 to 29 with a median age of 25.

The stimulus used was a set of five playing cards. These cards were lined face down on one side of the table used by each subject; who was instructed to turn over one at his or her option and look at it during the time when the examiner left the room. The examiner asked questions on each of these cards at intervals of 20 seconds. The subject was also instructed to give a negative reply to all including the one he selected. The questioning was performed in two series. The order of questions was changed with each series to prevent the subject from anticipating the sequence of the question on the card he selected. The response to the first question of the first series was eliminated from scoring.

A San-ei biophysigraph 120 system was used for measurement and recording. The bio-electro-amplifier 1117 was used to record the skin potential response (SPR) and the skin resistance response (SRR) together with the changes in skin-blood flow. The changes in the skin-blood flow was measured by Shin-ei's Shincorder and the recording was carried out through the DC amplifier of the above system. The sensors and attachments were used as follows: skin-blood flow element for measuring temperature was taped to the subject's left thumb; the right distal phalanx as the active electrode and another to the tip of the forearm about 10cm above the wrist as an indifferent electrode for measuring SPR. The time constant was 1.5 seconds, a 3.3 square centimeter silver plate electrodes were attached to the tips of the left 3rd and 4th fingers, for measuring SRR.

Results

Examples of the skin blood flow reaction records and others are as shown in Figures 1 and 2. Figure 1 shows a rising curve of skin-blood flow to the relevant questioning and returns to pre-stimulus questioning level. Simultaneously a conspicuous response is shown in both SRR and SPR.

Studies on Skin-Blood Flow

The skin-blood flow recording of Figure 2 shows a sudden rise immediately after the relevant questioning as seen but it diminished soon after. A rising curve is again seen to the irrelevant questioning.

Thus, the skin-blood flow increases and decreases in response to stimulus or shows a two-way reaction. Therefore, the size of reaction is shown by the difference between the peak and lowest point of the curve after the questioning.

In order to study the comparison between SPR and SRR as an index of lie detection test, a mean rank and the detection rate were used as a measure.

In the mean, the reaction showing the greatest response during questioning was ranked first and others were ranked 2-5 according to the size of responses for each index. Using this ranking as a base, a mean rank of relevant question for each index was obtained. A t-test was used to examine its validity. The results are shown in Table I.

In the event the subject shows a constant maximum response during the relevant questioning (questions related to the card selected by the subject), the mean rank is 1.00. The highest was the 1.83 shown in SPR followed by 2.42 in the skin-blood flow reaction and SRR showed the lowest ranking of 2.65.

The detection success numbers used were obtained from examples showing the highest ranking in responses dealing with cards selected by the subjects. The SPR showed the best detection success rate of 76%, followed by the skin-blood flow change as an index proved successful in detecting 5 out of 13 cases and the lowest of about 15% was by SRR. The chance expected value is 1/5; therefore, only the results of SPR significantly surpassed the chance expected value in the binomial distribution (13, 1/5) test.

Figure 1

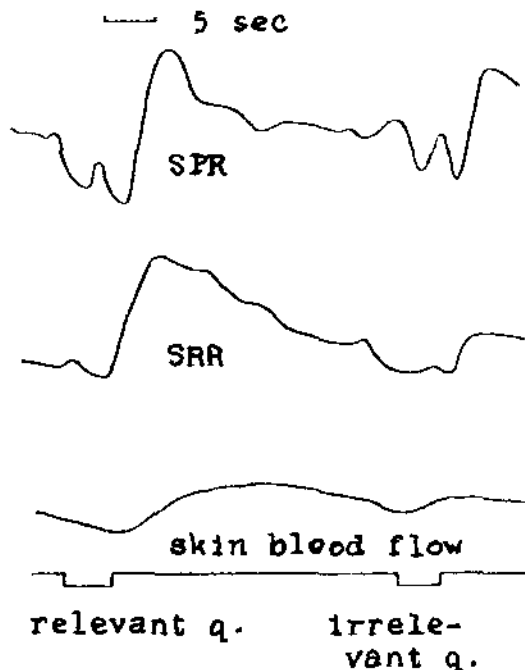


Figure 2

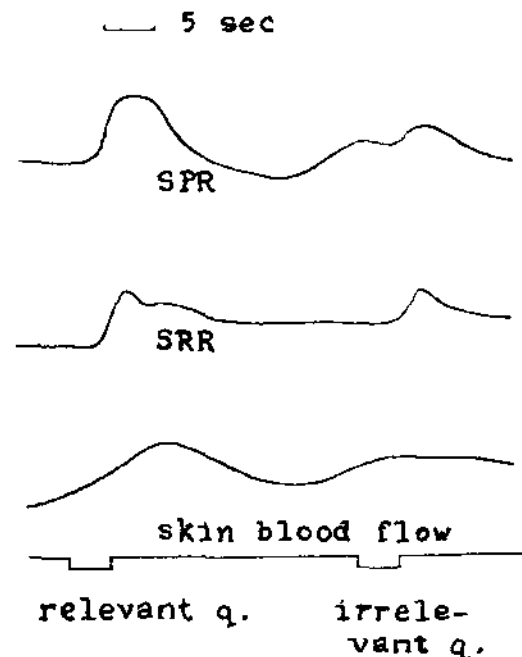


Table I: Mean Rank of Relevant Question

<u>Indices</u>	<u>Mean Rank</u>	<u>Average Standing</u>
Skin Blood Flow	2.42	3.84**
SRR	2.65	2.59*
SPR	1.83	7.93**

* $p < .05$ ** $p < .01$

Table II: Number of Successful Detection in Each Index

<u>Indices</u>	<u>Number of Successful Detection</u>	<u>Number of Unsuccessful Detection</u>
Skin Blood Flow	5	8
SRR	2	11
SPR	10*	3

* $p < .01$

Discussion

The skin-blood flow changes are measured by placing warm metal and comparison metal electrodes on the skin surface. An electric current (6v) to the warming plate produces a temperature difference of 1.5-2.5 degrees centigrade between the two metal plates. The changes in temperature difference caused by the localized increase-decrease of the blood flow are measured and recorded (Hagiwara, *et al.*, 1968 a). This change in the skin-blood flow can be seen in a simple stimulus as in opening and closing of the eyes, but it is also seen in other visual and audio stimuli and in the comparatively more complex mental stimulus. The application of the skin-blood flow reaction as an index of lie detection test proved better than anticipated in our test. However, there remain many problems related to testing conditions, etc.

In our experiment, the simplest procedure of questioning was used. As motivating factor and psychological pressure were not introduced which contribute to a high detection success rate. It cannot be said that, from the mean rank and detection success rate obtained from the test, the effectiveness of the skin-blood flow reaction is very high. And no conspicuous difference was noted between blood flow and SPR. However, in a comparison with SRR, it showed neither superior nor inferior results. Many investigators have uniformly recognized the effectiveness of SRR in an experimental lie detection test. For example, the organizational lie detection research conducted by Ellson *et al.*, (1952) proved that SRR is superior to others in terms of sensitivity to stimulus and difficult of

controlling the reaction by the testee. In our experiment, SRR showed a much lower detection rate than anticipated. In our previous experiment, 2-digit numbers were used as a stimulus which showed a detection success rate of about 48% (chance expected value of 20%); that, compared to the 15% shown in this experiment, was much superior (Yamaoka and Suzuki 1973). Therefore, when compared to the detection by SRR, the detection by skin-blood flow reaction cannot be evaluated as superior according to our experiment. It was reported by Hakuno *et al.* (1966) that the simultaneous recording of the skin-blood flow changes and SRR using an audio stimulus (bell sounded without warning) showed a steep rise by SRR and a slightly delayed decline by the skin-blood flow changes, but the changes were transitory and returned to the original level in around 30 seconds. It was also reported that an instruction "to do mental arithmetic" was given. The anticipation alone caused a transitory decrease in the skin-blood flow but hardly any change was noted in SRR. Therefore, these reports indicate the possibility that it is necessary to take into consideration that the skin-blood flow change shows superior sensitivity than SRR according to the testing condition.

Since the measurement of skin-blood flow changes was not accompanied by the measurements of blood pressure, pulse rate or finger pulse volume, a direct comparison with other physiological reaction of the same circulatory system cannot be made. In our previous experiment (Yamaoka and Suzuki 1973), a finger pulse volume was used as an index. It showed that it was somewhat inferior to SPR and SRR but the detection success rate of about 45% exceeds the chance expected value of 20% which suggests a high effectiveness as a lie detection index. The deciding criterion for the finger pulse volume response can be considered a relative change in the amount of blood; thus, a close tie with the change in the skin-blood flow can be assumed.

The 2-way response reactions (showing increase or decrease) in the skin-blood flow is a feature common in physiological reaction of the circulatory system. Suzuki and Watanabe (1972) reported this phenomenon in their studies on systolic blood pressure measurement. They also reported that during systolic blood pressure measurement, the reaction to stimulus becomes hazy due to spontaneous fluctuation, but the skin-blood flow reaction did not produce such a phenomenon.

As mentioned above, if the testing conditions such as the intensity of stimulus can be governed in the skin-blood flow reaction, a greater and effective detection rate than the finger pulse volume response will be expected.

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* * * * *

In the discovery of truth,
in the development of man's mental powers and privileges,
each generation has its assigned part;
and it is for us to endeavour to perform our portion of this
perpetual task of our species.
Whewell.

* * * * *

VERMONT LICENSING LAW UPHELD IN FEDERAL COURT

On December 30, 1980, the U.S. District Court for the District of Vermont dismissed a suit brought by Dr. John W. Heisse, Jr., M.D., who claimed that the Vermont polygraph licensing law was unconstitutional. The challenge was based on a number of constitutional issues. The Court was asked to enjoin enforcement of the Act and award damages in the amount of \$250,000 plus interest and fees. Although all of the constitutional issues were dismissed for other reasons, the Judge was clearly influenced by testimony that PSE tests had been conducted without the subject being aware that a test was in progress. The full text of the opinion appears below.

UNITED STATES DISTRICT COURT
FOR THE
DISTRICT OF VERMONT

John W. Heisse, Jr., M.D.)	
v.)	
State of Vermont, Warren)	
Cone, Commissioner of)	Civil Action
Vermont Department of Public)	
Safety, and M. Jerome Diamond,)	File No. 79-312
Attorney General of the State)	
of Vermont)	

MEMORANDUM OF DECISION

This is a civil rights action brought under 42 U.S.C. §§ 1981, 1983. Jurisdiction is based on 28 U.S.C. §§ 1343, 2201. The plaintiff is John W. Heisse, Jr., M.D., a board certified otolaryngologist duly licensed to practice medicine in the states of Vermont, Maryland and New York. He is also a practitioner in the field of truth and deception detection, particularly in the use of the Psychological Stress Evaluator (hereinafter the PSE). The PSE measures certain physiological phenomena reflected in the human voice. Defendant Warren Cone at the time the action was instituted was the Commissioner of Public Safety for the State of Vermont. The office is presently held by Paul R. Philbrook. Pursuant to 26 V.S.A., §§ 2901 *et seq.*, the Commissioner is charged with administering the professional activities of Vermont polygraph operators, including the issuance, suspension and revocation of licenses to administer polygraph or other truth or deception detection examinations. Defendant M. Jerome Diamond is the Attorney General of the State of Vermont. Both defendants are sued only in their official capacities.

Dr. Heisse's complaint alleges that as a PSE operator, he and others have been denied a license under Vermont's Polygraph Examiners Act, 26 V.S.A. §§ 2901 *et seq.*, (hereinafter the Act) because the statute has been restricted to licensing persons using the polygraph machine to detect deception or verify truth. Dr. Heisse claims that the Act violates rights protected by the equal protection and due process clauses of the Fourteenth Amendment of the United States Constitution by arbitrarily

discriminating against those who use devices other than the polygraph for the purpose of truth and deception detection. The plaintiff also challenges the constitutionality of the Act on other grounds: he asserts that the Act's definition of "polygraph examiner" is impermissibly vague and overbroad; that the Act is special legislation designed to maintain a monopoly in favor of polygraph operators; that the Act delegates legislative power to the Commissioner of Public Safety without providing sufficient standards to govern its exercise. The complaint further charges that defendants' refusal to issue licenses to Dr. Heisse constitutes the taking of private property without due process as required by the Fourteenth Amendment. And finally, the plaintiff claims loss of income resulting from defendants' failure to issue him a license.

In his prayer for relief the complainant requests the court to declare the Act unconstitutional, to enjoin its enforcement, and to establish plaintiff's right to practice truth and deception detection without interference from defendants. In addition, he seeks damages in the amount of \$250,000 with interest, costs and attorney's fees.

The defendants responded to the complaint by moving to dismiss the action on several grounds. Defendants contend that the court lacks subject matter jurisdiction over the cause since the complaint does not present a "case or controversy" and the plaintiff is without standing to bring the suit. It is also defendants' contention that the court lacks jurisdiction over the action because the suit is in fact a petition for a legislative amendment. Defendants raise the Eleventh Amendment as a bar to a claim for damages against state officials. They additionally argue that the good faith qualified immunity afforded state official prohibits this action. Defendants' final assertion is that the doctrine of abstention precludes federal court review of the Act.

During the course of the hearings the court ordered the trial of the action on the merits be advanced and heard with the motion for preliminary injunctive relief as provided in Fed.R.Civ.P. 65(a)(2).

FINDINGS OF FACT

The Polygraph and PSE Machines

Four elements are involved in the examination of a subject to ascertain truth or deception: the person being examined who makes predictable responses to stress; a measuring device which records his responses; a structured examination for control; and an examiner who interviews the subject and evaluates the causes of stress. In certain circumstances, discussed herein, the person who conducts the interview and the individual who performs the analysis of the results may not be the same person. Some or all of these characteristics commonly apply to examining situations involving the use of the polygraph and the PSE.

Both the polygraph and the PSE operate on the principle that stress causes physiological changes in the body which can be measured to indicate whether the subject of the examination is telling the truth. During an examination in which a polygraph is used, sensors are attached to the subject so that the polygraph can mechanically record his physiological responses to a series of questions. The polygraph employs a blood pressure cuff attached to the subject's forearm or wrist to measure cardiac

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activity, tubes circumscribing his chest or abdomen to measure respiratory changes, and electrodes attached to his fingers to measure skin conductivity. During the examination period the polygraph examiner calls upon the subject to respond to ten or fifteen questions, leaving time for the body to normalize between each response. Several of the questions are control questions; the remaining ones constitute the relevant interrogatories. The questions are of the type which can be answered "yes" or "no." Typically, a polygraph examination session lasts no more than four or five minutes because longer periods cause discomfort for the subject.

One of the principal advantages of the use of the polygraph is that an individual cannot be subjected to a truth or deception detection examination without his knowledge. A disadvantage is that in some instances a subject's obesity or other medical condition may preclude its use. In addition, the fact that sensors are attached to the subject may induce stress and thus render the test results inconclusive.

The PSE measures change in the frequency modulation of the human voice. It determines pulse rate, blood pressure level, respiratory rate and micro-muscle tremor. Specifically it measures: a single respiratory utterance, the rate of glottic closure, the duration of an utterance, the micro-muscle tremor, the presence or absence of pulse as related to blood pressure, changes in pitch, general nervous tension, and the wave shape of voice frequency.

An examination involving the use of the PSE proceeds with the following steps. An interview with the subject is recorded on a tape recorder. The tape recording of the examination is electronically processed through the PSE which produces a graphic read out of the degree of stress or non-stress present in the subject's voice as he responds to questions. The charts are analyzed to determine the causes for the stress. The chart analysis and the initial interview may be performed by different persons.

The PSE offers several advantages. One is that since the subject is not wired to a machine, the examination conditions do not in themselves produce stress. In addition, the examination period may last longer than just a few minutes because the PSE does not use monitoring devices which cause discomfort to the subject. The subject may give narrative responses, rather than just monosyllabic replies. The disadvantages are twofold. An individual may be subjected to PSE analysis without his knowledge. In addition, the analyst may be a different person from the interviewer and consequently may not have observed the subject during the interview.

Numerous studies have analyzed the reliability of the PSE as a device for detecting truth and deception. Although several studies have concluded that the PSE is a reliable, workable instrument, there is disagreement in the scientific community about the validity of PSE testing.

The Act

In 1975 the Vermont General Assembly enacted the Polygraph Examiners Act, 26 V.S.A. §§ 2901-2910. Section 2903 of the Act provides that "A person may not administer polygraph or other examination utilizing instrumentation for the purpose of detecting deception or verifying the truth of

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statements ... without being licensed as a polygraph examiner" under the provisions of the Act.

Section 2902 establishes the minimum instrumentation required under the Act. It provides that "Any instrument used ... for the purpose of detecting deception ... shall record visually, permanently and simultaneously:

- (1) A subject's cardiovascular pattern, and
- (2) A subject's respiratory pattern."

The Act prohibits the "use of any instrument or device to detect deception which does not meet these minimum instrumentation requirements." The record of additional physiological changes is not proscribed by the statute.

Section 2904, which sets out the requirements for obtaining a license; provides that a prospective polygraph examiner licensee must complete not less than six months of internship training or such other training as the commissioner may prescribe. "Internship" is defined in Section 2901 as "the study of polygraph examination and of the administration of polygraph examination by a trainee under the personal supervision and control of a polygraph examiner in accordance with a course of study approved by the commissioner." To date the Department of Public Safety does not have an established internship program. Nor has training, other than the intership program, been prescribed by the Commissioner. Although the only persons who may supervise interns are licensed examiners, the Act does not impose upon licensed examiners an obligation to supervise interns.

Section 2904 defines "polygraph examiner" as any person who purports to be able to detect deception or verify the truth of statements through instrumentation or the use of a mechanical device." *Id.* The penalty for violating the Act is a fine of not more than \$1,000.00 or imprisonment for not more than six months, or both. 26 V.S.A. § 2909.

Two opinions interpreting the Act have been rendered by the Attorney General's Office. The first was written by Assistant Attorney General Paul F. Hudson at the request of Francis E. Lynch, former Commissioner of the Department of Public Safety. Dated October 3, 1978, this opinion stated that the Vermont Act does not permit the issuance of a polygraph examiner's license to trained PSE examiners and that "they may not legally use the technique to determine truth or deception." It further stated that the PSE does not meet the minimum instrumentation requirements of the Act. A later opinion by Hudson, dated October 24, 1979, responded to a request for informal advice made by James L. Morse, Defender General. Hudson reiterated his opinion that PSE examiners could not legally be licensed under the Act and that use of the PSE for truth or deception detection was subject to penalty under 26 V.S.A. § 2909.

In the 1978 Session of the Vermont legislature, Senate Bill S-231 was submitted to the House Committee on General and Military Affairs, after passing the Senate. The bill would have broadened the scope of the Act to include the PSE. Although its passage was supported by members of the Vermont State Police, it was not reported out of the House prior to adjournment.

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The Parties and the Events Leading Up to the Filing of the Action

John W. Heisse, Jr., M.D., is knowledgeable in the field of truth and deception detection. He is informed both in the area of forensic polygraph and in the use of the PSE. A charter member and past president of the International Society of Stress Analysts, Dr. Heisse has lectured and testified on the use of the PSE and its comparative reliability to the polygraph. Dr. Heisse has both practiced and instructed in the use of the PSE. He has conducted approximately 700 PSE examinations since 1971, 400-500 of which occurred following the enactment of the statutes in question. Although Dr. Heisse is qualified in both experience and training to be licensed as a polygraph operator, he prefers to use the PSE for the practice of truth and deception detection.

In 1975 Dr. Heisse applied for a license under the Act. He withdrew his application after State Police Commissioner Corcoran advised him that he did not require a license to use the PSE in connection with his practice as a physician. In December of 1975, however, Commissioner Corcoran stated that a license was required for the use of the PSE to detect truth or deception.

In 1978 Dr. Heisse, along with eleven other persons, applied for licenses under the Act. All expressed a preference for the use of the PSE. Among the eleven applicants were Lt. Col. Charles McQuiston and Dr. Marilyn Van Graber, Ph.D. Col. McQuiston is a former intelligence officer for the U.S. Army who is licensed as a polygraph operator in both Florida and Virginia. During the 18 years preceding his application for a Vermont license, he conducted 8,500 polygraph examinations and 28,000 PSE examinations. He is a co-inventor of the PSE. Dr. Van Graber holds a Ph.D. in rhetoric and communication psychology. She has received extensive training in the use of the PSE and is a qualified instructor and examiner. Since 1976 she has worked as a communication consultant for Diogenes Affiliates, which provides truth verification services.

Following the issuance of the first opinion of the Assistant Attorney General, the Department of Public Safety rejected all twelve applications. Each application rejected was returned accompanied by a cover letter and a copy of the October 3, 1978 opinion of the Attorney General. The applications were rejected not because of the qualifications of the individual applicants, but because the Attorney General's opinion indicated that a PSE user could not be licensed under the statute.

Since the Act became law in 1975, Dr. Heisse has been informed on several occasions by members of the Vermont State Police Force that the use of the PSE in Vermont is illegal. In 1978 Sgt. Michael C. Vinton, then the State of Vermont's Chief Polygraph Examiner, told Dr. Heisse that his use of the PSE was contrary to Vermont law. On April 4, 1979, Corporal Wayne Heath of the Vermont State Police discussed age regression hypnosis with Dr. Heisse. Corporal Heath testified that he was instructed by his supervisors to confiscate the tapes after the hypnosis session and he did so. The purpose of the confiscation was to prevent Dr. Heisse from using the tapes in PSE analysis.

The prosecuting attorney in Grand Isla County, Edward Cashman,
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advised Dr. Heisse that if Dr. Heisse used the PSE in Grand Isle County and a complaint were forwarded to his office, Mr. Cashman would prosecute Dr. Heisse for violation of the Act. Mr. Cashman testified, however, that he is not aware of any pending or concluded investigation which would subject a person to criminal prosecution for use of the PSE device. Dr. Heisse also testified, as did Dr. Van Graber, that he does not know of any proceedings against either of them. Although Dr. Heisse has continued to conduct PSE examinations since being advised of its illegality, he feels he is not able to practice as freely or advertise as broadly as he might otherwise do.

Motion to Dismiss

Defendants' first argument is that plaintiff's complaint does not satisfy the case or controversy requirement of justiciability. A prerequisite to the adjudication of constitutional issues under Article III of the Constitution is the presentation of concrete legal issues in the context of actual cases. To determine whether an actual controversy exists, the court is called upon to consider whether the facts as set out in the complaint demonstrate that there is a substantial controversy between parties whose legal interests are adverse. The controversy must be sufficiently immediate and real to justify declaratory relief. Golden v. Zwickler, 394 U.S. 103 (1960). The power of courts may be exercised when the interests of the parties before the court require protection from actual interference with the exercise of their rights. Id. at 110.

This case sets out a controversy challenging the constitutionality of state licensing procedures. Plaintiff alleges that the licensing act in question has violated his equal protection and due process rights. Specifically, Dr. Heisse alleges that he is being foreclosed from practicing his profession by the State's refusal to grant him a license under the Act. He also entertains fear of prosecution for his continued use of the PSE. Plaintiff's concerns are not speculative. He has been denied a license. He has been told by members of the Vermont State Police that practicing the profession using the PSE is unlawful in Vermont. He has received notice from the Grand Isle's State's Attorney that he will be prosecuted if a complaint is filed with that office. Defendant has made much of the fact that plaintiff is not currently under investigation, nor is he presently accused. But a person is not required to undergo arrest and prosecution to challenge a statute he claims invades his constitutional rights. Steffel v. Thompson, 415 U.S. 452, 459 (1974). In addition, Dr. Heisse has claimed that the denial of a license constituted deprivations of his equal protection and due process rights. Mini Cinema 16 Inc. of Fort Dodge v. Habab., 326 F.Supp. 1162 (N.D. Ia. 1970). The parties have sufficient adversity to satisfy the case or controversy requirement.

Standing

Defendant, without citing authority, challenges plaintiff's standing in two respects: plaintiff is under no threat of prosecution; plaintiff is raising the rights of others who are not parties to the action.

In Warth v. Seldin, 422 U.S. 490, 498 (1975), the Supreme Court stated that within the realm of justiciability, the standing question determines whether the plaintiff's interest in the resolution of the

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controversy justifies exercise of the court's powers on his behalf. It must be shown that the plaintiff has suffered either threatened or actual injury as a result of the challenged action. Id. at 499. The plaintiff must assert his own legal rights and not merely the legal rights of others.

Applying these criteria to the facts of the case, the court holds that Dr. Heisse has standing. Plaintiff's complaint is that the provisions of the Act, as interpreted by the Attorney General's Office and as enforced by the Commissioner, preclude him from obtaining a license to practice his profession and that the preclusion denies him rights secured by the Federal Constitution. Although his complaint refers to a group of persons who have been denied licenses, Dr. Heisse has not brought the suit for others' benefit. Instead, as one of the persons who was denied a license, he seeks redress on his own behalf.

Dr. Heisse's denial of a license constitutes injury in fact. In addition, there is a logical connection between the claimed injury and the constitutional challenge to the statute applied to effect their denial. Furthermore, Dr. Heisse's interest in becoming an examiner in the field of truth or deception detection is within the interest sought to be regulated by the Act, namely the regulation of those who may practice in the field. He therefore has standing to maintain the action.

The Eleventh Amendment Bar to Suit for Money Damages Against State Officials

In Quern v. Jordan, 47 USLW 4241 (1979) and Edelman v. Jordan, 415 U.S. 651 (1974), the Supreme Court established the parameters for the exercise of the federal court's remedial powers under § 1983 to order payment of funds from the state treasury. Those cases stand for the proposition that Section 1983 does not abrogate Eleventh Amendment immunity of the states. While a court can order prospective injunctive or declaratory relief, it is unable to provide retroactive relief involving payment of state funds from the state treasury. A federal court may, however, enjoin state officials from violating the paramount law and may require them to act in accordance with federal law even though the order may have a collateral effect on the state treasury. Quern v. Jordan, supra at 4242. Thus, although a federal court order may require state funds to be expended as an essential consequence of future compliance with federal law, it may not direct compensation to be paid from state funds to compensate for past breach of legal duty.

In his complaint, Dr. Heisse seeks \$250,000 damages for loss of income and profits he would otherwise have enjoyed had he been able to use the PSE as a licensed examiner. He has sued the named defendants only in their official capacity. The action is therefore in fact suit against the State of Vermont. Were he to prevail, the damages he seeks would require payment of funds from the state treasury to compensate him for past wrongs. That part of Dr. Heisse's complaint which seeks money damages will be dismissed.

The Immunity of the Officials

Defendants claim that a suit against the Attorney General and the

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Commissioner of Public Safety is barred by immunity afforded public officials acting in good faith. As authority for this proposition, the defendants cite Scheurer v. Rhodes, 416 U.S. 232 (1974). However, that controversy involved an action for money damages against officials who were sued in their individual as well as official capacities. Two years later in Imbler v. Pachtman, 424 U.S. 409 (1976), the Supreme Court granted absolute immunity from civil suit damages under Section 1983 to a prosecutor initiating a prosecution and presenting the State's case. The court left open the question of immunity available to a prosecutor acting as an administrative or investigative officer, rather than performing the role of advocate. Neither Imbler nor Scheuer was concerned with the question of immunity or government officials in a suit involving injunctive or declaratory relief. There is considerable and respectable authority to the effect that government officials acting in their official capacity are not immune from 1983 actions in which declaratory and injunctive relief is sought. Salvin v. Curry, 574 F.2d 1256 (5th Cir. 1978), modified 583 F.2d 779 (1978); Boyd v. Adam, 513 F.2d 83 (7th Cir. 1975); Harris v. Harvey, 419 F. Supp. 30 (E.D. Wis. 1976). The court holds that action may be pursued against state officials for declaratory and injunctive relief.

Abstention

Defendants urge that the abstention doctrine precludes the court from considering the constitutionality of the Act. Defendants based their argument on Younger v. Harris, 401 U.S. 37 (1971) and Huffman v. Pursue, 420 U.S. 592 (1975). Younger stands for the proposition that federal courts should ordinarily abstain from enjoining ongoing state criminal prosecutions. In Huffman, the Court applied Younger principles to a pending state civil proceeding which was similar to a criminal proceeding and in which the federal plaintiff had not exhausted his state appellate remedies before seeking relief in federal court. Defendants claim that under Huffman, plaintiff must either first file suit in state court or exhaust his administrative remedies before seeking relief in federal court. Younger and Huffman are inapplicable here. No state action, whether civil or criminal, is pending. Furthermore, in Steffel v. Thompson, *supra*, 415 U.S. at 452, the Supreme Court held that a federal court could provide proper declaratory relief against state criminal statutes when a prosecution was not pending.

Suit for Legislative Amendment

Defendant's final claim is that plaintiff's suit is in reality a petition for legislation amendment. Defendants' claim might have merit if Dr. Heisse had done no more than petition the court to require PSE examiners to be licensed under the Act. But this is not the case. Plaintiff alleges that the licensing statute itself is constitutionally defective. For the reasons stated, the court holds that it has jurisdiction to consider the merits of the plaintiff's claim.

Plaintiff's Claim

The first count of Dr. Heisse's complaint charges that the Act violates equal protection rights guaranteed by the Fourteenth Amendment of the United States Constitution. Specifically, the plaintiff alleges that the Act arbitrarily discriminates against practitioners of the truth and

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deception profession who prefer to use the PSE or another device, rather than the polygraph. Licenses under the Act are issued only to polygraph operators and the minimum instrumentation requirements set out in Section 2902 apply only to the polygraph machine.

The function of equal protection analysis is to measure the validity of classifications created by statute. In this case the relevant classifications are those who wish to practice the profession of truth and deception detection through the use of the polygraph and those who prefer to use only the PSE. The Act permits licenses to be issued to the former group but not to the latter.

In equal protection analysis, the threshold question is whether the state infringes on a fundamental interest or discriminates against a suspect class. If it does either, the court will subject the statutory scheme to the strict scrutiny test. If a fundamental interest is not in jeopardy or a suspect class is not involved, the court determines whether the classification is rationally related to the objectives of the regulation. Massachusetts Bd. of Retirement v. Murgia, 427 U.S. 307, 312 (1976) (Per Curiam).

Fundamental rights include the right to privacy, the right to vote, rights guaranteed by the First Amendment, the right to procreate and the right to interstate travel. Id. at Note 3 and cases cited therein. Impermissible classifications involving a suspect class are those based on alienage, race and ancestry. Id. at Note 4 and cases cited therein. This case does not concern a suspect class. Nor is the right to practice the profession of truth and deception detection a fundamental right. See Younger v. Colo. State Bd. of Bar Examiners, 482 F.Supp. 1244 (D. Colo. 1980) (entry into law practice not a fundamental right). The court is thus called upon to determine only whether the statute has created an unreasonable and arbitrary classification that is wholly unrelated to the statutory objectives. E.g. Reed v. Reed, 404 U.S. 71, 76 (1971); Royster Guano Co. v. Virginia, 253 U.S. 412, 415 (1920).

A state has a valid interest in regulating professions, especially, where, as here, the practice of the profession has serious implications for the privacy rights of those who may be subjected to it. The testimony before the court reveals that although several studies have indicated that the PSE is a reliable device for truth and deception detection, within the scientific community there continues to be some discord as to the validity of its testing results. The polygraph, on the other hand, has wider acceptance within the scientific community and a longer history of use than does the PSE. More importantly, however, the evidence established that an individual may be subjected to a PSE examination without his knowledge or consent. In fact, some of the witnesses testified that they had, on occasion, conducted a PSE test without the subject being aware his truthfulness was being tested. With the use of the polygraph machine the subject cannot be examined unknowingly. That this may have been a concern of the legislature is indicated in Section 2908 of the Act which provides that a license may be revoked if the examiner fails to inform the subject of the nature of the exam and that his participation is voluntary. These concerns establish a rational basis for the limitation of the licensing provisions of the Act to polygraph operators.

The plaintiff further contends that the exclusion of the PSE is irrational in that the language of the Act would permit a licensed polygraph operator to use the PSE in conjunction with the polygraph and then to ignore the polygraph results and base his findings solely on the PSE test. It is true that the face of the statute does not prohibit this arrangement. Defendants have also suggested this would be permissible under the Act. The court is less certain. But even if one assumes *arguendo* that such a situation would be acceptable, plaintiff's argument ignores the possibility that the permissible use of the PSE in conjunction with the polygraph machine may serve the legislative purpose of protecting the privacy rights of individuals who could otherwise be tested using the PSE without their knowledge or consent. Furthermore, when neither a fundamental right nor a suspect class is involved, the state can effect its legislative scheme in increments. See Trafelet v. Thompson, 594 F.2d 623 (7th Cir. 1979). The Act may represent the General Assembly's initial attempt at regulating the profession. Control of the entire spectrum of possibilities is not required. The Act will be upheld in that the classification it is based on bears a reasonable relationship to the regulation of the profession of truth and deception detection.

The second count of Dr. Heisse's complaint challenges the statute by asserting that its definition of "polygraph examiner" is unconstitutionally overbroad and vague. The definition given in 26 V.S.A. § 2901 for polygraph examiner is "any person who purports to be able to detect deception or verify the truth of statements through instrumentation or the use of a mechanical device." According to plaintiff, the Act applies to any person who interrogates another for the purpose of determining whether or not he is telling the truth and who uses the aid of any instrumentality whatever, including a telephone, tape recorder, hearing aid, or other simplistic devices. The plaintiff claims that there is no way for a person of ordinary intelligence to determine if his acts are forbidden.

The Supreme Court has established that when statutes not involving First Amendment freedoms are challenged for vagueness, the challenge must be examined in light of the facts of the case at hand. United States v. Powell, 423 U.S. 87 (1975). While it is true that the term "mechanical device" is a general one, it is not necessarily vague in the context of the statute's application to the complainant. The statute defines an examiner as one who "purports to be able to detect deception ..." through the use of a mechanical device. The word "purports" implies that the individual is holding himself out as a truth or deception examiner in addition to using a mechanical device to conduct his examinations. Applied to the facts at hand, the statute appears to give adequate warning to Dr. Heisse that if he holds himself out as a truth or detection examiner and he uses the PSE in the conduct of the examinations, he will fall within the Act's definition of Polygraph Examiner.

Plaintiff also challenges the statute for overbreadth. His argument is essentially the same as that raised in the vagueness challenge. In urging invalidity of the statute for being overbroad, the plaintiff relies on Doran v. Salem Inn, Inc., 422 U.S. 922 (1975). Doran, unlike the present controversy, involved a statute which threatened freedoms protected by the First Amendment. When sensitive rights are in issue, a defendant may challenge a statute on the grounds of overbreadth even though the statute may be constitutional as applied to him. Protected rights are not

threatened here. The single question for the court's determination is whether the statute may constitutionally be applied to Dr. Heisse under the facts of this case. In this instance, Dr. Heisse seeks to be licensed to use the PSE to practice truth or deception detection. The PSE clearly comes within the definition of mechanical device. Dr. Heisse's situation is not a marginal case, but one that falls squarely within the ambit of activities the act is seeking to regulate.

Finally, the definitions section of the Act, when read in conjunction with the body of the Act, affords plaintiff fair warning of whether his activity is proscribed. If plaintiff purports to be able to detect truth or deception using a mechanical device which does not meet the minimum instrumentation requirements set out in Section 2902 of the Act, then he is on notice that his activities are in violation of the Act.

The third count of Dr. Heisse's complaint alleges that the Act is unconstitutional for the reason that it constitutes special legislation which creates a monopoly in favor of truth or deception detectors who use the polygraph. The crux of plaintiff's argument is that the Act requires applicants seeking to obtain a license to complete a six month internship program, but that it does not impose a requirement that licensed polygraph operators supervise the internship programs.

The Supreme Court has recognized that an act general in form may in fact apply to a single individual alone. Ft. Smith Light Co. v. Paving Dist., 274 U.S. 387, 389 (1927). The Fourteenth Amendment does not prohibit legislation solely because it is special or limited in its application. Id. at 391. Uniform application of legislation is not required so long as the discrimination has some rational basis. The fact that a state rule results in incidental individual inequality does not make the rule offensive to the Fourteenth Amendment. See Martin v. Walton, 368 U.S. 25 (1961) (Per Curiam). The requirement of an internship program is rationally related to the State's objective of limiting licenses to those who have demonstrated some skill in the regulated profession of truth detection. The rules governing the licensing and examination of Polygraph examiners set out specific directions as to the reports the intern must submit upon completion of the training program. The State's proper concern with the quality of training available to interns also provides a rational basis for the provision that only polygraph operators may conduct internship programs. Inasmuch as the internship provisions reflect a valid state concern with the competence of those licensed under the Act, the fact that it fails to impose on licensed polygraph operators an obligation to conduct internship programs does not constitute an infirmity that would render the Act invalid.

Count IV of the complaint alleges that the State's refusal to license PSE users in an unconstitutional taking of property without due process. As this claim was neither briefed nor argued by the parties, the court will discuss it only summarily. The claim must necessarily fail in that the plaintiff has not established that he has an entitlement to practice his profession that rises to the level of a property interest protected by the Fourteenth Amendment. Such an entitlement must be derived from a reasonably identifiable source apart from the claimant's mere desire or expectancy. See Board of Regents v. Roth, 408 U.S. 564 (1972); Colm v. Vance, 567 F.2d 1125 (D.C. Cir. 1977). In this instance the plaintiff has

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failed to demonstrate his interest in practicing psychological stress evaluation meets the requirement of a protected interest.

The remaining count on plaintiff's complaint is that the Act makes an unconstitutional delegation of legislative power to the Commissioner of Public Safety because it does not sufficiently define or establish the criteria by which its actions are governed. From the pleadings it is unclear how plaintiff intended to treat this claim. Plaintiff has invoked federal jurisdiction to adjudicate his claims. No substantial federal question is presented by the contention that a state statute unconstitutionally delegates power to a state agency. Ohio ex rel Bryant v. Akron Park District, 281 U.S. 74, 79 (1930); Mann v. Powell, 333 F.Supp. 1261, 1266 (N.D. Ill. 1969).

Thus the court is constrained to consider the claim to be a state claim over which it has pendent jurisdiction. United Mine Workers of America v. Gibbs, 383 U.S. 715 (1966).

The substance of plaintiff's complaint is that the Act and its accompanying rules do not specify the criteria to be used to judge an applicant's qualifications. It has been established that there is a distinction between a delegation of power to make law and the conferring of authority for the execution of the law. The former is impermissible. The latter can be done if certain guidelines apply. A law authorizing the issuing or withholding of licenses must be such that administrative decisions are guided by rules or standards which apply evenly to those the law affects. The administrative function may not be effected arbitrarily. Village of Waterbury v. Melendy, 109 Vt. 441 (1938); Village of St. Johnsbury v. Aron, 103 Vt. 22 (1930). In the St. Johnsbury case the court recognized its duty to make every presumption in favor of the constitutionality of an ordinance of this type and recognized its obligation to give the ordinance, if possible, a construction of validity. In St. Johnsbury a licensing ordinance was held to be invalid because it did "not specify any rules or regulations upon compliance with which the right ... (engage in the specific business) can be exercised." Id. at 25.

The statute before the court at this time is not invalid for an unconstitutional delegation of authority. Although it vests in the Commissioner some discretionary authority in the exercise of his function, it does not leave him with a blank charter which he may map as he wishes. In order to be licensed under Section 2904 an applicant must demonstrate he is of good moral character, that he has not been convicted of a crime involving moral turpitude, that he has graduated from a polygraph examiner's course approved by the Commissioner and has satisfactorily completed six months of internship training or other training prescribed by the Commissioner. The Rules promulgated require an intern to submit for review five of his first fifteen polygraph examinations. In addition, Section 2908 lists twelve specific reasons for which the Commissioner may refuse to issue or may revoke or suspend a license. The Act, therefore is valid and will survive plaintiff's charge that it is an unconstitutional delegation of state legislative power.

In summary, it is not open to dispute that the function of searching for the detection of truth or deception by physiological and psychological testing is an endeavor that deeply affects the public interest,

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particularly as it relates to individual rights or privacy. The opportunities for distortion and abuse in this area are manifold.

The business is rather akin to that of other detection pursuits. See Norwood v. Ward, 46 F.2d 312, 313 (2d Cir.) (Swan, J.) affd 283 U.S. 800 (1930). In this posture the activity is well within the reach of the police power of the General Assembly of Vermont. And it is within the legitimate province of the state legislature to adopt appropriate means to assure the integrity and competency of those administering the test. Id. This includes the authority to exclude testing methods and procedures that do not make manifest the fact that a truth detection test was being performed and to guard against surreptitious testing. Clearly such is the design and purpose of the polygraph requirement. In the statutory means and method adopted by the lawmakers to achieve this valid legislative objective the court perceives no offense to rights protected by either the Due Process and Equal Protection Clauses. The court recognizes there is some authority to the contrary. See e.g., Illinois Polygraph Society v. Pellicano, No. 78-711 (Court of Appeals Nov. 14, 1979). The case cited concerned a municipal ordinance which was held to be invalid under provisions of the Illinois Constitution. It is not persuasive on the challenge to the Vermont statute presented here.

The court holds that the Act is not unconstitutional. Plaintiff's motion for injunctive relief must therefore be denied. The Clerk is directed to enter an order dismissing the action. It is so ORDERED.

Dated at Rutland, in the District of Vermont, this 30th day of December, 1980.

James S. Holden
Chief Judge

* * * * *

Report of the Department of Commerce on the
Feasibility and Desirability of Licensure of
Audio Stress Examiners to the Governor and The
General Assembly of Virginia

House Document 5
Commonwealth of Virginia
Richmond, Virginia
1981

House Resolution No. 45

Requesting the Department of Commerce to conduct a study of the desirability and feasibility of licensure of audio stress examiners.

Agreed to by the House of Delegates, February 7, 1979

Whereas, the practice of certain professions and occupations is regulated by State law for the protection of the health, safety, and welfare of the public; and

Whereas, current State law, and regulation promulgated under such law, regulates the activities of polygraph examiners; and

Whereas, through the operation of an audio stress evaluator it has been alleged that an audio stress examiner can perform much the same tasks as are presently being carried out by polygraph examiners; and

Whereas, it is highly desirable that an unbiased and informed study of audio stress examiners be conducted prior to a decision as to the need for State regulation of their profession; now, therefore, be it

Resolved by the House of Delegates. That the Department of Commerce is requested to study the desirability and feasibility of State licensure, certification or regulation of audio stress examiners. The Department is requested to lay its findings, together with any legislative recommendations, before the nineteen hundred eighty Session of the General Assembly.

Executive Summary and Recommendation

In its study of voice stress analysis, the Board of Commerce did not find the Audio Stress Evaluator an effective method for the determination of deception.

The validation study, conducted by the Department, established no relationship between results obtained from PSE examination of criminal suspects and those obtained from polygraph examination.

Based upon the above findings, the Department of Commerce recommends to the 1981 Virginia General Assembly that no action be taken to regulate Audio Stress Examiners under Chapter 27, Title 54 of the Code of Virginia.

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Background Information

This issue of audio stress examiners revolves around two problems: (1) The ability of the devices to indeed record voice characteristics that result in detection of deception (2) The needed training and/or examination of individuals to operate devices, assuming such are valid.

At the present time audio stress machines are not permitted for use in Virginia. Such activities are restricted to polygraph examiners who may only use a machine measuring at least two physiological reactions which relate to deception. An individual cannot be examined without his knowledge by use of the polygraph.

Unlike the polygraph, however, audio stress devices purport to detect deception by measurement of the presence or absence of "microtremors" which are reflected in the voice. Responses to questions may be tape recorded and then charted or converted by the actual devices to a pattern. Patterns are then "read" by trained individuals. Some devices bypass the taping procedure and produce an indication of truth or deception immediately. The devices could be used without the subject of the examination being aware that such examination is being conducted.

Pursuant to House Resolution 45, the Department of Commerce, through the Board of Commerce, spent the last year in study of an audio stress device manufactured in Virginia, has surveyed the literature and is conducting an evaluation in conjunction with the State Police to compare this device to the polygraph.

The issues involved are substantial. If the device is approved for use, it will be used for criminal investigations, employment purposes, and may, upon stipulation, be introduced as evidence in legal proceedings. Since a review of the literature offers no conclusive evidence as to its validity, completion of the formal evaluation should be a prerequisite to its licensure.

In March of 1979 a subcommittee of the Board of Commerce was appointed to conduct the study. The appointees to the study are Mrs. Polly Y. Campbell, Mr. Zack T. Perdue, and Mr. Alan McCullough, Jr., as Chairman.

The staff began the study by gathering all available information and literature on the subject of audio stress analysis. Those persons recognized in the field of detection of deception were notified of the study and were requested to make all information available. The studies and reports received were reviewed for all pertinent information concerning the use of the audio stress machines.

Voice stress analyzers are widely used in the private sector, and by law enforcement agencies; however, their use remains controversial. Investigation of research literature indicates conflicting opinions of the reliability and validity of voice stress analyzers. The accuracy rate of the machines and the operators to detect deception range from 32 percent to one of 100 percent.

From the literature available on the subject of voice stress analysis, it is reasonable to conclude that the effectiveness of the method in

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accurately detecting deception has not been resolved. (See Appendix C.)

At the present time, of the twenty-five states that license polygraph examiners, only one, North Carolina, issues licenses to voice stress operators. Four states, Alabama, Mississippi, Oklahoma and Oregon, have opinions from their Attorneys General to the effect that the PSE and similar devices may not be used. In Illinois a circuit court has issued an injunction against their use. New York has passed a statute specifically prohibiting the use of the PSE and similar devices in the employment context. In Pennsylvania it is illegal to use these devices surreptitiously. In Texas voice stress operators have been jailed and fined for using their equipment within the state. In Virginia recently a voice stress operator was fined for illegal use of the machine within the state. The state of Florida held public hearings in 1974 concerning the Psychological Stress Evaluator. The hearing officer concluded that the PSE in the hands of a competently trained operator is equally as credible as to the polygraph. At this time, however, audio stress examiners are not required to be license.

The Department of Commerce conducted a field study to assess the reliability of voice stress analysis. This evaluation was conducted in conjunction and cooperation with the Virginia State Police and Dektor Counterintelligence and Security, Inc. Dektor Counterintelligence and Security, Inc., agreed to allow department investigators to attend an 80-hour course in the use of the PSE. The Virginia State Police agreed to tape record actual polygraph examinations for the purpose of charting through the PSE instrument.

A meeting was held at the Department of Commerce to formally establish the field study and to delineate the areas of responsibility to those participating in the field evaluation. Representatives of the Department of Commerce, the Virginia State Police and Dektor Counterintelligence and Security, Inc. were present and agreed substantially to the design of the evaluation.

In accordance with the study, two assumptions were made by the Department: (1) that the General Assembly licensed polygraph examiners and the use of the polygraph machine in Virginia; therefore, the polygraph process is assumed to be reliable in detecting deception; (2) that both the PSE operator from Dektor and the state Police polygraphers were competent in their field.

It was decided that the Virginia State Police polygraph examiners, using their equipment, would tape record polygraph examinations. The results of the examinations and the tapes would be sent to the Department. The tapes would then be distributed to a PSE examiner of Dektor Counterintelligence and Security, Inc. and the investigators of the Department to be charted through the PSE process. The results obtained by the PSE examiners and the polygraph examiners would then be correlated by an independent statistician from Psychological Consultants, Inc. for comparisons of the voice stress analysis method for the polygraph.

It was decided that a total of at least forty tapes would be charted through the PSE process, as this would provide a significant data base.

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Findings

The study established no significant relationship between results obtained from the PSE examination of criminal suspects and those obtained from polygraph examination of the same subjects. In addition, there is no significant evidence that different PSE examiners will reach similar conclusions when examining the same data tapes.

When the results of the voice analysis #1 was compared with voice analysis #2, they agreed 31.7% of the time and disagreed 24.4% of the time. Voice analysis #1 vs Voice analysis #3 agreed 38.1% of the time and disagreed 26.1% of the time. Voice analysis #2 agreed with voice analysis #3 41.8% and disagreed 34.9% of the time. See Table 10, Appendix B.

The most damning fact concerning the accuracy of the machine is that there is no consistent comparison in any aspect of the tests with any operator. They all have different results in all aspects of the test. Hence, the guilt or innocence of an individual is determined by the operator of the machine at any given time and not by any absolute that can be consistently read by interchangeable operators of the machine. As Dr. Filer says, "Thus, by all conventional standards of proof, we have to regard the validity and reliability of the Psychological Stress Evaluator as unproven. Indeed, it appears that by and large its validity and reliability are not only unproven, but rather are disproven." See Appendix B, Psychological Consultants, Inc.

APPENDIX A

AUDIO STRESS STUDY

BOARD OF COMMERCE COMMITTEE MEMBERS

Alan McCullough, Jr., Chairman
Polly Y. Campbell
Zack T. Perdue

PARTICIPANTS

Larry W. Barden	Virginia State Police
S. Suzanne Falls	Department of Commerce
Randall K. Filer	Psychological Consultants, Inc.
Gilbert W. Gray	Dektor Counterintelligence & Security
Rodney D. Grimes	Virginia State Police
Patrick B. Gurganus	Virginia State Police
Robert L. Harp	Department of Commerce
Edward W. Kupec	Dektor Counterintelligence & Security
David Purdy	Psychological Consultants, Inc.
Thomas A. Snead	Virginia State Police
Barbara L. Woodson	Department of Commerce

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APPENDIX B

Psychological Consultants, Inc.
6724 Patterson Avenue
Richmond, Virginia 23226

REPORT ON THE INVESTIGATION OF
THE VALIDITY OF THE PSYCHOLOGICAL STRESS EVALUATOR
For
THE VIRGINIA STATE DEPARTMENT OF COMMERCE
September, 1980

The following report summarizes the results of a study performed by Psychological Consultants, Inc. (PCI) to determine the potential use validity of a Psychological Stress Evaluator (PSE) for the Virginia State Department of Commerce. The PSE is a vocal stress analysis technique which purports to be able to measure whether or not an individual's responses to a set of structured questions exhibit an attempt to present a deceptive pattern. Advocates of the PSE have proposed that it would be of significant value in a number of situations. Among these are criminal investigations and pre-employment screening. Clearly, usages with such inherent potential for significantly affecting the lives of individuals require that validity and reliability in order for its use to be sanctioned. It is important to bear in mind that while academic researchers couch their findings in terms of "statistical significance" (results different from chance), American Jurisprudence requires a far tougher standard of proof, that of "beyond reasonable doubt." While this level of accuracy is not constitutionally required of any input into the judicial process, it is clear that before sanctioning any device or technique, those in a position of responsibility must demand proven levels of value concomitant with that device's potential influence over individuals.

Section I - Summary of Relevant Literature Findings

The literature with respect to vocal stress analysis techniques (in particular the PSE) can best be described as mixed. Discounting wild claims on the part of the manufacturer, there do appear to be a number of studies which indicate a potential for obtaining accurate information from the PSE. Three of these (Kradz, Kriete and Stanley, and Heisse) claim accuracies for the PSE in excess of ninety-five percent when compared with either polygraph findings or known results of criminal investigations. A fourth study (Barland, 1975) finds a significantly lower, although still statistically significant, correlation between PSE results and polygraph analyses.

On the other hand, a number of studies have failed to confirm these findings. Among these are studies by Brenner and Branscomb, Kubis, Horvath, Nacheshon, Suzuki et al., Link, Older and Jenney, and Barland (1973). It is recognized that the Kubis study was negatively received by Dektor Corporation (the manufacturers of the PSE) and that a number of potentially valid criticisms of its research design have been raised. No study, whether it reaches favorable or unfavorable conclusions with regard to validity of the PSE, can be regarded as the definitive word on the issue. Rather, each study must be evaluated in the context of other

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available information and the overall pattern emerging from the sum total of available research.

In this light, there appear to be two disturbing questions that are continually raised in the analysis of the PSE. First of all, a number of studies have found that the PSE fails to correlate at a better-than-chance level with results from traditional polygraph analysis. While the Kubis study was perhaps the first and most widely quoted of these, it by no means stands alone. Similar results were found by Horvath, Nacheshon, Suzuki et al., and Barland (1973). Further questions are raised concerning the PSE by the relatively low level of interrater reliability reported in several studies. (See, for example, Brenner and Branscomb, Horvath, and Nacheshon). It is clear that if independent judges cannot reach significant agreement on the amount of deception indicated by the PSE, then the results of this process cannot be regarded as valid for use.

We do not need to go as far as David Raskin (professor of psychology at the University of Utah) who concluded in Congressional testimony that "there is not a single respectable, scientific study, and one that would meet the standards of publication in a scientific journal, which has shown the voice stress analysis technique to be any better than flipping a coin", in order to have serious reservations concerning its use. For example, it is recognized that some studies (see Kratz) have reported high levels of interrater reliability. It is not necessary, however, to question the results of this study, although such might be possible. It is sufficient to indicate that in numerous occasions, interrater reliability was not significant. Thus, simply because two raters in one situation did agree with each other, the results cannot be extrapolated to an assumption that the technique is consistent. There is sufficient evidence from numerous studies to conclude, rather, that in general, raters exhibit a low level of consistency when evaluating the same information. Similarly, it is not necessary to disprove all studies which indicate a high degree of accuracy or correlation with polygraph results in order to disapprove of the use of the PSE. The conclusion that in some contexts or some situations the PSE may be accurate, while in others it exhibits results no better than chance, is strong enough to justify withholding blanket approval of the device. Rather, the existence of a large number of studies which raise significant questions with regard to the PSE's accuracy and consistency throws the "burden of proof" back to its advocates. At the moment, the literature does not appear to indicate a sufficient degree of reliability or predictive accuracy to warrant the usage of the PSE.

However, there remain sufficient questions to indicate the desirability of further research. In this light, another study regarding the accuracy and reliability of the PSE was conducted by Psychological Consultants, Inc. for the Department of Commerce of the State of Virginia.

Section II - Methodology

The current study focuses on three questions: (1) To what extent do results obtained by professionally trained PSE examiners correlate with those obtained by conventional use of the polygraph? (2) How consistent are results obtained when different examiners analyze PSE data? and (3) To what extent does tape quality affect the validity of the PSE analyses?

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Data for the study were provided by the Virginia State Police. Tape recordings were made of actual polygraph examination sessions. Charts of these tape recordings were made using the Psychological Stress Evaluator and these charts were independently analyzed by three PSE examiners. One of these examiners was a professional in the employ of Dektor Corporation, the device's manufacturer, while the other two were employees of the Virginia State Department of Commerce who had been trained in the usage of the PSE and certified as competent PSE analysts by Dektor Corporation. After eliminating unusable sessions from the sample, there remained a set of fifty observations. Each observation consisted of one polygraph examination results and three associated PSE examination results. A number of comparisons and analyses were performed and will be reported in detail below.

In theory, it was possible to compare results on individual questions or charts as well as overall examination conclusions. In light of the poor overall performance of the PSE to be reported below, however, it was judged unnecessary to focus on specific components. The data at this level performs even less well than overall conclusions, and its reportage would make the final report unnecessarily burdensome. Results to be reported include the relationships between PSE results (averaged across the three examiners) with polygraph results, the relationship between individual PSE results and polygraph results, the relationship between PSE results and polygraph results for each of the three examiners, and the interrelationship of PSE results for each pair of examiners.

The data provided by State Police was generated in the course of actual investigations. The vast preponderance of the subjects were suspects in criminal investigations, although some were being questioned as either witnesses or victims.

Section III - Results

At the end of each PSE or polygraph examination session, the examiner placed his or her conclusions into one of three categories. It was concluded that either the subject was definitely being truthful, was definitely attempting to deceive the examiner, or else that no conclusion could be reached and the session should be regarded as inconclusive. With three categories, an individual attempting to guess the results of a polygraph examination on the basis of no information at all would be expected to be correct approximately one-third (33%) of the time. Results obtained from the PSE should always be examined in this light.

Three-way contingency tables comparing vocal stress analyzer results with those from polygraph examinations or the results obtained by two individual vocal stress analysts have been generated. There are a number of statistics which might be used to evaluate the degree of association between these variables. The most common such statistic, and the PSE, is the Chi square statistic. This statistic measures whether the distribution of observation into cells of the contingency table is essentially random or whether there exists an association between observations on one variable and those on the other variable. There is, however, another statistic which utilizes more of the available information. The results of the polygraph and PSE examinations possess what are known as ordinal properties. That is, although there is no uniform spacing between the categories, there is an appropriate ordering of the categories. Essentially,

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this says that if a polygraph examination concludes that the subject was being definitely truthful, a vocal stress analysis which concludes that the subject was attempting to deceive is in less agreement than one which finds an inconclusive pattern. While the commonly used correlation coefficient (Pearson r) is not appropriate with ordinal data, a form of rank order correlation coefficient (Kendall Tau) is appropriate and can make use of this ranking property of the observations. For each of the analyses reported below, both Chi square statistics and Kendall Tau coefficients will be reported. Conventionally, levels of statistical significance of .10 or less are required in order for a researcher to regard an hypothesis as being substantiated. Essentially, this says that there is less than ten percent chance that any associations observed in the data could have arisen by chance. Any results percent probability of chance occurrence must be dismissed as inconclusive. It should be emphasized that this ten percent significance level is extremely liberal, and that many researchers require a much lower probability of chance occurrence before regarding an hypothesis as being established.

With three PSE examiners for each polygraph session, there are a total of 150 possible pairs of observations. In fact, analyses are based on somewhat smaller sample sizes. In ten of the fifty cases, at least one of the PSE examiners was unable to evaluate the tape. Thus, there are forty cases for which complete results are available. In most of the other ten cases, however, at least one of the PSE examiners was able to evaluate the session and reach a conclusion. Therefore, there are a total of 138 pairs of polygraph/PSE results. Of these, the PSE examiners raised some question as to the tape quality in twenty cases, leaving a total of 118 pairs of results where no question as to the ability of the vocal stress analyzer tapes to be rated was raised.

Table 1 reports the results when polygraph results were compared with the average ranking obtained by the three PSE examiners. It is obvious that the distribution of results across the various cells of the table is relatively close to the conclusions reached by the two methods. Neither the Chi square statistic nor the Kendall Tau approached anything close to a level of statistical significance. There is, however, one reservation which must be raised in conjunction with this table. The averaging of the PSE results contains an implicit assumption of at least some cardinal rather than ordinal properties in the data. That is, it assumes that an inconclusive result lies exactly half-way between a definitely truthful result and a definitely deceptive result. This concept of "distance" is somewhat strange with regard to the current type of data. Therefore, more satisfactory results may be obtained by comparing the polygraph result with each individual PSE result. This generates the above-mentioned 138 pairs of observation. The fact that each polygraph result is paired with more than one PSE result does not in any way affect the statistical properties of the analysis.

Table 2 shows the results of such a comparison. As can be seen in the table, once again there is an overall impression of randomness in the two sets of results. For example, of the sixty-one cases where the polygraph examination indicated that the subject was definitely being truthful, the PSE indicated definite truth in twenty-four and definite deception in twenty-seven, with ten tapes being regarded as inconclusive. Overall, results of the PSE exams agreed with results of the polygraph exam in 39% of the cases, compared with the 33% that would be expected simply by flipping

coins. This result is not statistically significantly different from chance. In fact, to extend the analysis even further, in 30% of the cases, the PSE results were diametrically opposed to the polygraph results. That is, one device gave a reading of definitely truthful while the other was indicating definite deception. This is somewhat higher than might be expected as a result of chance. Therefore, one is left with the conclusion that there is no discernable or measureable relationship between results from a professionally conducted vocal stress analysis examination and results from a professionally conducted polygraph examination.

This finding is not dependent upon the inclusion of questionable tapes in the PSE sample. Table 3 shows results when only those tapes with regard to which no question at all was raised by the PSE examiner are included in the study. Based on these 118 "good" pairs of observations, the above-stated results must be resubstantiated. Once again, there is no statistically significant correlation between results obtained by the two processes. Indeed, in a statistical sense, the PSE performs somewhat closer to the polygraph when the questionable tapes are included than when they are omitted.

It is also clear that no individual PSE analyst is able to satisfactorily correlate his or her results with those obtained from the polygraph, although some analysts do better at this than others. Tables 4 through 6 show the results when each analyst's conclusions are related individually to those resulting from the polygraph session. Table 4 represents the performance of the professional employee of Dektor Corporation while tables 5 and 6 represent the performance of the employees of the Virginia State Department of Commerce. It is interesting to note that substantially the worst performance was recorded by the Dektor employee. However, once again, it should be emphasized that no individual analyst was able to predict significantly the results obtained from the polygraph.

Finally, we turn to the interrater reliability of the PSE conclusions. Once again, the results are not statistically significant. Tables 7 through 9 report the results obtained for the three possible pairs of ratings. It can be seen that in no case did the raters agree on even 50% of the possible conclusions. Rater 1 (the professional Dektor employee) agreed with the two Department of Commerce employees 38% and 42% of the time, while the two Department of Commerce employees agreed only 32% of the time. It must be emphasized that not only did the PSE results not correlate significantly with the polygraph results in any possible experimental configuration, but that there was, in addition, no significant relationship between results obtained by three professionally trained PSE examiners using the same tapes.

Section IV - Conclusions and Recommendations

The conclusions of the current study can be succinctly and powerfully stated. From this research, it cannot be established that there is any statistically significant relationship between results obtained from PSE examination of criminal suspects and those obtained from polygraph examination of the same subjects. In addition, there is no statistically significant evidence that multiple PSE examiners will reach similar

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conclusions when examining the same data tapes. The implication of this finding is that the results obtained from a PSE examination of an individual will vary depending upon who conducts the examination. To return to the three questions outlined for the current study, it is possible to reach the following conclusions.

1. We have no evidence that the PSE results are significantly related to those obtained from polygraph examinations. Thus, it is not possible to reject the hypothesis that PSE examination results are totally independent of those obtained by polygraph exams. It should be emphasized that this finding only enables us to conclude that the PSE is not equivalent to the polygraph. It can make no judgement as to the inherent validity of either methods. While it is unlikely it is possible that the results of the PSE examinations were accurate and those of the polygraph were inaccurate in this study. Given the large volume of data available regarding the polygraph and the mixed performance of the PSE in other studies, as outlined above, we are inclined to doubt that such is the case, however. It is clear that both of the devices cannot possibly be accurate.

2. It does not appear that the poor performance of the Psychological Stress Evaluator is the result of the forced conclusions of less-than-adequate data. The device performs no better when analysts were allowed to exclude all tapes with regard to which they had any question about their suitability.

3. It is also abundantly clear from the data that we cannot accept the hypothesis that there is any relationship between PSE results obtained by one examiner and those obtained by another examiner from the same data. This is an especially disturbing conclusion because it implies that a subject's truthfulness or deception is not a function of what the subject himself says, but rather simply a function of which particular examiner is conducting the analysis. This suggests very strongly that the PSE does not provide valid data for use in either employment or criminological investigations.

When the results of the current study are combined with those from other studies outlined above, the following conclusions and recommendations can be made. Although there is some evidence from some studies that the Psychological Stress Evaluator have validity in some situations in assessing truthfulness or deceptive intent on the part of individuals, there remain significant questions as to its value. It appears that the preponderance of research, including the current study, strongly suggests that the Psychological Stress Evaluator can do no better than blind guessing in predicting the results obtained from more conventional methods of stress measurement (especially the polygraph). In addition, numerous studies, including the current one, have found that there is no significant inter-rater reliability between various individuals evaluating the same data using the PSE. Thus, by all conventional standards of proof, we have to regard the validity and reliability of the Psychological Stress Evaluator as unproven. Indeed, it appears that by and large its validity and reliability are not only unproven, but rather are disproven.

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TABLE 1

AVERAGE RESULTS OF VOICE ANALYZER

Result of Polygraph Exam	Definitely Truthful		Inconclusive			Definitely Deceptive		Row Total
Definitely Truthful	0	2	4	2	7	1	2	18
	0.0%	5.0%	10.0%	5.0%	17.5%	2.5%	5.0%	45.0%
Inconclusive	0	2	0	4	0	1	2	9
	0.0%	5.0%	0.0%	10.0%	0.0%	2.5%	5.0%	22.5%
Definitely Deceptive	0	2	2	2	2	2	3	13
	0.0%	5.0%	5.0%	5.0%	5.0%	5.0%	7.5%	32.5%
Column Total	0	6	6	8	9	4	7	40
	0.0%	15.0%	15.0%	20.0%	22.5%	10.0%	17.5%	100.0%

Chi Square = 11.98684 with 10 Degrees of Freedom
 Significance = 0.2859
 Kendall's Tau = 0.05625
 Significance = 0.3505

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TABLE 2

RESULTS OF VOICE ANALYZER EXAM

RESULTS OF POLYGRAPH EXAM	Definitely Truthful	Inconclusive	Definitely Deceptive	Row Total
Definitely Truthful	24 17.4%	10 7.2%	27 19.6%	61 44.2%
Inconclusive	11 8.0%	8 5.8%	15 10.9%	34 24.6%
Definitely Deceptive	14 10.1%	7 5.1%	22 15.9%	43 31.2%
Column Total	49 35.5%	25 18.1%	64 46.4%	138 100.0%

Raw Chi Square = 1.49213 With 4 Degrees of Freedom.
 Significance = 0.8280
 Kendall's Tau = 0.05875
 Significance = 0.2224

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TABLE 3

RESULTS OF VOICE ANALYZER EXAM

RESULTS OF POLYGRAPH EXAM	Definitely Truthful	Inconclusive	Definitely Deceptive	Row Total
Definitely Truthful	22 18.6%	6 5.1%	23 19.5%	51 43.2%
Inconclusive	10 8.5%	7 5.9%	13 11.0%	30 25.4%
Definitely Deceptive	13 11.0%	7 5.9%	17 14.4%	37 31.4%
Column Total	45 38.1%	20 16.9%	53 44.9%	118 100.0%

Raw Chi Square = 2.24405 With 4 Degrees of Freedom.
 Significance = 0.6910
 Kendall's Tau = 0.03765
 Significance = 0.3255

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TABLE 4

RESULTS OF VOICE ANALYZER EXAM
(Examiner = Dektor Professional)

RESULTS OF POLYGRAPH EXAM	Definitely Truthful	Inconclusive	Definitely Deceptive	Row Total
Definitely Truthful	7 14.6%	3 6.3%	10 20.8%	20 41.7%
Inconclusive	6 12.5%	1 2.1%	6 12.5%	13 27.1%
Definitely Deceptive	7 14.6%	1 2.1%	7 14.6%	15 31.3%
Column Total	20 41.7%	5 10.4%	23 47.9%	48 100.0%

Raw Chi Square = 1.09605 With 4 Degrees of Freedom.
Significance = 0.8949
Kendall's Tau = 0.06304
Significance = 0.3176

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TABLE 5

RESULTS OF VOICE ANALYZER EXAM

(Examiner = Department of Commerce Employee # 1)

RESULTS OF POLYGRAPH EXAM	Definitely Truthful	Inconclusive	Definitely Deceptive	Row Total
Definitely Truthful	4 9.1%	5 11.4%	11 25.0%	20 45.5%
Inconclusive	1 2.3%	5 11.4%	4 9.1%	10 22.7%
Definitely Deceptive	0 0.0%	5 11.4%	9 20.5%	14 31.8%
Column Total	5 11.4%	15 34.1%	24 54.4%	44 100.0%

Raw Chi Square = 4.79024 With 4 Degrees of Freedom.
 Significance = 0.3095
 Kendall's Tau = 0.11933
 Significance = 0.1954

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TABLE 6

RESULTS OF VOICE ANALYZER EXAM

(Examiner = Department of Commerce Employee # 2)

RESULTS OF POLYGRAPH EXAM	Definitely Truthful	Inconclusive	Definitely Deceptive	Row Total
Definitely Truthful	13 28.3%	2 4.3%	6 13.0%	21 45.7%
Inconclusive	4 8.7%	2 4.3%	5 10.9%	11 23.9%
Definitely Deceptive	7 15.2%	1 2.2%	6 13.0%	14 30.4%
Column Total	24 52.2%	5 10.9%	17 37.0%	46 100.0%

Raw Chi Square = 2.42216 With 4 Degrees of Freedom.
 Significance = 0.6586
 Kendall's Tau = 0.13020
 Significance = 0.1691

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TABLE 7

RESULTS OF VOICE ANALYZER

(Examiner = Department of Commerce Employee # 1)

RESULTS OF VOICE ANALYZER (Examiner = Dektor Pro- fessional	Definitely Truthful	Inconclusive	Definitely Deceptive	Row Total
Definitely Truthful	0 0.0%	9 21.4%	8 19.0%	17 40.5%
Inconclusive	2 4.8%	2 4.8%	1 2.4%	5 11.9%
Definitely Deceptive	3 7.1%	3 7.1%	14 33.3%	20 47.6%
Column Total	5 11.9%	14 33.3%	23 54.8%	42 100.0%

Raw Chi Square = 11.67967 With 4 Degrees of Freedom.
 Significance = 0.0199
 Kendall's Tau = 0.11630
 Significance = 0.2101

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TABLE 8

RESULTS OF VOICE ANALYZER

(Examiner = Department of Commerce Employee # 2)

RESULTS OF VOICE ANALYZER (Examiner = Dektor Pro- fessional	Definitely Truthful	Inconclusive	Definitely Deceptive	Row Total
	9	2	6	17
Definitely Truthful	20.9%	4.7%	14.0%	39.5%
Inconclusive	3	0	2	5
	7.0%	0.0%	4.7%	11.6%
Definitely Deceptive	9	3	9	21
	20.9%	7.0%	20.9%	48.8%
Column Total	21 48.8%	5 11.6%	17 39.5%	43 100.0%

Raw Chi Square = 1.18545 With 4 Degrees of Freedom.
 Significance = 0.8805
 Kendall's Tau = 0.08410
 Significance = 0.2777

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TABLE 9

RESULTS OF VOICE ANALYZER

(Examiner = Department of Commerce Employee # 2)

RESULTS OF VOICE ANALYZER (Examiner = Dept. of Com- merce Employee	Definitely Truthful	Inconclusive	Definitely Deceptive	Row Total
Definitely Truthful	3 7.3%	1 2.4%	1 2.4%	5 12.2%
Inconclusive	8 19.5%	0 0.0%	5 12.2%	13 31.7%
Definitely Deceptive	9 22.0%	4 9.8%	10 24.4%	23 56.1%
Column Total	20 48.8%	5 12.2%	16 39.0%	41 100.0%

Raw Chi Square = 3.92791 With 4 Degrees of Freedom.
Significance = 0.4159
Kendall's Tau = 0.16551
Significance = 0.1284

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TABLE 10
INDIVIDUAL RESULTS

Case	Polygraph Results	Voice Analyst Number One	Voice Analyst Number Two	Voice Analyst Number Three
1	Inconclusive	Truthful	Inconclusive	Deceptive
2	Inconclusive	Deceptive	Deceptive	Inconclusive
3	Deceptive	Deceptive	Deceptive	Deceptive
4	Deceptive	Deceptive	Inconclusive	Truthful
5	Deceptive	Inconclusive	Deceptive	Deceptive
6	Truthful	Not Rated	Not Rated	Truthful
7	Deceptive	Truthful	Inconclusive	Not Rated
8	Truthful	Inconclusive	Truthful	Truthful
9	Inconclusive	Truthful	Inconclusive	Truthful
10	Inconclusive	Deceptive	Not Rated	Not Rated
11	Truthful	Truthful	Inconclusive	Deceptive
12	Truthful	Not Rated	Inconclusive	Truthful
13	Truthful	Truthful	Deceptive	Deceptive
14	Truthful	Deceptive	Deceptive	Truthful
15	Truthful	Truthful	Not Rated	Not Rated
16	Inconclusive	Deceptive	Inconclusive	Truthful
17	Truthful	Truthful	Not Rated	Truthful
18	Deceptive	Deceptive	Deceptive	Inconclusive
19	Truthful	Deceptive	Truthful	Deceptive
20	Inconclusive	Truthful	Inconclusive	Not Rated
21	Truthful	Deceptive	Deceptive	Deceptive
22	Truthful	Inconclusive	Inconclusive	Deceptive
23	Inconclusive	Deceptive	Deceptive	Deceptive
24	Deceptive	Truthful	Inconclusive	Truthful
25	Truthful	Deceptive	Truthful	Truthful
26	Deceptive	Truthful	Deceptive	Inconclusive
27	Deceptive	Deceptive	Deceptive	Deceptive
28	Inconclusive	Truthful	Inconclusive	Deceptive
29	Deceptive	Truthful	Inconclusive	Truthful
30	Truthful	Truthful	Inconclusive	Truthful
31	Truthful	Inconclusive	Inconclusive	Truthful
32	Truthful	Deceptive	Deceptive	Truthful
33	Truthful	Truthful	Deceptive	Truthful
34	Inconclusive	Truthful	Deceptive	Inconclusive
35	Truthful	Deceptive	Truthful	Inconclusive
36	Deceptive	Truthful	Deceptive	Truthful
37	Deceptive	Truthful	Deceptive	Truthful
38	Truthful	Deceptive	Deceptive	Truthful
39	Inconclusive	Truthful	Not Rated	Deceptive
40	Deceptive	Deceptive	Not Rated	Truthful
41	Deceptive	Deceptive	Inconclusive	Deceptive
42	Deceptive	Deceptive	Deceptive	Truthful
43	Inconclusive	Inconclusive	Truthful	Truthful
44	Inconclusive	Deceptive	Not Rated	Not Rated
45	Deceptive	Truthful	Deceptive	Deceptive
46	Deceptive	Deceptive	Deceptive	Deceptive
47	Truthful	Deceptive	Deceptive	Truthful
48	Inconclusive	Deceptive	Deceptive	Deceptive
49	Truthful	Deceptive	Deceptive	Deceptive
50	Truthful	Truthful	Deceptive	Truthful

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ARSON AND THE POLYGRAPH - 1952 REVISITED

The June 1952 issue of the ISDD Bulletin, published by the International Society for the Detection of Deception, edited by C. B. Hanscom, was devoted to arson. Several of the articles and news items produced in that issue are reprinted here as a matter of interest. In 1952 the ISDD Officers were Herbert P. Lyle, M.D., President; Nathan W. Heller, Vice President; and C. B. Hanscom, Secretary-Treasurer. The Board of Directors were Alex Gregory (Chairman), Charles M. Wilson, Colonel Ralph W. Pierce, and Freeman B. Ramey. Lyle, a practicing physician, Heller, a practicing attorney, and Pierce, a Retired Army Officer, were all in private practice. Hanscom was Director of the Department of Investigation at the University of Minnesota, Wilson was Superintendent of the Crime Laboratory in Madison, Wisconsin, and Ramey was at the Crime Laboratory of the Pennsylvania State Police in Harrisburg.

POLYGRAPH "LIE DETECTION" IN THE INVESTIGATION OF ARSON

By

Herbert P. Lyle, M.D.

The polygraph examiner in rendering assistance to the arson investigator is merely doing what is usually done in his work. The examiner is attempting to determine whether or not the subject under investigation is answering certain questions truthfully and fully. The examiner is attempting to "detect deception", he is practicing "lie detection".

There is no such instrument as a "lie detector" as you well know. There are instruments which make continuous, permanent recordings of the changes occurring in the physiology of certain bodily systems. The polygraph examiner sets up certain stimulus situations and then interprets the graphs of the subject in relation to the subject's responses to the stimuli. There is nothing mysterious or occult about the procedure.

Physiologists and psychologists have been familiar for many years with the bodily responses brought about by certain emotions. The qualified polygraph examiner of today is a person whose background, training and experience enable him to operate the instruments making the records and then interpret the records or graphs obtained. He has also been trained in other interrogation techniques. The application of the examination using the polygraph and the verbal interrogation methods jointly in an investigation comprises the polygraph technique.

The polygraph examiner may assist the arson investigator by screening a group of people for suspects, by examining suspects, witnesses,

The author, in 1952, was President of the ISDD. The paper above was first printed in the International Association of Arson Investigator's Newsletter of January 1952. It was reprinted in the ISDD Bulletin with permission of the Editor of the IAAI Newsletter, Dr. Richard C. Steinmetz.

informants and complainants.

There may be a dozen people who could have set a certain fire. After a preliminary investigation it is still uncertain as to which one or ones are guilty. In such cases a screening of all of these people would permit the dismissing of some or all as suspects. Those not ruled out by the screening would be more thoroughly investigated by both the polygraph method and other investigation procedures.

Suspects are examined by asking them specific questions concerning a certain event. The number of questions asked using the polygraph, and the length of verbal interrogation are decided by the results obtained from these interrogation methods.

The examinations of witnesses, informants and complainants are conducted to determine whether these people are revealing the true facts as they believe them, and whether they are withholding information.

Specifically, the polygraph examiner attempts to obtain answers to the classic questions; WHO - WHEN - WHERE - WHY - WHAT - WITH WHAT - HOW - TRANSPORTATION. It is hoped that the guilty suspect's intent and motive may be established and a full and complete confession result.

In the screening process only a sufficient number of tests would be made to determine the subject's normal reaction to the test procedure and the answers to several pertinent questions which would serve to rule out the innocent or uninformed person. This could very well be done by using four specific questions and one general control question.

1. Do you know how the fire started?
2. Do you know why the fire was started?
3. Do you know who started the fire?
4. Did you start the fire?
5. Have you answered all of my questions truthfully?

The above questions serve to check one another. Question 5 checks all of the questions. If the subject started the fire himself reaction will be obtained to all questions. If the subject obtained someone or was an accessory to the start of the fire reactions would be obtained to all but question 4. The subject who knows how the fire was set but nothing else will react to question 1.

When the screening process is completed, if they have not already been subjected to further examination, the suspect or suspects are questioned in detail as to their knowledge.

- Do you know if the fire was started in such or such a location?
Do you know if (accelerant) was used to start the fire?

Motive may be established in the same manner. The revenge motive, including spite and jealousy; the personal financial gain motive, whether free desire to defraud the insurer or to obtain payment for setting the fire for someone else; the concealment motive to cover a crime, shortage in inventory, to permit the perpetration of a crime during the fire and ensuing excitement; or sabotage.

Did you set the fire to get even with X?
Did you set fire to the car to collect the insurance money?
Did you set fire to the barn to burn up Y's body?
Did you set fire to the shop on instructions from (party)?

These individuals who set fires because of some abnormal mental condition may range from the person with a sexual deviation, the pathological personality type having a character and behavior disorder, the person with a hysterical reaction, to those with psychotic disorders.

The question arises as to what may be done with those persons in the way of polygraph examinations. My own personal experience with the true psychotic and the hysterical reaction type of individual is nil. I believe that some of these cases may be examined by the qualified and experienced examiner if due caution is exercised in the interpretation of the graphs. Otherwise I think that the examinations should be conducted by psychiatrists or clinical psychologists who are experienced in the method. There are very few such examiners.

The individuals of the pathological personality type can be examined successfully by the qualified polygraph examiner.

There are some things which the arson investigator can do to assist the examiner and add to the satisfactory conduct of the tests. The examiner should be supplied with a full detailed account of the case including the statements of those from whom statements have been obtained. At the very least, an accurate summary including the points of difference between statements should be given the examiner. The complete accuracy of the material submitted to the examiner is essential. Whenever there is a doubt as to the accuracy of any of the material it should be indicated to the examiner. If the first name of a person is "Chester" and the investigator gives it as "Charles" difficulties have then been injected into the examination. Names of places and locations must be correct. False reaction which will require a considerable amount of the examiner's time to correct, will be obtained when false information is given as correct.

The polygraph technique requires that simple questions, clearly phrased, containing but one thought, and which may be answered with "yes" or "no" must be used. Do not expect the examiner to ask such questions as "Did A or B set fire to the building?" He cannot do this while using the polygraph. He would ask:

"Do you know if A set fire to the building?",
and
"Do you know if B set fire to the building?"

Make a list for the examiner of the questions you want answered and then rely upon him to phrase them properly for the examination.

It is also of assistance to the examiner if the subject does not know all of the details of an occurrence. This means that they must not have been published by the press or over the air, and should not have been given to the subject by the investigator or someone connected with the occurrence in any capacity. In other words, "Don't tell everything you know about the case to everyone."

If the investigator is present at the examination he should not expect the examiner to be able to immediately answer definitely, immediately, all questions concerning the tests. A careful study of the graphs may be necessary. Very frequently additional tests may be necessary, either at the time or at some later time before a definite answer may be given. At times a definite answer is not possible, even after additional tests.

Should the subject be ill, badly fatigued, hostile due to mistreatment or for some other reason not in proper physical or mental condition for the examination, the examination should be deferred or the examinations repeated when the subject is in satisfactory condition.

The polygraph technique involves the recording of changes in the physiology of certain bodily systems as was indicated earlier in this article. If the subject's physiology is not normal at the time of the tests due to the factors mentioned or for other reasons, the tests may not be reliable.

The whole matter of the examinations may be summed up by saying that you should give the examiner the breaks you would want if you were in his place, and that the subject should be given the same consideration you would want if you were in his place.

The subject may have at stake his reputation and standing in the community, his job, his financial security, possibly even his freedom or his life. If you were the innocent subject you would want the test to be run right. You would want a competent most reliable equipment. You would expect the examiner to be honest and fair in his interpretation of the tests. Let us not ask others to accept less than we should be willing to accept ourselves under similar conditions.

The polygraph detection of deception technique has been of great assistance to many arson investigators. It can be of even greater assistance in the future when the examiner realizes the problems of the arson investigator and the arson investigator understands the problems of the polygraph examiner. The method has been tried extensively at this time and its worth when properly used is beyond question. In these days when the criminal is using modern methods in the perpetration of his crime, methods in use fifty years ago are no longer adequate in the apprehension of this individual. The polygraph is one of the contributions of science to the armamentarium of the modern investigator.

* * * * *

In his paper, "Arson and Explosives" presented by Dr. Steinmetz at the last IACC convention, as mentioned earlier in this bulletin, he says - "Undoubtedly the frequent use of the polygraph - "lie detector" - in the crime laboratory in cases involving arson suspects will help result in the solving of many more arson fires. It is not unusual for a "fire bug" to tell about many fires he has set, once he can be persuaded to talk. A competent polygraph operator can be of real assistance in the majority of arson investigations where his help is employed."

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1952 Revisited

PSYCHOPATHIC PYROMANIA

By

Richard C. Winehorst

One of the most interesting cases I have had the pleasure to run happened recently. There were two 2-alarm fires in South St. Louis, one next door to the other. The first fire began on February 16, 1952, about 3:40 a.m. The fire was confined to a three-story brick tenement house. As a result of this fire, one person died and seven more were injured. The cause of the fire was unknown. The Fire Department and the Police Arson Squad could not, after careful investigation, determine if the fire was deliberately set or accidental.

Several weeks later another two-alarm fire was sounded to the house next door to the first fire. However, no one was injured as a result of this fire. Again the Fire Department and Arson Squad could not find any concrete evidence, relative to arson. Both houses were tenement houses. Both houses were owned by the same person. Both were serviced by the same janitor.

The janitor was questioned and agreed to take a polygraph examination and was brought to the Police Laboratory. During the pre-interrogation of the janitor, I was of the opinion that this man had all the symptoms of Pyromania. The type of test used was of the relevant-irrelevant nature together with two controls. The results of these examinations were positive.

When confronted with the results of this examination, the janitor at first, denied all knowledge of setting these fires. Upon further interrogation of the janitor, he stated that on the night of the first fire he was drinking beer in a neighborhood tavern and returned to his quarters in the basement where he was employed. Before going to bed he procured some paper and kindling wood from the front of the basement and started a fire on the top of the gas furnace and then engaged in the act of masturbation. He then went into his room and fell across the bed without removing his clothing. Sometime later he awoke for the purpose of going to the lavatory and opened the door leading to the basement and found the whole basement afire. The fire was spreading rapidly and he ran from the basement and sounded the alarm.

Several weeks later, again drinking in a tavern, he returned to the basement next door to the first fire. He again procured some paper and kindling wood and started another fire. Upon completing the act he noticed that the fire had ignited the wooden joists and he ran from the basement to a restaurant to eat his supper.

The facts in this case were presented to the Grand Jury of the City of St. Louis on April 10, 1952, who returned an indictment charging the

1952 Revisited

janitor in this case a pyromaniac would be loose upon the city and no telling how much loss of life and property would be endured.

* * * * *

LIE TEST CLEARS ARSON SUSPECT*

An arson suspect was released from city jail Wednesday after a couple of little needles pointed out he wasn't the man wanted for setting fire to the Hood Street Church of Christ Tuesday midnight. The suspect, a Negro, was arrested by police and deputy sheriffs an hour after the fire was doused when he allegedly ran into a Highway 31 barbecue stand and said he and another man set the fire. But Detective Captain Wiley Stam said someone had their wires crossed on this information. Henry Sanders, operator of the barbecue cafe, who was questioned about furnishing this information to police, told Stam he wasn't even at the cafe when the man came in, and he never saw him. Stam said a check with other witnesses at the cafe failed to uncover anyone who had heard the suspect state he set fire to the church. "I think someone must have been a little hysterical and was probably hearing things," Stam said.

But it was the two little needles on the city's lie detector machine that really opened the jail doors for the Negro. Identification Officer Sam C. Fuller gave the suspect a lie detector test Wednesday afternoon and police said the results left no doubt that the man was innocent of setting any of the recent fires. So because the little needles didn't bobble, police are again without a suspect for the series of recent incendiary fires.

During the test the man was asked questions concerning the other fires, at Sanger Avenue School, First Baptist Church and the Turner Street Baptist Church, but the chart showed the same reaction when he denied any connection with those fires, Fuller said.

Reprinted from a Waco, Texas newspaper of July 19, 1951 in the June 1952 issue of the ISDD Bulletin.

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PSYCHOPATHIC PYROMANIA

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Richard C. Winehorst

One of the most interesting cases I have had the pleasure to run happened recently. There were two 2-alarm fires in South St. Louis, one next door to the other. The first fire began on February 16, 1952, about 3:40 a.m. The fire was confined to a three-story brick tenement house. As a result of this fire, one person died and seven more were injured. The cause of the fire was unknown. The Fire Department and the Police Arson Squad could not, after careful investigation, determine if the fire was deliberately set or accidental.

Several weeks later another two-alarm fire was sounded to the house next door to the first fire. However, no one was injured as a result of this fire. Again the Fire Department and Arson Squad could not find any concrete evidence, relative to arson. Both houses were tenement houses. Both houses were owned by the same person. Both were serviced by the same janitor.

The janitor was questioned and agreed to take a polygraph examination and was brought to the Police Laboratory. During the pre-interrogation of the janitor, I was of the opinion that this man had all the symptoms of Pyromania. The type of test used was of the relevant-irrelevant nature together with two controls. The results of these examinations were positive.

When confronted with the results of this examination, the janitor at first, denied all knowledge of setting these fires. Upon further interrogation of the janitor, he stated that on the night of the first fire he was drinking beer in a neighborhood tavern and returned to his quarters in the basement where he was employed. Before going to bed he procured some paper and kindling wood from the front of the basement and started a fire on the top of the gas furnace and then engaged in the act of masturbation. He then went into his room and fell across the bed without removing his clothing. Sometime later he awoke for the purpose of going to the lavatory and opened the door leading to the basement and found the whole basement afire. The fire was spreading rapidly and he ran from the basement and sounded the alarm.

Several weeks later, again drinking in a tavern, he returned to the basement next door to the first fire. He again procured some paper and kindling wood and started another fire. Upon completing the act he noticed that the fire had ignited the wooden joists and he ran from the basement to a restaurant to eat his supper.

The facts in this case were presented to the Grand Jury of the City of St. Louis on April 10, 1952, who returned an indictment charging the

The author was an associate member of the ISDD and a Detective on the St. Louis Metropolitan Police Department.

THE POLYGRAPH AS AN AID IN ARSON INVESTIGATION

By

Glen H. McLaughlin

Few instruments available to modern investigative procedure are so widely discussed and so little understood as the so-called "lie detector". This is perhaps not altogether the fault of the public or of the officers who may have formed opinions on limited information. It may also be to some extent a result of the fact that we, as polygraph operators, have failed to make full information available as to the correct application of the lie detector test. As a consequence, the subject of lie detection is one that, insofar as the public is concerned, may cause the raising of eyebrows.

Today we are not so much concerned with public attitude except as it may be focused on you as an investigator when you suggest its use in cases coming to your attention. Better results may be obtained when you are better informed and when you have a better understanding of its possibilities and limitations.

The polygraph is not the complete answer to the problem of law enforcement. It has its place in investigative procedure and serves a very useful purpose. As you well know, there is no such instrument as a lie detector. The instrument usually called by that name is one which makes continuous and permanent recordings of changes accompanying certain bodily functions. During the polygraph test stimuli, usually in the form of questions, are presented to the subject and the operator interprets the subject's responses to the stimuli and expresses an opinion based on his interpretation of these reactions. Since the principal use of deception testing equipment is for the purpose of determining the truthfulness of an individual, the name "lie detector" has come into common usage and we, too, will employ it.

Let us think for a moment about the purpose of the polygraph test. Of course, the answer is readily at hand. It must be "to determine if the subject is telling the full truth about his knowledge, or lack of knowledge, of a particular incident or situation."

Frequently the question is raised to the advisability of the polygraph since generally the results are not used in court. To us this is such a foolish attitude as to readily not deserve an answer; however, it does serve the investigator in determining a course of action. Not infrequently circumstances encountered in the beginning of the investigation may involve several subjects who may possibly be implicated. One of the

The author was, in 1952, Chief of the Bureau of Identification and Records, Texas Department of Public Safety, Austin, Texas. He was an early member of the ISDD and in 1952, Chairman of the Membership Committee. This paper was presented at the 8th Annual Seminar and Training Course for Arson Investigators at Purdue University, April 28 to May 2, 1952.

problems presenting itself to the investigating officer is to correctly evaluate the circumstances and the available evidence in order that he may concentrate his investigation along the lines which are likely to produce the most results. The polygraph is extremely useful in assisting the investigator in deciding the right course of action and to help him to determine which path to following order that the energy expended and the time consumed may be more profitable.

The procedure followed may be that of screening individuals who appear to have guilty knowledge concerning a particular offense, and then as more specific information is available, to follow through with a testing procedure to determine specific guilt on the part of the individual or individuals.

In addition to determining the guilt or guilty knowledge of the subject, the polygraph may also be useful in identifying and locating evidence which might not otherwise be found. The success of the polygraph testing depends very largely upon the availability of specific information developed in the investigation.

One of the best illustrations of the use of the polygraph for this type of work, in our experience, was in connection with a murder in West Texas. The proper application may be made in any investigation which may be undertaken. In this particular case a man was under investigation in connection with the death of his wife whose body had been found in the home which she was occupying alone since she and her husband had separated. The post mortem examination revealed that death was the result of several blows with a blunt instrument. The identify of the instrument was not known. A series of questions was used, which called for specific responses on the part of the husband. The result indicated the he was responsible for the death of his wife. Questions were then asked in an effort to identify the weapon. Various kinds of weapons were included in questions and the reactions indicated that the man had used a piece of pipe. Once it had been determined that the pipe was not taken away from the scene by the subject when he left, questions were asked concerning the direction from the house in which the pipe was disposed of. Reactions indicated it was southwest of the house. Then several questions were asked as to the distance from the house. The piece of pipe was located within a hundred yards of the house in a southwesterly direction.

When the operator has reached the conclusion that the subject has guilty knowledge, the psychological advantage which had already been established through the testing procedure may be followed by an interrogation and frequently the subject will admit his participation in the crime. It has been the experience of the polygraph laboratory of the Texas Department of Public Safety that 65% of the subjects who have been diagnosed as guilty make written statements concerning their guilty before leaving the polygraph room. The polygraph is a definite aid to interrogation as well as an instrument for determining guilt.

Methods for the detection of deception are based upon the fact that various autonomic and voluntary bodily changes accompany deception, particularly when the subject is aware of the examination procedure and the purpose of the test. The mental processes need not be fully understood to notice the apparent effect in the bodily changes accompanying the emotional disturbances. When the subject is aware of the purpose of the

test, the fear of the consequences of exposure may enhance the emotional responses which accompany the stimuli. Often a conscious effort will be made to prevent exposure.

We are primarily concerned in changes in pulse pressure, pulse rate and amplitude; changes in respiration and in the electrodermal response; and in some instances voluntary and involuntary muscular movements. All of these can be conveniently recorded.

Before applying our discussion of the lie detection technique more specifically to the problem of the investigation of arson, I think it might be wise for us to discuss briefly the accuracy of the testing procedure.

It is difficult to obtain information that will permit us to properly validate the results of polygraph testing. In the polygraph laboratory of the Texas Department of Public Safety, we have sought to make follow-up checks of the accuracy of the opinions given; utilizing as the basis for confirmation of results the admission of the individual himself; the admission or confession of others (thereby exonerating individuals who may have been diagnosed as having no guilty knowledge), and other reliable proof which has led to the conviction in court of the subjects examined. We have found that opinions given have been correct in 99.26% of the cases. Of all of the subjects examined 40.5% have been diagnosed as guilty or having guilty knowledge; 45.3% have been diagnosed as innocent and 14.2% have been reported as indefinite or unable to determine. The 99.26% is the evaluation of the opinions given. We frankly admit that in 14% of the cases handled we have been unable to give a definite opinion.

It is interesting to note that in the period covered by this report, where it is shown that indefinite opinions are given in 14% of all of the cases handled, that of the arson cases handled, indefinite reports were given in only 8% of the cases.

The percentage of arson cases handled by the Texas Department of Public Safety, of course, will not reflect an accurate picture throughout the country, but merely as a matter of interest, we would like to point out that during the fiscal year ending August 31, 1951, a total of 395 polygraph cases were completed. Of these, 44 were in connection with arson investigation, representing 11% of the total. Arson cases handled were fourth in frequency. The five most frequent crimes investigated being burglary, 103; theft, 93; murder, 58; arson, 44; and armed robbery, 16. Of the 44 arson cases examined, 16 subjects were diagnosed as not guilty, 25 were diagnosed as guilty and of these, 20 made statements. Only 3 indefinite charts were run.

We have already pointed out, and have tried to emphasize in our discussion of the reactions demonstrated by subjects examined in connection with investigation of certain arson cases, the success of the polygraph test depends to a very large degree upon a complete understanding of the subject and a complete exchange of information between the investigator and the polygraph operator. It is to be noted that the more specific the information, the more specific the results; conversely, the more general the information, the more general the results. The polygraph is not a magic instrument. It is not possible to get something for nothing. The

more complete the investigation, and the more exact or accurate the information, the better the results will be.

We cannot emphasize too strongly the usefulness of the so called "hidden detail" or circumstances developed in the course of the investigation, information on which can only be available to the subject being examined from his participation in the crime or guilty knowledge of it.

Again I believe that an illustration will serve to emphasize this point.

A few years ago a man was being examined in connection with the death of his former wife's husband. This man had driven a considerable distance from East Texas to a West Texas town, had entered the residence occupied by his former wife and her current husband and had killed the husband by firing a .22 pistol while held against the temple of his intended victim. The defendant owned a .38 caliber revolver which was in his possession at the time that he was arrested in connection with this investigation. He did not have a .22. The officers in conducting the investigation were of the opinion that death had been inflicted with a .38 revolver. At autopsy, fragments of the bullet were removed and were submitted to the firearms laboratory for examination. Upon examination it was determined that these fragments were from a .22 and could not possibly have come from a .38. At the time of examination of the subject, no one knew that the deceased had been killed with a .22 except the polygraph operator, the firearms examiner, and the subject responsible for the man's death. Questions were then asked as to whether or not the subject had killed the deceased with a .45, .44, .38, .22, .25 and other caliber weapons. As reactions were obtained only the .22, we could be sure that the subject had guilty knowledge. Confronted with this, a statement soon followed.

The handling of the subject prior to a polygraph examination is a matter which deserves some consideration. Best results are obtained when the subject is in good physical and mental condition. Not infrequently, we have observed that during the examination of an individual the reactions to the pertinent questions may grow dim as the subject becomes exhausted. When he is permitted to rest and to restore some of his vitality and is then re-examined, reactions of great intensity may again be observed.

We emphasize again that the polygraph is not the complete answer to law enforcement, therefore it is not the complete answer to arson investigation. However, where a diligent search has been made for information and accurate information is available and when the polygraph examination is conducted by a competent and trained man, good and useful results may be obtained. The polygraph is an instrument of modern police science which should not be overlooked by the arson investigator.

* * * * *

Electrodermal

Venables, P. H. and Fletcher, R. P. "The Status of Skin Conductance Recovery Time: An Examination of the Bundy Effect," Psychophysiology 18 (1) (January 1981): 10-16.

The independent status of recovery of the skin conductance response has been an important assumption underlying work in which electrodermal response to different task demands have been examined or in studies in which different psychopathological groups have been differentiated. Doubts on this issue have recently been raised by Bundy and Fitzgerald. The present study examines data on this point from two samples and suggests that it is still worthwhile to treat SCR recovery as an independent variable. [Author abstract]

Reprints may be obtained by writing to Dr. Peter H. Venables, Department of Psychology, University of York, Heslington, York, YO1 5DD, England.

Edelberg, Robert and Muller, Michael. "Prior Activity as a Determinant of Electrodermal Recovery Rate," Psychophysiology 18 (1) (January 1981): 17-25.

The study attempts to assess Bundy's 1974 report that electrodermal recovery rate (ERR) can be accurately predicted by a variable, X, based on the recency and amplitude of prior activity. Five different types of assessment were made with the following results. (1) ERR was significantly related to X in two paradigms which avoided the temporal constraints of Bundy's experiment. (2) ERR of responses to repeated reaction time stimuli could be altered by controlling the magnitude of X. (3) A change in stimulus from a reaction time signal to a loud noise failed to change ERR when the value of X was held constant and when response amplitude was treated as a covariate. (4) The rank order of ERRs for reaction time signals and for loud sounds could be reversed by controlling the magnitude of X. (5) Differences in ERR associated with a cold pressor exposure and a mirror tracing task were reevaluated taking into account prior activity. Analysis of covariance with Bundy's X as the covariate failed to erase the difference. However, with a new covariate, namely the number of electrodermal responses in the 15 sec before the measured response, the difference in ERR became nonsignificant. In agreement with Bundy, prior activity appears to represent a major determinant of recovery rate. It is suggested that for those studies reporting ERR differences, attention should be focused on the biobehavioral implications of the likely differences in prior activity. [Author abstract]

Reprints may be obtained by writing to Dr. Robert Edelberg, Department of Psychiatry, DMDNJ-Rutgers Medical School, Piscataway, New Jersey 08854.

BOOK REVIEW

The Kinesic Interview Technique by Frederick C. Link and D. Glen Foster. Anniston, Alabama: Interrotec Press, 1980. 76 pp. double spaced, illustrated. Available from Interrotec Press, P. O. Box 2264, Anniston, Alabama 36202 at \$7.95 per copy plus \$1.65 for postage and handling.

A REVIEW

By

Norman Ansley

This is a short text on how to analyze and take advantage of nonverbal behavior during an interview. The book offers no new material, but presents a useful core of concepts, with some details, that will help everyone who conducts interviews. The authors are careful to caution the practitioner to establish the interviewee's normal behavior patterns before deciding on what constitutes meaningful behavior, to look for clusters of behaviors indicating stress, and to recognize that the interviewee will be observing the interrogator's behavior. In regard to the latter, there are chapters on the interrogator's image and the use of color (They prefer blue). These chapters are weak, and in the next edition should be developed or deleted.

The heart of the text is chapter six on body language. Here the authors have apparently been strongly influenced by the work of Richard O. Arther, and the chapter is a summary of the terms and the meaning to be given to observable behaviors. The text is tempered, and hesitates to give absolute and precise meanings to each behavior, an approach that is both the strength and weakness of Arther's detailed teaching.

There is an excellent chapter on self-initiated verbal behavior, with observations on the analysis of verbal responses, the subject's attitude, and the various ways in which people say no. While much of this has been said before in other books in interrogation, this is a practical and useful summary.

The chapter on interviewing with structured questions is no more than an adaptation of questions selected from the pretest phase of John Reid's polygraph technique. The author's also relied on Frank Horvath's analysis of responses to these structured questions.

The chapter on kinesic control of the interview is disappointing. Where I expected to see a thorough treatise on the exploitation of what has been learned about detecting deception in nonverbal communications, there was only a description of what Richard O. Arther has often said about moving in very close to the subject, followed by five other principles that are useful in eliciting admissions. Principles relating to mimicking, attacking the middle zones of the body, conditioning to give a yes answer, pretending boredom when discussing the matter under investigation, and conditioning the subject so he will attempt to please you, are not altogether related to kinesic interviewing, but relate to general principles of interrogation. In addition, these principles should have been developed earlier in the book, then illustrated with cases and examples of the application of kinesic interrogation, to give them meaning.

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Surely the authors should have been more generous in attributing ideas, concepts, and methods to the original proponents and authors. Even in an informal text such as this one, much more should have been said about the contributions of their colleagues in the polygraph profession to the field of kinesic interrogation. In this respect, the "Partial List of Sources" in the back of the book and brief mention in the introduction is inadequate recognition of the contributions of others.

Despite the book's shortcomings, it is worth reading; and may find a place as a supplemental text in polygraph and interrogation courses.

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