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THE ROLE OF ATTENTION
IN "LIE-DETECTION"

by

DAVID A. DAY
B. A., College of the Holy Cross, 1966
M. A., University of Windsor, 1968

A Dissertation
Submitted to the Faculty of Graduate Studies through the
Department of Psychology in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Philosophy at the
University of Windsor

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ABSTRACT

In the present study, an attempt was made to investigate a theoretical formulation which was constructed to explain the behavioural phenomenon known as "lie-detection". The theory constructed was labelled as an "attention" theory. It was offered as a substitute to the more generally accepted "threat of punishment" theory.

In order to present evidence relevant to the above mentioned theories, four groups of subjects were formed. Two groups of subjects received instructions to the effect that they were participating in a "lie-detection" experiment, whereas the other two groups received "neutral" instructions. The instructions also differed along the dimensions of personal involvement and threat to self-esteem. GSR records taken during the experimental sessions were evaluated in a "blind" fashion. Detection rates were significantly better than chance in all four groups, with no significant differences in detectability between the groups. In effect, the "neutral" groups were unaware that they were participating in a "lie-detection" experiment and yet their detection rates were similar to the two aware groups. Attention rather than lying and/or motivation to "beat the machine" was seen as the sufficient condition for detection.

PREFACE

The present investigation and theoretical discussion proceeded from a major paper submitted to the University of Windsor in 1968. In that study the present writer found that lying was not a necessary factor in the detection of deception. These data were difficult to incorporate into the existing theoretical formulations or explanations of the phenomenon. It was this concern for explanation which prompted the present theory and experimental manipulations.

The author was especially fortunate to have had the direction of Byron P. Rourke, Ph.D. His tolerance and humanism allowed for an unfortunate but necessary change in research topic. Similarly, Robert C. Fehr, Ph.D. and Cornelius J. Holland, Ph.D., despite an unreasonably short notice agreed to cut short their vacations to assist in the direction. Still further, J. F. Kubis, Ph.D., of the University of Fordham, agreed to render his expert opinion at the thesis defense. This again intruded upon an already over-burdened schedule. The writer is greatly indebted to Arthur A. Smith, Ph.D., whose technical knowledge and practical suggestions proved again to be essential. Similarly, Doctors Auld, Nanikas, Hirota and Starr generously donated their time, interest and useful insights.

Special acknowledgment is made to Miss Valerie Hamrlik for her patience and care in the preparation of the manuscripts.

Finally, gratitude goes to all those subjects who participated in the research proper.

There are, however, some gifts for which the mere expression of gratitude seems an insult. I should like to mention again, Robert C. Fehr, Ph.D., former Head of the Psychology Department at the University of Windsor.

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CHAPTER I
INTRODUCTION
"Lie-Detection"

The phenomenon known today as "lie-detection" has a long history which includes the use of diverse techniques of questioning and varying behavioural indices of deception. In tracing this history, four points will be made. First, the "trials" -- or, in psychological parlance, "measures used" -- for detecting a guilty person were often fascinating but crude when compared to twentieth century standards. Second, the technique of interrogation was again crude in appearance, but rested on essentially the same theoretical foundation as one of two general methods of interrogation in use today. Third, the validity of these techniques is open to serious question. Fourth, the theories which attempt to explain how "lie-detection" works do not readily explain recent research findings.

History

Trovillo (1939) constructed a well documented history of "lie-detection". He pointed out that many different tests for the veracity of statements have evolved in various areas of the world. Zoroaster, it is fabled, proved the truth of his words and his god to the Persian king by undergoing an ordeal, which in that country,

determined the veracity of one's spoken statements. One such ordeal involved touching one's tongue to a red hot iron nine times. If the unlucky accused failed to scorch his tongue, he was, of course, innocent. It is clear that a very wet tongue may have saved the accused, but fear of being discovered (or fear of being burned) could have dried the mouth and tongue and led to a guilty verdict. Still another ordeal involved a local witchdoctor more directly. The witchdoctor worked himself into a trance and then leapt at the suspect, smelling him feverishly. If necessary, he performed this ritual on each member of the tribe. Distinctive odors indicated guilt. It is possible that the fear of being caught produced the distinctive odor.

Boiling water was used for one ordeal. All the suspects immersed their arms first into cold water and then into boiling water. The one amongst them who blistered by the next day was declared guilty.

The digestive tract has provided considerable room for variation in "lie-detection" technique. One method involved fasting for twelve hours, swallowing a small amount of rice and following it with a bark-coloured water. If all the rice was ejected, the accused was considered innocent. A slight variation involved eating odum wood followed by a pitcher of water. The innocent here were supposed to be able to retain the mixture.

Another variation involved chewing rice and spitting it out. If the matter was dry or mixed with blood, the suspect was obviously guilty.

The Roman Catholic church in the dark ages had a similar ordeal. If the accused could not swallow a mixture of barley and cheese, he was, of course, guilty. (Trovillo (1939) mentioned that clergymen, no matter how notorious, were never unable to swallow the mixture.)

In light of Frank's work (1961) it seems quite reasonable to hypothesize that many of these ordeals did work to a limited extent. For those who believed strongly enough in the local deities and customs, certain physiological reactions might logically have followed certain rituals. An accused who sincerely believed in the efficacy of the ritual might well have endured such fear as to yield a dry mouth and subsequent detection. In light of some of Frank's examples, a failure to blister after placing an arm in boiling water does not seem totally impossible.

On the other hand, those who were more intelligent (or outside the cultural myth), such as the clergy of the Middle Ages, probably would have had little trouble in eating their barley and cheese without an undue amount of fear.

According to Inbau and Reid (1966, p.1), the first attempt to use a "scientific" instrument in order to

detect deception was made in 1895. Using a "hydro-sphygmograph" Cesare Lombroso obtained crude readings of the presence or absence of blood pressure pulse changes under questioning about a criminal offense. In 1915, William Molton Marston measured blood pressure in a deception situation with a sphygmomanometer (an instrument used by physicians to record a patient's blood pressure). Marston (1917) reported 96 per cent accuracy using this technique.

Inbau and Reid (1966, p.2), noted that Vittorio Benussi was the first to publish an account using respiration changes as symptoms of deception. His publication was in 1914. H.E. Burtt (1921) confirmed Benussi's findings, at least in part.

An instrument capable of taking three measures (blood pressure, pulse and respiration) was constructed by Larson in 1921. According to Inbau and Reid (1966, p.3), Leonarde Keeler developed a similar but a more satisfactory machine in 1926. Both of these instruments were foreshadowed by an ink polygraph developed in 1906 by Sir James Mackenzie, an English heart specialist. He used the device solely for medical purposes.

Trovillo (1939a) noted that Munsterberg, around the turn of the century, pointed to the possibility of using the galvanic skin response (GSR) for "lie-detection" procedures. Summers (1937) reported spectacular results

using this measure as a means of detecting deception. This measurement was eventually included in the Keeler polygraph in 1939. Blood pressure, respiration rate and GSR have been the major physiological measures associated with "lie-detection" since that time (Davis, 1961).

Measures Used at Present

It has long been known that the body reacts physiologically to almost any stimulus. To explain how these physiological reactions have been used to "separate deception from truth" is the purpose of the present section.

Two measures of breathing can be taken, the amplitude and cycles per second. When a subject responds to questions an increase in amplitude is the result. When a subject is lying, an increase in amplitude also results but it is not as large as that which occurs with truthful responses (Davis, 1961). Inbau and Reid (1966, pp.42-46), listed several "respiration deception responses" which, unfortunately, have not been subjected to rigorous experimental testing. These authors noted that a subject often stopped breathing for several seconds following a test question. They also noted an amplitude increase which occurred gradually with the amplitude waves increasing in steplike fashion. Quite similarly, the baseline as well as the amplitude peaks might rise gradually. The cycles per second has been observed to increase for some individuals and decrease for others,

after the relevant question. Any erratic breathing response at the time of the relevant question has also been considered indicative of deception.

Respiration has been shown to discriminate poorly in a short testing situation but becomes a more reliable measure in long testing situations (Davis, 1961). It has been noted that respiration is subject not only to autonomic nervous system but to central nervous system influences and is seemingly more easily manipulated by subjects. This manipulation also affects other physiological measures such as the GSR. Inbau and Reid (acknowledged experts in "lie-detection") consider this (respiration) to be their most reliable measure (1966, pp. 40-41).

According to Davis (1961), however, blood pressure is relied on by most practitioners. The criterion here has been that there is a greater rise in blood pressure after a lie has been told (Davis, 1961). Inbau and Reid (1966, p.58) mentioned essentially the same criterion. Davis (1961) also noted that this measure, like respiration, is better in long rather than short testing situations.

Davis (1961), concluded that GSR was the best indication of deception in short time intervals, but poorer in longer questioning periods. There have been many criteria of deception used with this method.

Block, Rourke, Salpeter, Tobach, Kubis and Welch (1952),

listed several:

- 1) Relation of the reaction to the critical stimulus and the reaction to the preceding non-critical stimulus.
- 2) Relation of the reaction to the critical stimulus and the reaction to the following non-critical stimulus.
- 3) Relation of the reaction to the critical stimulus and the combined reactions to the preceding and following non-critical stimuli. (The GSR is larger for the above situations at the critical response).
- 4) Consistency of the critical reaction during the entire record.
- 5) Secondary characteristics:
 - a) Occurrence of additional reactions.
 - b) Prolonged series of reactions superimposed on the critical reaction.
 - c) Change in baseline following the critical reaction
- 6) "Relief" phenomena following the critical reaction as indicated by no reaction to the following question.
- 7) Height and width of the critical reaction which sometimes show low correlations, due to secondary reactions.
- 8) Irregularities in the record due to:
 - a) Frequent secondary reactions.
 - b) Pronounced changes in base resistance.

For their objective measurements these authors (Block, et al., 1952) relied on their third criterion which dealt solely with magnitude change. Most recent experimental studies in the literature deal with magnitude change in one form or another and it seems to be the most widely used criterion: Gustafson and Orne (1965) "largest mean response", Gustafson and Orne (1965a) "highest response", Gustafson and Orne (1964) "greatest change" (no mention of baselines), Gustafson and Orne (1963) "the difference in skin resistance between the level immediately prior to the stimulus and the lowest level reached in the next four seconds," Lykken (1959) "largest response,"

Lykken (1960) "rank order of amplitude" (again, no mention of baselines), Kugelmass (1966) maximal change from baseline at time of presentation of the number."

Inbau and Reid (1966, p.220), are highly critical of the GSR as an accurate measure in real life "lie-detection" procedures. These authors have been unable to obtain a high degree of accuracy using this measure. However, laboratory investigations such as those mentioned above have found it to be a consistently accurate measure. Davis (1961) hypothesized that the difference may be due to the fact that the procedures used by Inbau and Reid (1966, p.220) postulated that "the primary, if not the only factor involved (in GSR) is the alertness and attention required for lying about a chosen card. The subject views it as a game. He does not have the fears which affect a person trying to lie about a crime or other serious incident". Woodworth and Schlosberg (1956, p.143), have documented evidence which seems to corroborate Inbau's and Reid's claim. They stated that "adrenin seems to inhibit the GSR, contrary to the expected effect of this sympathomimetic substance. Hence GSR may not be an adequate measure of changes in activation level during strong emotion." This controversy as to the effectiveness of the GSR is, however, still largely unresolved (Kugelmass, 1968, 1968a).

There have been several other measures which have

have been used or proposed which have not, as yet, gained practical acceptance. The pulse rate is the most commonly considered amongst these measures. The predominant lie response is a slowing of the pulse rate reaching a peak after five seconds. This method has been shown to have only moderate value (Davis, 1961). Volume pulse is another measure which has been shown to be related to blood pressure. The observed reaction to a lie response has been a decrease in the amplitude of the pulse wave which is a manifestation of constriction of the arterioles in that region (Davis, 1961).

Muscle movements have received some research in recent years (Kelley, 1953). Technically known as an electromyogram, a tensing or a twitching of the muscles has been observed in relation to deception. Inbau and Reid (1966, p.207) have measured muscular movements and tension as indirect rather than direct indicators of deception. That is, many subjects have been able to attain specific blood pressure readings by a tensing or relaxing of the muscles in their arms and legs. Inbau and Reid stated that, by separate recording of these muscular movements they have been able to pinpoint individuals who were consciously trying to disguise the blood pressure tracing.

Observing the eye has led to several indices of deception. By one method, guilt or innocence was determined

by observing which of two or more objects the eye focuses on. (Davis, 1961). Counting the number of eye movements or the characteristic "shifty eye" has also been recorded (Berien, 1940, 1942). Berien (1943) and Harney (1943) have reported success by measuring the size of the pupil. The major difficulty with these measures has been the recording devices themselves. Using a camera would be the most accurate means of recording, but some investigators may take objection to this technique because of the delay required for having the film developed. This is especially crucial in these techniques which require instant feedback for the examiner. This will be discussed in some detail in a later portion of this paper.

Velocity of the pulse wave, an indirect measure of blood pressure, has also been proposed. The pressure increase in an artery following a systole has been shown to be propagated through the fluid by a known equation. Picking up the increase in pressure from two different points in the artery would yield a measure of this velocity (Davis, 1961).

Careful measurement of gastrointestinal reactions has also been suggested. However, these reactions and their discovery are usually quite slow (Davis, 1961). The electroencephalograph or brain wave recordings has also been suggested (Oberman, 1939). Most recently the quality of the subject's recorded voice has been researched

with fruitful and intriguing results (Kubis, 1972, personal communication).

Techniques Used

There have been developed in the history of "lie-detection" several procedures or techniques in which the above physiological measures have been used. These techniques or procedures can be put into two rather broad classifications.

First, there is the "undisguised question method" (Burack, 1955), referred to recently as the "guilty person technique" (Lykken, 1960). Most field practitioners have used some variant of this method (Burack, 1955). It proceeds historically from the direct confrontation method mentioned in the history of the more primitive procedures. It represents a small methodological advance in that several questions, rather than one global "are you guilty" trial, are presented. Some of these questions were obviously relevant to the crime, others were not. Each suspect was used as his own control. If he yielded responses on the relevant questions which conformed to the many criteria mentioned above, but did not so respond on the irrelevant questions, he was considered guilty.

It gradually became obvious that the relevant question "Did you kill _____?" planted among irrelevant questions such as "Are you presently living in this

city?" yielded reactions interpretable as deception, even amongst the most innocent of subjects. "No study has ever shown that innocent suspects invariably show less emotion than guilty suspects when asked obviously implicating questions (Burack, 1955, p. 415)". Thus the technique, despite the sophistication of the measuring instruments used and the addition of baseline readings from innocuous questions, is still at its heart a direct confrontation in which the suspect is asked, "Are you guilty?" An individual's reaction to this situation will depend strongly on his degree of belief in the cultural myth, in this case the trappings of science. False positive judgments of deception because of innocent fear and false negative judgments of deception because of complete disbelief (as in the case of the clergy of the Middle Ages) are complicating factors in such a procedure.

Confessions obtained either before or after the trial are not inherent to this technique. They are equivalent to presenting the suspect with a situation in which he is told that his guilt will be obvious or is obvious because the interrogator possesses this infallible lie-detector record, this unchallengeable witness, or this irrevocable piece of evidence. In each case, the suspect is frightened by belief alone into confessing, whether the witness really exists or not, whether the lie-detector is valid or not.

In light of the complicating factors mentioned above, variations on this technique have been developed. These variations have attempted to render a more sound theoretical basis for the procedure. The following example was taken from Inbau and Reid (1966, pp. 26-33 and 125-127), acknowledged as the leading book in the field. (J. F. Kubis, personal communication). These writers have labelled this a "control question technique". It would resemble the following example: (Joe "Red" Blake is suspected of killing John Jones and stealing his watch last Saturday night). The sequence of questions would be as follows:

- 1) Do they call you "Red"? (irrelevant question)
- 2) Are you over 21 years of age? (irrelevant question)
- 3) Did you steal John Jones' watch last Saturday night? (relevant question)
- 4) Are you in Chicago now? (irrelevant question)
- 5) Did you shoot John Jones last Saturday night? (relevant question)
- 6). Besides what you told about, did you ever steal anything else? (control question)
- 7) Did you ever go to school? (irrelevant question)
- 8) Were those your footprints near John Jones' body? (evidence connecting question)
- 9) Do you know who shot John Jones? (know who question)
- 10) Did you ever steal anything from a place where you worked? (control question)

The relevant questions, three, five and eight as well as the irrelevant questions, one, two, four and seven are all obviously undisguised. Since, as previously mentioned innocent subjects are apt to respond to the relevant questions, control questions six and ten were added. The

hypothesis is that, when a subject says "no" to these control questions, he is lying. Elaborate procedures are explained which aid in the choice of these control questions and, after the test, the subject is asked whether he was truthful or not in answering these questions. If he was being truthful, another test with new controls is given in an effort to obtain a response which is untruthful. The purpose of these procedures is to compare a subject's lie-reaction on the control question to his reaction on the relevant question. If his lie-reaction on the control question is equal to or greater than his reaction to the relevant questions, he is considered to be innocent. If, however, his reactions to the relevant questions are greater than his reactions to the control questions, he is considered guilty. It is assumed that an innocent person will react emotionally to a forced lie, while a guilty person will react less emotionally to a forced lie. Both of these assumptions rest upon the more basic assumption that the control and relevant questions have equal import to the innocent subject. It seems doubtful that these assumptions are met in all circumstances where this procedure is used. It is quite reasonable to hypothesize that, even in the example given above an innocent subject would react much less emotionally to a question such as "Did you ever steal anything?" than to a question which has obvious import with regard to innocence or guilt such as, "Did you steal John Jones' watch last Saturday night?"

In addition to these procedures, an additional "guilt complex" question is often added. This type of control is intended to pinpoint those suspects who are reacting as was hypothesized above. This question would resemble the following: "Did you shoot and rob Jim Smith at the same location two Saturdays ago?" If the suspect's reaction to this accusation is equal to or greater than the relevant question, he is considered innocently nervous. If his reactions to the relevant questions are greater, however, he is considered guilty. This situation again assumes that the examiner is able to make this control question as relevant as is the real crime question. This is doubtful, since the real crime has involved several questions, this fictitious crime only one and the real crime has probably received much notoriety, this fictitious one none at all. Inbau and Reid (1966) repeat these several questions in what can be considered an attempt at reliability. However, repetition of this sort does nothing to overcome the problems with validity alluded to above.

Lee (1953, p.84) added another control question. This he called a "secondary relevant" question. For example, "Did you kill White?" is considered a major relevant question, whereas, "Did you hit White with a lead pipe?" is considered a secondary relevant question. If a subject reacts to both questions, Lee considered him to

be guilty, since all such questions should be threatening to a guilty person. If, however, the subject reacted to the major but not to the secondary question, he was considered innocent, since the secondary questions are meaningless and non-threatening. These again are assumptions and there is no research in the literature which supports such claims. It can be hypothesized, however, that Lee's "secondary relevant" question rests on the hypothesis that innocent people would not know that a lead pipe was used and therefore, such a question would be meaningless and non-threatening. If this be the case, it is actually a crude forerunner to the second major category of techniques to be delineated.

This second major category of "lie-detection" techniques has been termed the "disguised questions test" (Burack, 1955), the "guilty knowledge technique" (Lykken, 1960) and the "indirect or association method" (Lee, 1953). This technique rests on a more firm theoretical base. The principle is simple and has been the clever maneuver of many a Hollywood crime fighter. After the criminal has made a relatively idle statement, the detective reminds him that only the guilty person could have known that particular detail of the crime. In the field of "lie-detection" a situation is deliberately constructed to take advantage of this circumstance which seldom presents itself to the weary investigator. It

adds the use of sophisticated measuring equipment.

One general variation of this technique involves presenting a relevant detail of a crime amongst several similar but irrelevant details. A typical case would resemble the following. Suppose a diamond ring has been stolen. One group of questions would be:

"Do you know whether a fur coat was stolen?"

"Do you know whether a gold pin was stolen?"

"Do you know whether a diamond ring was stolen?"

"Do you know whether a jade bracelet was stolen?"

"Do you know whether a mink coat was stolen?"

The groups of questions could be much more subtle. They might involve details about the weapon, the scene of the crime, time of occurrence, etc. (This procedure assumes that the subject has not innocently acquired a knowledge of such details.) The time between each of the stimuli has usually been at least five to ten seconds, so that the individual reactions are allowed to dissipate. There are many variations of this method, depending on the style of question. An example of such a change in style would be:

If you are the thief you would know that the object stolen was a:

a) fur coat

b) gold pin, etc.

According to Lykken (1960), this method does not require the subject to answer the questions. He need only sit and listen to the stimuli. However, Burack

(1955, p.418), maintained that "the technique which required answers to questions is probably best, because a person with responsible guilt or guilty knowledge will fear detection of his lie, in addition to fearing detection of his recognition of the one relevant item in the group." This statement is clearly another theoretical assumption and has not been supported by relevant literature.

A variant of this technique which had considerable use has been called the "peak of tension test". Inbau and Reid (1966, pp.37-40) explained their use of the technique. It differs slightly from the above example in that the critical stimuli is presented in a serial order. For instance:

"Was \$1,000 stolen?"
"Was \$2,000 stolen?"
"Was \$3,000 stolen?"
"Was \$4,000 stolen?"
"Was \$5,000 stolen?"

These authors also looked for a gradual rise (or fall) of the baseline readings which reaches a peak at the critical item. This criterion, no doubt, helped label the procedure. They mentioned further that the same list of questions was repeated three times in the same order. The purpose of this procedure was to create apprehensiveness in the guilty subject. What variables this procedure does in fact introduce has not been adequately considered.

Another variant of the "disguised question" test

has come to be known as the "association method" (Woodworth & Schlosberg, 1965, p.66). It involves presenting roughly 20 relevant stimulus words to the suspect. These are randomly spaced in a list of about 80 non-relevant stimuli. The subject is supposed to respond with the first word that comes to mind. Reaction time and GSR are the common measures taken. It is predicted that the guilty person will yield a greater reaction on the GSR and a slower reaction time in giving an association to the relevant items. Occasionally, other measures are taken with this method, such as homophonic misinterpretation of the words, the disruption of an on-going behaviour, the utterance of highly idiosyncratic or implicating responses words (the "Luria technique," Woodworth & Schlosberg, 1965, p.189). The basic principle of the technique remains the same, namely, a reaction on the part of the subject to details or information which are assumed to be known only by the guilty person.

Similarly, other remote methodologies such as those mentioned by Davis (1961), in which the interrogator observes which of the two or more objects the subject's eye focuses on, are easily understood as resting on what has been termed here the "guilty knowledge" principle. This increased clarity of thinking aids greatly in improving research design by drawing clear distinctions between questioning techniques and methods of measurement.

The entire disguised questions procedure demands, to relevant items, that innocent subjects be unaware of the details being presented. That is, innocent subjects should be expected to have no knowledge of the details of the crime in question and therefore, they could be expected to react randomly to a series of questions about these details. This would require in most instances that the test be given soon after the incident, before press release, interrogator's inadvertent communication of knowledge, etc.

Theoretically, the disguised questions test has a more solid rationale than does the undisguised questions test. The disguised questions test demands only one assumption. That is, there will be some involuntary physiological reaction to remembered details of a crime. It will be remembered that the undisguised questions procedure has numerous and often unfounded assumptions underlying it.

Validity

The crucial question is then, what evidence has been presented which demonstrates the concurrent or predictive validity of the above procedures rather than just their face validity. As noted above, there has been a significant lack of well-designed studies to validate "lie-detection" procedures. Inbau and Reid (1966, p.234), make the following comment. (They incidentally devote only one page, out of 287 to this particular issue.)

A statistical determination of the accuracy of the Polygraph technique is practically impossible, just as in so many other fields involving the testing of human beings. For instance, the medical profession could hardly arrive at statistically sound figures as to the accuracy of the diagnosis physicians make with respect to the physical ailments of patients. Not all of the mistakes of physicians are discovered and there are many instances where the correctness of their diagnosis never becomes known to them. Yet, we know that by and large their successes far outnumber their failures.

This has not convinced those seriously questioning the basis for "lie-detection" technique. Most "lie-detection" firms claim 80 to 100 per cent accuracy (Burack, 1955). This writer is in agreement with Lykken (1960), who states, "I can find no published accounts of properly conducted studies which corroborate such claims." For instance, Inbau and Reid (1966, p.234), stated that the "percentage of known errors with the technique used in the laboratories of John E. Reid and Associates is less than one per cent." This figure is quite meaningless as it is thus presented. It was apparently derived from an earlier book (Inbau & Reid, 1953, p.111). Burack (1955) and Sternbach, Gustafson, Colier (1962) point out the inadequacies of this statistical report. Burack, however, allowed that the authors had achieved over a 99 per cent accuracy figure. Sternbach et al. (1962), noted that only 26 per cent of all those reported guilty were actually verified as such, while only 11.7 per cent of all those reported as innocent were later verified as such. Looking at the data in still another way, it was noted that 791

subjects were reported guilty. These were later interrogated with the aim of obtaining a confession. Certainly, not every criminal can be expected to confess. However, simply judging from the number who later did not confess, the possibility exists that out of this sample of 791, the per cent of error could have reached 38.6 per cent. It is clear, then, that the claim of only one per cent error is clearly unsubstantiated. Since agencies for ethical reasons have not allowed independent inspection of their data, sophisticated analysis of their results has not been forthcoming.

It is necessary, then, to look at the more artificial laboratory situations to obtain further information. Fictitious crimes are often enacted in the lab or a person chooses a card out of a deck and the examiner proceeds to establish which card has been chosen. Studies of this type have been reported above with accuracy ranging from 60 to 80 per cent. However, Inbau and Reid (1966, p.234) noted that the "accuracy of the Polygraph technique (cannot) be determined in a psychology laboratory setting or by the use of fictitious crimes under other testing circumstances. This limitation prevails for the simple reason that it is practically impossible to simulate conditions comparable to those involved in actual case situations." Nevertheless it seems that laboratory studies offer the most reliable evidence. That is, field studies

use as their criterion, a confession by the subject. If a researcher included only such cases his accuracy would be spuriously high since confessions are often contingent upon being "caught" by the examiner. Independent criteria such as jury verdict are clearly inadequate. It would be hoped, then, that field work would use those techniques that have proved most useful in laboratory research on the admitted assumption that these techniques are the better in all situations. In actual practice, however, researchers have trailed rather than led the field of "lie-detection".

This author is of the opinion that leading "lie-detection" examiners do obtain relatively accurate results. However, an important question which Meehl (1965) asked of psychological testers can likewise be raised in this field. Despite the fact that some "lie-detection" examiners obtain spectacular results, how good is the average examiner in the field. In light of the elaborate procedure outlined by Inbau and Reid (1966), considerable variation should be expected. Block et al. (1952) stated that,

Final accuracy (was) 95-99 per cent for the operator, 88-90 per cent for the independent expert and approximately 85 per cent for purely objective criteria. Apparently the independent expert was utilizing non-measured and perhaps non-measurable criteria for diagnosing guilt or innocence; the operator who spoke to and questioned the suspect was influenced by still other qualitative indicators not measured by the objective criterion. It seems reasonable to assume that other than the evolved measurable criteria were used and to advantage.

In this vein Inbau and Reid list several behavioural indices, such as cooperation with the examiner, attitudes held during separate phases of the examination and physical characteristics such as fidgeting, attempts to distort, etc. (None of these has received rigorous experimental testing). It would appear that skillful technique is possible only after years of experience. Indeed, just what proportion of the questionable field results is due to the extraneous criteria is open to question. Such information might be useful in evaluating the efficacy of "lie-detection" techniques. This resembles another question asked by Meehl (1965) about projective psychological testing. How much additional information are we being provided with by using these psychological records? Would another and better controlled situation yield these extraneous behavioural systems with greater accuracy?

It is appropriate at this time to mention the possible effect of the examiner on the suspect's responses. Davis (1961), noted Rosenthal's recent work in this area. The fact that an experimenter might unconsciously influence the physiological reactions of the subject was demonstrated by Malmo, Boag, and Smith (1957). Indeed, Inbau's and Reid's technique (1966), explicitly attempts to instill belief in the efficacy of the "guilty person" technique and fear of detection at various points in their testing and re-testing. Possible prejudgments by the examiner or

judgments based on the above-mentioned extraneous criteria would have a devastating effect on the "objectiveness of the test." Similarly, variations in the examiner's ability to instill belief in the procedure (and consequently, fear of detection for guilty parties and calmness over expected exoneration for innocent people) must surely exist. Tape recorded questions, flashed cards or a memory drum were recommended by Davis (1961) to eliminate the possible experimenter or examiner bias.

It is felt, then, that the most objective procedure possible at the present time would follow the disguised question technique outlined by Lykken (1959, 1960). Presentation of the stimuli would utilize one of Davis' suggestions. The probability of an innocent subject answering in a "guilty" fashion would be small and could be calculated. Another refinement would utilize the paradigm given by Davis (1961). It was stated as follows:

(Response		-Response)Suspect
	Relevant Stimulus		Irrelevant Stimuli	
(Response		-Response)Average
	Relevant Stimulus		Irrelevant Stimuli	Suspect

This paradigm would be most valuable when several groups of questions needed in the disguised question technique were not possible. By evaluating this function for its detection power, the field operator could then be given a table showing the probability of correct detection for each value of the function. In this manner, the "lie-detection" expert will simply be another piece of evidence

rather than the final "judge and jury".

Theory Underlying the Procedures

Assuming for the time being that certain techniques and measures have proved to be valid, it is possible to relate some of the theories that have been put forward to explain this phenomenon.

Davis (1961) mentioned three main theories which are presently prominent. Ferster and Perrott (1968) have presented a variation of one of these and A. A. Smith (1970, personal communication) added still another view on the subject.

The first is the conditioned response theory (Davis, 1961). This theory postulates that the critical questions for a guilty subject would have been associated with strong emotional stimuli. This association with an especially traumatic event would have resulted in conditioned reactions which are differentiable from non-relevant stimuli. In this connection, Woodworth and Schlosberg (1965, p.152) noted that words with strong personal association evoked large GSR responses. They also noted the relative ease with which GSR may be conditioned.

A variation of this conditioning paradigm was presented by Ferster and Perrott (1968, p.91). This view holds that an association is made between lying and punishment during childhood years. Lying is followed by spanking with its unconditioned reflexes, including blood

pressure changes, GSR reactions, etc. In adulthood, the unconditioned reflexes are elicited by the conditioned stimulus, the lie itself.

The third possible theory is the punishment or threat of punishment principle (Davis, 1961). This has also been referred to as the consequences of detection theory. (Gustafson & Orne, 1963). "Here the subject harbours a deep rooted instinctual fear of detection and consequences of being caught (Inbau & Reid, 1966, p.220)." The suspect is therefore detected for the simple reason that he fears he will be detected. Notice that the emphasis is not on a "guilt" response or a previous history of association between negative reinforcement and lying per se. It is rather the fear of being caught and punished. In the laboratory situation this punishment would have to be interpreted in a very broad sense, such as losing a game which the subject is playing with the experimenter.

The fourth position held by many is a theory of conflict (Davis, 1961). This theory presumes that large physiologic disturbances would occur when two incompatible reaction tendencies occur at the same time. One tendency is to answer the critical question truthfully. The other tendency, if the suspect is guilty, is to lie.

The fifth theory, set forth by A. A. Smith (personal communication, 1970), proceeded from the work of Jacobson and others, discussed by Woodworth and Schlosberg (1965,

p. 178, pp. 816-817). These authors demonstrated that ideational activity was accompanied by muscular tension in the appropriate muscle system -- deaf mutes, for instance, showing tension in the arms, normals showing similar activity in the tongue. Similarly, persons asked to imagine an arm movement yield measureable electrical activity in the arm. Persons asked to imagine a visible object yield similar muscular tension but in the eye region. Thus, for a theory of "lie-detection", the presentation of the relevant stimuli may elicit thoughts and memories relevant to the crime along with the accompanying muscular behaviour.

Purpose of the Present Research

It has been shown (Woodworth & Schlosberg, 1965, p. 183), that differentiating one emotion from another, for instance, fear and anger, by means of physiological measures, has met with little success. It is not surprising then, that research attempts to specify the reasons for the physiological changes occurring in the "lie-detection" situations have focused on the external situation for an explanation of what the individual is feeling (i.e. recall of a strong emotion, guilt over lying, fear of being caught, conflict over response tendencies). An organization of these attempts is then, forthcoming. Two main research areas exist.

Area 1

One very basic assumption which is often made has been subjected to critical analysis. It is "...that the tension occurring with deception is different from the tension occurring in response to similar stimuli to which the subject answers truthfully (Block, Rourke et al. 1952)." In short, it has been assumed that a "lie" is a critical factor in causing detectable physiological responses.

Evidence from numerous sources indicates that this is not the case. First, Inbau and Reid (1966, pp.102-104, guilty person technique) unwittingly question this assumption in their discussion of the "yes test". In their real life situations, they noted that a subject who had previously been lying and then responded "yes" (a mandatory response to the critical question) often still showed the same physiological reaction in heartbeat and respiration. Likewise, a previously truthful subject now required to lie by saying "yes" to the relevant critical question often showed no "lie" reaction. He would be expected to, under the "lying" hypothesis.

Second, there was a great deal of research carried out dealing with the association method mentioned above. It will be remembered that the subject is required to associate a word in response to various relevant and irrelevant stimulus words. "Lying" was not involved, yet, significant detection rates were claimed.

Third, Lykken (1959), using the guilty knowledge technique with a simulated crime, obtained detection rates significantly above chance levels with subjects who made no response at all.

Fourth, Kugelmass, Lieblich and Bergman (1967) and Day (1968) addressed themselves to this point directly. These investigators used the standard card test most often used in introductory psychology classes. With this test, the subject chooses one of several numbered cards. He is then asked "Did you choose the number three?", "Did you choose the number six?", etc. This test can be viewed as a one trial or one item guilty information or guilty knowledge test. Kugelmass et al. (1967), required one group of subjects to respond "no" to all such questions (i.e. they lied about their chosen card) and another group to respond "yes" to all such questions (i.e. this group told the truth about their chosen card). There was no difference in detection efficiency between these groups and both were detected at significantly better than chance rates. Kugelmass et al. (1967) stated that they repeated this study finding the same results.

Similarly, Day (1968) required one group of subjects to respond "no" to all such questions (i.e. they lied). Another group responded "no" to all questions except those which pertained to their chosen card; to this they responded "yes" (i.e. they told the truth). A third group

was required to simply listen to all of the questions. Again, all groups were detected at levels significantly above chance and there was no difference in detection rates between them.

Contradictory evidence was presented by Gustafson and Orne (1965a). These investigators used a card test also and were unsuccessful in detecting a group making no responses at all. This inconsistency has been discussed previously (Day, 1968). For the present, it is sufficient to note the following. First the same investigators, Gustafson and Orne (1963), while studying another problem, reported significant detection rates with subjects who did not make any verbal response. Secondly, their results were subject to several limitations including the relative insensitivity of their GSR measurements, possible mistakes in their statistical evaluation and general lack of clarity with respect to experimental design and to distinguishing "guilty information" from "guilty person" procedures. Thirdly, the bulk of both the remote and more directly related evidence contradicts their results.

It was felt that the following conclusion was warranted. Although a lie may be sufficient to elicit physiological reactions different from those occurring during truthful responses, it is not a necessary factor in eliciting such reactions.

This data is relevant to the five general theories.

mentioned above as explanatory principles. Theory one (strongly conditioned personal associations to relevant stimuli) easily incorporates such data. Theory two (conditioned association between lying and punishment) has difficulty incorporating such data since no lie has occurred. It must postulate internal or subvocal lies to explain all of the data. Theory three (threat of punishment) easily incorporates these data. Theory four (conflict between answering truthfully or falsely) has difficulty incorporating such data again since no lie was involved and again a subvocal response and conflict must be hypothesized. Theory five (ideomotor activity with stimulated memory) easily incorporates these data.

Area 2

The other studies available to this author dealing with the question of why physiological responses are successful in detecting deception proceed from and tend to support the "threat of punishment" principle. Burt (1921) related that the presence of other people during the interrogation procedure increased the likelihood of deception. Chappell (1929) noted that subjects who were lying in a situation in which there was no possibility of detection or punishment were not readily detectable. Similarly, Larsen (1922), related that after a subject had confessed, the relevant items no longer produced physiological behaviour indicative of guilt. Finally, Gustafson

and Orne (1963, 1965) and Orne and Thackeray (1967), reported that subjects in an experiment who were motivated to deceive were detected. Those who were not so motivated were not detected.

Lykken (1959, 1960), spoke about the need for only one assumption underlying the guilty knowledge procedure. It was that "a guilty person will show some involuntary physiological response to remembered details of his crime." Implicit in his research seems to be, however, a belief that this response occurs in relation to threat or motivation. Lykken threatened his subjects with shock (1953) or loss of a ten dollar prize (1960) if they were detected.

More remotely, those who tend to view the presence of authority figures as important in eliciting the physiological reactions of the suspects, patients, etc. would be prone to theorize in terms of theory three (F. Auld, 1971, personal communication). By extrapolation, the common notion has arisen that psychopaths who know no such fear would be undetectable.

The relevance and compatibility of these data and theorizing to general theory number three, the threat of punishment principle, has been obvious. Theories two (conditioned guilt) and four (conflict) which were found wanting with respect to the research dealing with the necessity of a lie, are presented with similar difficulties dealing with these data, especially that of Chappell (1929)

and Gustafson and Orne (1965) were verbal "lies" were present with non-significant detection rates. Theory five (ideomotor activity) also has difficulty incorporating the present data. That is, relevant stimuli were presented to consciousness, yet the expected physiological concomitants were not distinguishable. Thus, unless further theorizing concerning fatigue or extinction of this activity is accepted, it falls short of an overall explanatory principle. It is worthwhile to mention, however, that this is a relatively uncommon theory and worth further study, in light of some criticisms of the threat of punishment principle delineated below. Such research might involve presenting stimuli in one sensory modality and testing in another, etc.

Theory one (strongly conditioned, personal associations to the relevant stimuli) is capable of incorporating these data. Gustafson and Orne (1963) pointed out accurately that original learning and memorizing of the appropriate card was different for their motivated and non-motivated groups. The highly motivated group also learned in a more motivated or intense situation. Their more detectable responses may have been due to the subjects' more intense involvement and consequently, greater degree of original conditioning. These authors suggested changing "the consequences of deceiving" during different parts of the experiment. That is, they proposed spacing non-threatening or non-consequential trials among threatening

ones. Disappearance and reappearance of responses would strongly favour the threat of punishment theory. More gradual and continual disappearance (i.e. deconditioning) would favour the conditioning paradigm. Another approach might vary the intensity of the learning conditions.

Paralleling this idea, Day (1968) felt that his decrease in detection rates during a second trial on a card test was reminiscent of a deconditioning process. Reanalysis of that data indicated, however, that a better explanation of the decrease involved the adaptation of the GSR response to all of the test items, rather than to just the critical one.

Thus, while much of the research and a good deal of the research sentiment has rested with the threat of punishment principle, some evidence and hypotheses have been brought to bear concerning other explanations, most notably a conditioning paradigm.

It should be mentioned here, however, that the research purporting to demonstrate the threat of punishment principle is not without contradiction.

First, Block et al. (1952) threatened to and actually gave an electric shock after every truthful response but not after a lie, in a standard card test. Characteristic detection patterns were neither reversed nor eradicated. In terms of a threat of punishment principle such results were completely unexpected and quite difficult to assimilate.

Second, both Kugelmass et al. (1967) and Day (1968) obtained results almost identical to Gustafson's and Orne's (1963) motivated group (all three procedures were card tests). Kugelmass et al. (1967) did not report and Day (1968) did not use any experimental motivation. That is, subjects were neither threatened nor offered rewards for being caught or going undetected, similar to Gustafson's and Orne's (1963) unmotivated, but not significantly detected group. Thus, while Gustafson and Orne purported to demonstrate the necessity of a motive to deceive, two other studies using no such motive obtained equally high detection rates. The Kugelmass et al. (1967) and the Day (1968) studies which were in agreement were "single-blind", the Gustafson and Orne study was unclear on this point. An examination of the subject population indicated that the subjects were college students seeking work, Gustafson (1963), university students and army officers, Kugelmass (1967) and Catholic high school students, Day (1968). It was difficult to argue that the latter two groups were more motivated to deceive. It was postulated that they may have been more prone to fear authority figures and therefore may have been more reactive to the detection situation. Systematic variation of the type of subject sample has been proposed as a means of answering such a question. Whatever the ultimate explanation, it was felt that there were data which were not readily

explainable in terms of theory three (the threat of punishment principle). That is, the reason why non-experimentally threatened, non-experimentally motivated subjects who did not ever respond to questions were detected at rates significantly better than chance remained open to question.

Proposed Research

From a practical point of view, this question deserves further study since if all the procedures in use depend upon a fear of punishment principle, the field is faced with a familiar dilemma, namely non-reactivity by those who do not believe in the myth of detectability. That is, those who do not believe in the procedure would not fear detection and its consequences and therefore would not be detected. Day (1968) in light of the above reported results, postulated another principle which might explain the obtained results. It proceeded from a theory of attention, discussed by Woodworth and Schlosberg (1965). These writers noted (p.74) that there are several factors which determine attention. Size, colour, intensity, etc., are mentioned as stimulus variables. Emotional appeal, interests and familiarity are considered variables within the organism or subject. They noted further, in a completely different discussion that "GSR, attention, alertness and activation are closely related topics (p.151)". It was hypothesized in a previous study by Day (1968)

that with the presentation of a series of numbers as stimuli, short term "familiarity" is a sufficient condition for GSR recordings different from on-going GSR patterns. That is, similar to the visual situation in which a person will notice and focus on a familiar face in a crowd; a person will notice or pay attention to an auditory stimulus, in this case, his number amongst a series of numbers.

It should be noted that Inbau and Reid (1966, p.220) mentioned that GSR readings were obtained because of an "attention" or "alertness" factor, but they did not elaborate. Also one of the many measuring techniques mentioned above pp. 10 and 19, which recorded the direction of eye focus appeared to utilize just such a principle in the visual field.

The primary purpose of the present study was to examine this hypothesis. It was hoped to manipulate a group of subjects in such a way that they had no fear of the consequences of responding to relevant test stimuli, no motive to deceive the experimenter and indeed, had no knowledge that they were participating in a "lie-detection" experiment. It was reasoned that the demonstration of detection rates of significantly greater than chance expectancy would be extremely difficult to explain in terms of theory three, but more readily understandable in terms of the proposed theory. Groups I and II below, were thus

constructed. Group I read a psychological case history in which a series of relatively non-emotional stimuli - a number, a name, a color, etc. - were presented or embedded. Group II read a newspaper account of a kidnapping in which the same series of stimuli were contained. Both groups were then presented those same stimuli in a later series of numbers, names, colors, etc.

These groups were then compared to Group III, which had read the same kidnapping account, but was told that they were participating in a "lie-detection" experiment.

A secondary purpose of the experiment was to examine the threat of punishment principle. Group IV, which read the same kidnapping account and was told that only less intelligent subjects were detected, was thus constructed and compared to Group III, which was aware of the "lie-detection" situation but not experimentally motivated.

A third purpose was to duplicate the "no" response group run by Day (1968). That is, subjects in all four groups made no verbal responses.

A fourth purpose was to examine the validity of the "guilty knowledge" technique advocated by Lykken, (1959, 1960). Results from Groups I, II, III and IV were again relevant.

CHAPTER II

Methodology and Procedure

Subjects

Eighty subjects (Ss) took part in the experiment. They were all Caucasian males attending the University of Windsor, (Windsor, Ontario). They ranged in age from 18 to 30 years. None of the Ss had previously participated in an experiment dealing with "lie-detection". All of the Ss were randomly assigned to one of four experimental groups; there were twenty Ss in each group.

Apparatus

A skin resistance coupler (Beckman, Offner Division, Type 9892A, Type R Dynograph, Type 382) traced the galvanic skin response (GSR) on a paper folded chart (Beckman, number 344-206403). A second pen traced the time of the presentation of the test stimuli. The deflection of this pen was powered by a Burgess dry cell battery (number F4M, six volts). The experimenter (E) operated this circuit by hand. The chart paper was fed automatically under both pens at a uniform speed of five millimeters per second. Finger electrodes (Stoeltings, Cat. No. 24222) were fitted to the index and ring fingers of S's left hand. The bridge resistance and preamplifier were adjusted for each individual S.

A tape recorder (Sony Tc 105) was used to present the same set of instructions to each member of a particular

group. It was also used to present the test stimuli (questions) to the Ss. The information given prior to testing was on mimeographed paper and varied for each S. The content of each is discussed below.

E and both pieces of equipment were behind S who was seated and facing a blank wall. The room temperature was kept at 68° Fahrenheit.

Experimental Procedure

S entered the room and was seated immediately.

Each S had been predetermined to be in either group I, II, III, or IV. If S asked about the purpose of the experiment while en route to the experimental room he was told that it concerned an evaluation of a psychological case history (Group I), or an evaluation of a newspaper article (Group II) or that it concerned "lie-detection" (Groups III and IV). Once seated, a tape recorder was turned on and the following instructions were played.

Group I The content of psychology courses at the University has received considerable comment, some positive, some negative. The object of the present experiment is to examine the students' reaction to this content in detail. You will be given a psychological case history to read. Before beginning, however, the experimenter will attach a harmless recording device to your hand which will enable him to make a systematic evaluation of your reactions while you are reading the material. Your comments about and some questions concerning the material will be made after your reading.

E attached the electrodes and instructed S to keep his left hand in a comfortable palm down position on the table.

The experimenter is now presenting you with the case history. When he gives you the signal, please turn it over and read it carefully and attentively.

S was then instructed that the first part of the experiment was over, but to read the case history one more time.

The experimenter is going to allow this tape to continue playing. There will be roughly three minutes of silence followed by a series of questions concerning the case history you have just read. Please remember not to make any unnecessary movement and to keep your hand as still as possible. The questions presented to you will concern some of the details of the case history. Your task is to listen carefully to each and every question. You need make no verbal response. Simply listen carefully to the questions.

Group II The content of newspaper stories have received considerable comment, some positive, some negative, at the University. The object of the present experiment is to examine the students' reaction to this content in detail. You will be given a summarized newspaper account to read. Before beginning, however, the experimenter will attach a harmless recording device to your hand which will enable him to make a systematic evaluation of your reactions while you are reading the material. Your comments about and some questions concerning the material will be made after your reading.

E attached electrodes and instructed S to keep his left hand in a comfortable palm down position.

The experimenter is now presenting you with the summarized account. When he gives you the signal, please turn it over and read it carefully and attentively.

S was instructed that the first part of the experiment was over, but to read the summarized account one more time.

The experimenter is going to allow this tape to continue playing. There will be roughly three minutes of silence followed by a series of questions concerning the account you have just read.

Please remember not to make any unnecessary movement and to keep your hand as still as possible. The questions presented to you will concern some of the details of the account. Your task is to listen carefully to each and every question. You need make no verbal response. Simply listen carefully to the questions.

Group III This is, as you probably already know, an experiment in "lie-detection". You are going to be given a story concerning a kidnapping. For the purpose of the present experiment you are going to be considered as the kidnapper. Your task is to read the story over carefully. When you have finished, please signal.

E then requested S to read the story once again.

You now possess certain information which only the guilty person, the kidnapper, should know. The experimenter is going to attach a harmless recording device to your left hand in an attempt to discover what that information is.

E attached the electrodes and instructed S to keep his left hand in a comfortable palm down position.

The experimenter is going to allow the tape to continue playing and after roughly three minutes of silence, you will be asked a series of questions concerning the details of the case. Your task is to listen carefully to each and every question. You need make no verbal response. Simply listen carefully to the questions.

Group IV This is, as you probably already know, an experiment in "lie-detection". You are going to be given a story concerning a kidnapping. For the purpose of the present experiment you are going to be considered as the kidnapper. Your task is to read the story over carefully. When you have finished, please signal.

E then requested S to read the story once again.

You now possess certain information which only the guilty person, the kidnapper, should know. The experiment is going to attach a harmless

recording device to your left hand in an attempt to discover what that information is. In the past he has found it impossible to do this with intelligent people, especially bright college students.

E attached the electrodes and instructed S to keep his left hand in a comfortable palm down position.

The experimenter is going to allow the tape to continue playing and after roughly three minutes of silence you will be asked a series of questions concerning the details of the case. Your task is to listen carefully to each and every question. You need make no verbal response. Simply listen carefully to the questions.

At the appropriate time a stack containing twenty typewritten case histories (Group I) and sixty newspaper stories (Groups II, III and IV), arranged in a random order, was placed on the table. E gave S one off the top without knowledge of which set of information it contained. After S completed reading his information, the copy was marked appropriately as to the S's group and number in that group and filed.

All Ss (in all four groups) were then presented with the same set of verbal stimuli by means of the tape recorder. A more complete explanation of the information given and test stimuli presented follows immediately.

For Group I, a case history was written about a boy with emotional problems. For Groups II, III and IV, the story was about a boy who had been kidnapped. Thus, there were two essentially different typewritten information vehicles. (See Appendix B.)

The twenty stories presented to Group I were identical and the sixty stories presented to Groups II, III and IV were identical in every respect except for a change in five sets of details. That is, there were two completely different stories, a psychological case history and a kidnapping. Imbedded in each story, however, were five different sets of details. This meant in effect that there were five psychological case histories which were the same in every detail except for five pieces of information. Similarly, there were five kidnapping stories similar in every detail except for five pieces of information. The five pieces of information were always part of the same set and that set of information remained an intact unit for all four groups.

Thus, the boy in either the history or the newspaper story could have been born in any one of five birth order positions within the family (3rd, 4th, 5th, 6th, 8th). Similarly he could have worn one of five colored shirts (red, green, blue, brown, yellow), lived in one of five communities, broke one of five objects and have gone to one of five schools. If, however, he was the third child, he always wore a blue shirt, lived in the same community, broke the same object and went to the same high school. An example of each story is presented in Appendix B.

Twenty case histories and sixty kidnapping stories were mimeographed and shuffled thoroughly. The probability

of an S choosing one of the five sets of information was exactly four out of twenty.

The test stimuli consisted of a series of thirty questions presented by a tape recorder and spaced fourteen to sixteen seconds apart. The first six questions concerned which birth-order position within the family and were of the type:

Was he the 7th child in the family?
Was he the 5th child in the family?
etc.

Each of the five possible choices was presented after the initial question (7th child), which was used as a "buffer" item. Since the first such question in each series usually elicits a large GSR by virtue of its position, the presentation of a "buffer" item which is not scored serves as a control for this artifact. The second set of questions followed immediately (fourteen to sixteen seconds after the last number question) again introduced by a "buffer" question. This series concerned the color of the shirt which the boy was wearing. The third series concerned the community he lived in; the fourth series an object he had broken; the fifth series the high school he attended. Thus, there were five sets of questions, with five scorable stimuli in each, plus one "buffer" for each set for a total of thirty stimuli. The position of the questions concerning the set of information which a particular individual had received were randomized over the five series of

questions. That is, an individual who had learned that the boy was the third in the family, heard that number in the last position (6th) of the set of numbers. But the color he learned (in this case, blue) had been randomly placed in the fourth position in its series, his community in the third position of its series, and so on.

When the question period ended, each S was asked to fill out a questionnaire concerning his perception of what had taken place during the experiment. He was also asked to complete a multiple choice test concerning the items of information he had been given. The questionnaires are presented in Appendix C. Comments concerning any personal associations or memories S may have had during a particular set of test stimuli were also elicited. S's GSR record and questionnaire were then coded according to his number in his group.

Analysis of the Data

Galvanic Skin Responses were recorded throughout the time when the test tape was on. Records were scored without the knowledge of which story had been read. The records were scored according to the following criteria.

Rule 1

All records were scored by measuring amplitude change (conductance increase) in millimeters from the point at which the stimulus was presented to the highest level reached over the next ten seconds. In previous work, (Day, 1968) found this criterion to be sufficient. However, in pilot work with this present test situation, consistent decreases or increases in basal conductance levels were observed, rendering such a criterion difficult to interpret in some circumstances. This was especially true in cases with gradual increases in conductance over the course of the test period.

Rule 2

All records were rescored. For this analysis, a pencil line was drawn over the marker ink beginning five seconds before and extending ten seconds after the stimulus. Pen deflections were then measured (greatest change in millimeters over the next ten seconds) perpendicular to this straight line projection.

Rule 3

The records were scored again utilizing a criterion suggested by Block et al. (1952). Any rapid change in overall baseline readings following a particular item was noted. In the absence of scorable GSRs according to criterion two, this indicator was the sole criterion. If, however, scorable GSRs in a particular set of items were present, stimuli eliciting this response were ranked (to be discussed below) but only after items under criterion two were ranked.

Thus, if no responses measurable under rules one and two occurred with a block of five test stimuli, a rapid change in baseline following one such stimulus obtained for that stimulus a rank of one. If, however, one of the test stimuli was followed by a response scored according to rule two, that stimulus was ranked one and a test stimulus scored for rule three received a rank of two.

Rule 4

E noted when S had coughed, sneezed or made some gross body movement in proximity to a particular item. All records were scored again, re-ranking all such items last in terms of which item was most likely to be the information given to that S

Finally, S's responses to the multiple choice test (see Appendix C) was utilized. S had been tested to see

if he had actually remembered the relevant information. If S reported that he had no idea of what the relevant information was, all items in that particular set were ranked equally (i.e. a rank of three was given to all). If S reported, however, that another item (i.e. wrong choice) was the information he had been given, the rank for that item was simply exchanged with the rank for the correct item. That is, the incorrect item which was, however, "relevant" to S was now scored as if it actually were the correct item. This correction for memory was done with each of the four scoring rules mentioned above. This particular correction was, obviously, not done in a "double blind" fashion. However, it was carried out in so automatic and strict a manner that this was not felt to be a major factor at this point.

The ranking system was as follows. The greatest increase in conductance following a stimulus in a particular block of five stimuli received a rank of one, the second greatest, a rank of two and so on through to a rank of five. The ranks were then assigned to each of the five sets of information and totalled. Thus, a set of information could earn as little as five points (i.e. five ranks of one) or as much as twenty-five (i.e. five ranks of five). That set of information which received the lowest point total was deemed to be the set to which S had been exposed. The second lowest point total was the second

guess, the third lowest point total, the third guess, etc. This judgment was then compared to that set of information or story which S had actually read.

There were two hypotheses made. First, significant detection rates would be obtained in all four groups. Second, the addition of the awareness factor (i.e. knowledge that he was in a "lie-detection" experiment, Group III) and the addition of the motive factor (i.e. threat to S's ego, Group IV) would result in a progressive increase in detectability.

CHAPTER III

CHAPTER III

Presentation and Analysis of Results

The number of Ss whose given information was successfully detected or ranked number one along with the number of individuals whose given information was ranked two, three, four and five is presented in Table 1. That table presents the number of individuals so ranked for each of the four groups, for each of the four scoring rules used within each group and for the data as it was compiled both before and after the records were corrected for the memory factor.

Table 1

Detection Rates for Each Condition and for Each Scoring Rule for Each Condition

Group	No. per	Rank					% Ranked First
		1	2	3	4	5	
Group I	20	5	3				
Criterion 1	20	5	3	5	5	2	25
2	20	5	7	5	3	0	25
3	20	6	6	5	3	0	30
4	20	6	7*	5	2	0	30
Corrected for Memory Failures							
1	20	5	5	3	6	1	25
2	20	5	8*	4	3	0	25
3	20	6	7*	4	3	0	30
4	20	6	8*	4	2	0	30

Group II		20							
Criterion	1	20	8**	3	3	3	3		40
	2	20	9**	4*	3	0	4		45
	3	20	9**	3	4	0	4		45
	4	20	10**	3*	3	0	4		50
Corrected									
	1	20	6	5	2	4	3		30
	2	20	10**	2	4	2	2		50
	3	20	10**	3*	3	2	2		50
	4	20	12**	3*	2	0	3		60
Group III		20							
Criterion	1	20	9**	6*	3	1	1		45
	2	20	10**	4*	4	2	0		50
	3	20	10**	3*	5	2	0		50
	4	20	10**	3*	5	2	0		50
Corrected									
	1	20	9*	6*	3	2	0		45
	2	20	10**	2	6	2	0		50
	3	20	10**	3*	5	2	0		50
	4	20	10**	3*	5	2	0		50
Group IV		20							
Criterion	1	20	12**	4*	3	1	0		60
	2	20	8**	7*	3	1	1		40
	3	20	8**	6*	3	2	1		40
	4	20	8**	7*	2	2	1		40
Corrected									
	1	20	12**	5*	3	0	0		60
	2	20	10**	6*	2	1	1		50
	3	20	10**	6*	2	1	1		50
	4	20	10**	6*	2	1	1		50
TOTAL		80							
Criterion	1	80	34**	16*	14	10	6		42½
	2	80	32**	22*	15	6	5		40
	3	80	33**	18*	17	7	5		41½
	4	80	34**	20*	15	6	5		42½
Corrected									
	1	80	32**	21*	11	12	4		40
	2	80	35**	18*	16	8	3		43¾
	3	80	36**	19*	14	8	3		45
	4	80	38**	20*	13	5	4		47½

** Significant beyond the $\alpha = .05$ level using the Poisson approximation to the assumed binomial, $(20, 1/5)$

* Significant beyond the $\alpha = .05$ level using the Chi-Square test, $(df=1)$ for goodness of fit.

A Poisson approximation to the assumed binomial $(20, 1/5)$, indicated which of the above ranks of one were significantly different from chance expectancy. ($\alpha = .05$) (Appendix A, presents this and the following calculations consecutively.)

The Chi-square test ($\alpha = .05, df=1$) for goodness of fit was used to determine which of the above distributions of ranks were significantly different from chance expectancies. The categories for ranks one and two and ranks three, four and five were combined to fulfill the requirements of this test.

The number of individuals whose given information was successfully detected or ranked number one is presented in Table 2.

Table 2

Detection Rates for the Different Conditions Ordered According to the Criterion Measure Used

		Number whose given story was ranked 1			
		Group I	Group II	Group III	Group IV
Criterion	I	5	8	9	12
	II	5	9	10	8
	III	6	9	10	8
	IV	6	10	10	8
After Memory	I	5	6	9	12
	II	5	10	10	10
	III	6	10	10	10
	IV	6	12	10	10

A Chi-square test ($\alpha = .05$, $df=3$) to determine whether those obtained proportions were different from each other was insignificant for all eight criteria.

Similarly, individual Chi-squares ($\alpha = .05$, $df=1$), for instance, Group I versus Group IV were also insignificant.

Ranks one and two were totalled and presented in Table 3.

Table 3

Total Number of Subjects Ranked One or Two, Ordered According to the Criterion Measures Used

	Number whose given story was ranked			
	One or Two			
	Group I	Group II	Group III	Group IV
Criterion I	8	11	15	16*
II	12	13	14	15
III	12	12	13	14
IV	13	13	13	15
After memory				
I	10	11	15	17*
II	13	12	12	16
III	13	13	13	16
IV	14	15	13	16

* Significant beyond the .05 level using Chi-square test ($df=3$) for differences between distributions.

The Chi-square test ($\alpha = .05$, $df=3$) for the differences between the distributions in Groups I to IV (i.e. ranks one and two totalled, ranks three, four and five totalled) revealed the above noted significant differences.

CHAPTER IV

GENERAL DISCUSSION OF RESULTS

Results and Theoretical Importance

The present study offers data which were not easily explained by the use of the threat of punishment principle. The number of individuals whose responses were correctly assessed was significantly better than chance in each of Groups II, III and IV. (Table 1). Thus a group of Ss (Group II) which had not been informed that it was taking part in a "lie-detection" experiment was detected at a rate significantly better than chance.

When the data were analyzed more completely (that is, examining the entire distribution of ranks rather than only those guessed correctly), significant results were obtained in all four groups (see Table 1). Although the number of correct guesses was not significantly better than chance for Group I, the distribution of ranks was heavily skewed in that direction.

This method of analyzing the complete distribution of ranks has not, to this writer's knowledge, been tried previously. It demonstrated clearly, however, that some systematic and measurable GSR phenomenon was occurring in two groups of Ss which had not been informed that they were taking part in a "lie-detection" experiment

and had not been motivated to deceive the experimenter.

Similarly, a group of Ss (Group III) which was told that it was participating in a "lie-detection" experiment, but was not motivated to deceive E, was detected at a rate which was significantly better than chance. The difference between detection rates in Group III (unmotivated) and Group IV (motivated) was not significant. This result was clearly in contradiction to the findings of Gustafson and Orne (1963) and demands further amplification. Before this, however, a summary of the major findings and their theoretical implication will be given.

First, two groups of Ss (Groups I and II) which were not told that they were partaking in a "lie-detection" experiment and were not motivated to fear detection or to deceive E, were detected at levels significantly better than chance.

Second, a group of Ss (Group III) who were told that they were partaking in a "lie-detection" experiment but were not experimentally motivated to fear detection or deceive E were detected at a level significantly better than chance. In fact, there was no significant statistical difference between this group and that of a group of Ss (Group IV) who were so motivated.

Third, significant detection rates were obtained with a group of eighty Ss, none of whom responded verbally to any of the questions.

From a theoretical point of view, there are two implications these data present. First, awareness that one is partaking in a "lie-detection" situation and the experimentally induced fear of punishment or motive to deceive, although they may be sufficient, are not necessary to obtain GSR detection rates above chance levels. Second, verbal responses to the items, although they may be sufficient, are not necessary to obtain GSR detection rates above chance levels. The results of the current study are similar to those of Day, (1968) in which a group of twenty-four Ss gave no verbal response yet were detected at rates significantly above chance.

Results and Practical Application

From a practical point of view, a note of caution is in order. Although statistically significant results were obtained in all four groups, actual detection rates varied from as low as 25 per cent in Group I to a high of 60 per cent in Group IV. The detection rate for the entire group of eighty Ss under optimal scoring conditions (to be amplified below) was 47.5 per cent. When it is remembered that 20 per cent of the Ss would have been detected by chance alone, the obtained

results are rather unspectacular. Day (1968), using a sample of 72 Ss, the same overall technique and only one item (a number) achieved a 66 per cent accuracy figure. In the present study, five items were used, yet the accuracy decreased. This was quite unexpected. The rate of detection was also surprisingly low when compared to the contention of Lykken (1960) who claimed an amazing 100 per cent accuracy figure using similar methodology. The reasons for these discrepancies will be discussed below. The point at hand is that, if the technique were used as presently described, the following hypothetical result would have taken place. If a crime were committed by four men, and nine suspects (including the four men) were interrogated, one of the five innocent suspects would have appeared guilty by chance alone. Meanwhile, two of the four guilty suspects would have escaped the verdict of guilt. Thus with one false positive and two false negative judgments, six of the nine suspects would have been correctly classified as guilty or innocent. By chance alone, one could have correctly classified five out of nine by simply declaring the first person innocent, the second person guilty, etc. The technique as employed in this study yields reliable data. Its use, however, must remain restricted. It presents an investigation with one piece of evidence.

Such evidence is obviously fallible and should not be expected to replace or supercede the gamut of police investigative procedures.

To summarize the practical implications of the present study, two points have been demonstrated. First, a procedure which rests on sound theoretical assumptions (pp.19-20) has proven to be mildly successful and capable of presenting an investigator another bit of information with a known probability of accuracy. Second, the notion that all "lie-detection" procedures rest upon the suspect's belief in the procedure and consequent fear of detection has been seriously challenged. Such a finding resolves the dilemma posed above (see p.37). There appears to be a factor even more basic than fear of punishment which results in detection. The S's belief in the procedure and his fear of detection were not felt to be essential for detection. Imposing such a belief and fear, as recommended by Inbau and Reid (1966) does not appear necessary under the present procedure. It is, incidentally, the writer's belief that attempting to do this is part of the broad realm of interrogation techniques which rely on a threat to the S. Some techniques involve a direct physical threat and/or physical demonstration. "Lie-detection", founded on the threat of punishment principle, similarly involves a threat to

the future well-being of the S. However, the physical demonstration is not immediate. Such a parallel cannot be made with the present methodology.

Given these findings, research might be undertaken to understand more fully the factor responsible for detection in the present study. It is theorized below that this factor is best labelled "attention". If this is the case, systematic study of such variables as the emotional appeal of the multiple choice test items, or variation in style of questioning in order to maintain interest might prove to be extremely interesting. The marginal utility of the addition of a verbal response and motive to fear also might be further examined.

Still further, the present findings suggest the ominous possibility that situations can be constructed in which information can be obtained from individuals who are unaware that such information is being taken. In the present study, the Ss, although unaware that they were in a "lie-detection" situation, undoubtedly realized some information was being sought. More subtle presentation of test stimuli (i.e., a refinement in questioning technique) combined with telemetric recording devices (i.e., refinements in measurement), would appear to be the next logical experimental advancement toward this end.

Reservations

Clearly, an important factor in the detection of deception has been demonstrated. From a theoretical point of view, duplication of such a finding is required. Similarly, from a practical point of view, further controlled experiments in which questioning and measuring techniques are refined are also needed. The theoretical and practical implications of the present data deserve the clarification of further research.

For the present, a more critical look at the available data was felt to be important, both for verifying the existence of such a factor and for providing clues for further research. This analysis of the data was derived primarily from the post-experimental questionnaire. (Appendix C).

A Critical Analysis

Were the Experimental Conditions Successfully Constructed?

The critical reader might justifiably ask whether university-aged Ss could be fooled with regard to the purpose of the experiment. A general familiarity with the polygraph recorder may have given Ss in Groups I and II some suspicion that they were in a "lie-detection" experiment. Their responses to the questionnaire presented some useful information which is presented in Table 4 below. In evaluating this information, it should be remembered that

the questionnaires began with vague, open-ended comments about the experiment and its purpose and proceeded to a more direct question concerning whether they realized it was a "lie-detection" experiment.

The data from Table 4 seem to indicate that only 12 of the 40 Ss in Groups I and II were completely fooled, that is, completely unaware of the fact that they participated in a "lie-detection" experiment.

Table 4

The Subjects' Stated Awareness of Participating in a "Lie-detection" Experiment

	No. of <u>Ss</u> Who Stated They Were in a "Lie-detection" Experiment	
	Open-ended Questions	Specific "Yes", "No"
Group I	2	13
Group II	2	15
Group III	13	19*
Group IV	13	20

*One aberrant S in Group III who was clearly told that he was in such an experiment, nevertheless related that he was unaware of this fact.

A more positive view of the effectiveness of the experimental ruse arose from the open-ended questions (Table 4). Here, only two Ss in each of Groups I and II spoke spontaneously about "lie-detection" as compared

to thirteen Ss in each of the informed groups, III and IV. Positive and negative arguments (from the point of view of the experimental manipulation) were entertained. It was felt that Ss in Groups I and II did not want to appear to have been fooled. Although they did not realize they were in an experiment concerning "lie-detection", (open-ended questions), when asked about it directly, (close-ended questions), they stated that they were aware. From a negative point of view, the Ss in Groups I and II may not have wanted to commit themselves to their perceptions (open-ended questions) but, when asked directly (close-ended questions), they freely expressed themselves.

Given the limits of the present data, a resolution of this point must remain in the realm of conjecture. At the very least, the evidence seems to indicate that this experimental manipulation was mildly successful. An analysis of the twelve Ss who stated that they were completely unaware of any connection with "lie-detection" procedures is presented below.

Before proceeding to such an analysis, a similar question concerning the effectiveness of the motivating conditions utilized for Group IV was felt to be appropriate and essential to the understanding of the present data. It will be remembered that Lykken (1959,1960),

used shock and the loss of a ten dollar prize as motivators. The present E's predilection for avoiding pain and not giving away money necessitated the use of an "ego-involved" motivation, namely, the inclusion of the instructions for Group IV (the notion that it was impossible to detect responses "with intelligent people, especially bright college students.").

The questionnaire addressed itself to this issue with rather direct questions concerning whether S had attempted to manipulate his reactions or to do anything "special" during the question period. In effect, the inquiry concerned whether S had attempted to "beat the machine", the laboratory variant of the threat of punishment principle. The fear or motive aspect was inferred from their comments about what they did during the experiment. It should be mentioned that direct questions concerning the S's feeling state might yield additional useful information. Feeling threatened and attempting to avoid detection may be different or uncorrelated behaviours. A question concerning whether the S expected something to happen, such as a shock, would have been appropriate. Despite this shortcoming, informative data were obtained and are presented in Table 5.

Table 5

The Subjects' Stated Efforts to Manipulate Their Physiological Responses

	No. of <u>Ss</u> Who Stated		
	They Tried to Fool <u>E</u>	They Tried to Cooperate with <u>E</u>	They Made No Such Efforts
Group I	0	2	18
Group II	3	2	15
Group III	9	2	9
Group IV	14	0	6

The data suggest an increasing number of efforts to avoid detection as knowledge of participation in a "lie-detection" experiment and experimentally induced motivation increased. This progression was consistent with the data presented in the second column of Table 4. In effect, mere awareness that S is participating in a "lie-detection" experiment was a sufficient condition to motivate the S to attempt to avoid detection. The experimental motivation used appeared to "motivate" still more of the Ss. The manipulation was not perfect, since only fourteen out of the twenty Ss in Group IV stated that they had attempted to deceive E.

Interestingly, two persons in each of Group I, II and III expressed a desire to help E obtain positive

findings (i.e., respond on cue). While it may be gratifying to know that such cooperative people exist, the fact that there were no such volunteers in Group IV speaks to the efficacy of the experimental motive induced in that group.

In summary, it was concluded that mere awareness on the part of the S that he was participating in a "lie-detection" experiment was sufficient to motivate some Ss to deceive E. The experimental manipulation of motivation employed in the present experiment was effective in stimulating still more Ss to reveal that they had attempted to deceive. From their stated reports, this did not appear to be perfectly successful, since six Ss in Group IV stated that they had made no such efforts. It could be hypothesized that these Ss did not want to admit to being affected or manipulated even though they had been. Nevertheless, as with the awareness factor, a further analysis of the data utilizing the Ss' own assessment of motivational state is presented below.

A Reanalysis Utilizing
the Subjective Post-Experimental
Comments Given by the Ss

It is often assumed in psychological experimentation that the treatments or conditions effected by E have been successfully achieved. With regard to the present

experiment, data have been presented which demonstrate that this was not achieved perfectly. Many subjects, in the unaware, unmotivated groups were indeed aware and/or motivated. It has already been shown that such post-experimental comments are subject to various interpretations. Being cognizant of such vagaries along with the difficulties of combining data from different groups, the data were further analyzed. It was felt that before proposing to have demonstrated a heretofore unpredicted and unexpected result the data at hand should be subjected to the most rigorous scrutiny possible.

Consequently, those Ss in Groups I and II who stated that they were completely unaware of the fact that they were participating in a "lie-detection" study were examined. There were three correct guesses out of seven in Group I and three out of five in Group II. Thus, overall, there were six correct guesses out of twelve Ss completely unaware of participating in a "lie-detection" experiment. Still further, there were four second guesses, two third guesses and one fourth. Thus, not only was the 47.5 per cent correct classification rate of the entire study maintained, but the distribution of scores in this sample was similarly heavily skewed in the direction of detection. The Ss' post-experimental evaluation of their efforts to deceive were evaluated. These results are summarized in

in Table 6.

Table 6

Detection Rates According to Subjects' Stated Efforts:
Deceive (D); Cooperate (C); Indifference (I)

	D	C	I
Number Ranked First	<u>13</u>	<u>3</u>	<u>22</u>
Total Number Stating Such Motive	26	6	48
Percent Detected	50	50	46

Again, the per cent detection rates for each of the three alternatives open to an S was highly similar to the 47.5 per cent detection rate for the entire study. More specifically, the test for the significance of difference between proportions was insignificant, (i.e. between those with no stated motive (I); and those specifically detailing such maneuvering (D)). Thus, just as there was no statistically significant difference between Group III and Group IV, there was no such difference when the Ss were regrouped according to their reported efforts to deceive.

Still further, the analysis of motive was applied to the group of 12 subjects who stated they were completely unaware that they were participants in a "lie-detection" experiment. One of these 12 Ss attempted to cooperate

with E (i.e., respond to the relevant items.) There were no attempts at deception in this group. Excluding the one S mentioned above, it was found that six out of the eleven unaware, unmotivated Ss were correctly detected. The familiar 50 per cent detection rate was maintained.

In summary, the Ss' post-experimental comments tended to confirm the major findings presented above. A group of unaware, unmotivated Ss was detected at a rate of 55 per cent. Although the group was small, the consistency of the findings was noteworthy. Similarly, the addition of a motive factor did little (46 percent versus 50 per cent) to increase detection rates.

Heuristic Analyses

Efforts to understand why the results noted above were obtained took several forms. First, the Ss were asked whether they had expected to respond to the relevant stimuli before the question period began. They were also asked whether they felt they did respond physiologically during the question period. The relationships between the Ss' expectations, felt responses and detection rates are presented in Table 7 below.

Table 7

Detection Rates as a Function of Expectancies and Felt Reactions

	<u>S</u> 's Expectation			<u>S</u> 's Felt Reactions		
	Yes	No	Indifferent	Yes	No	Indifferent
Group I	8	8	4	10	6	4
Group II	6	11	3	13	5	2
Group III	9	8	3	10	8	2
Group IV	9	7	4	13	5	2
No. Detected:	$\frac{16}{32}$	$\frac{16}{34}$	$\frac{6}{14}$	$\frac{25}{46}$	$\frac{9}{24}$	$\frac{4}{10}$
Total No:	32	34	14	46	24	10

From the data contained in Table 7 it can be seen that S's stated expectation had little to do with whether S was actually detected (i.e., $\frac{16}{32}$ versus $\frac{16}{34}$ versus $\frac{6}{14}$). It was also noted that participating in the experiment tended to change some Ss' opinions about whether reacting would occur. Only 32 Ss expected to react whereas 46 Ss felt they actually did react. Finally, the Ss appeared to be fairly good judges of whether they had been detected. Twenty-five of the 46 Ss guessed correctly that they had been detected. Fifteen out of the 24 guessed correctly that they were not detected. Thus, a total of 40 of the 70 Ss assessed their reaction correctly. When ranks of one and two versus rank three, four and five were compared, the per cent of correct

judgments rose to 71 per cent. Further analysis by way of examining the relationship between expectancies and the group membership yielded no additional information and was not presented.

To summarize, the Ss tended to change their minds about their reactions as a result of the experiment and they tended to be fairly good judges as to whether they had actually reacted. Their pre-experimental expectations had little to do with whether they did react and consequently shed little light on the question of why positive results were obtained.

A second effort to understand the obtained results involved the remarks of some of the Ss on the questionnaires. Some felt that they had participated in a test of memory or intelligence. Understandably, the majority of such comments proceeded from Groups I and II (six and five respectively). Fewer such comments proceeded from the less ambiguous situations, Groups III and IV. (one and two respectively). It could be argued that, even though an S is not aware that he is participating in a "lie-detection" experiment, he may perceive himself under the "threat" of having to remember details. Consequently, the results from Groups I and II would be inflated for reasons which are inconsistent with the major conclusion above.

In response to such a possibility, those Ss mentioning that the experiment dealt with a test of memory were dropped from Groups I and II. The detection rates continued to be significant with five out of 14 and 10 out of 15 Ss being correctly detected in Groups I and II, respectively. Thus, 15 out of 29 Ss were guessed correctly. Still further, the group of 12 Ss mentioned above who were unaware of their participation in a "lie-detection" experiment were re-investigated. When the one S who attempted to cooperate with E and the two Ss who felt they were participating in a test of memory were dropped, the following result was obtained: $N=9$, four correct ranks of one plus one tie for a correct rank of one, two ranks of two and one rank of three. That is, the per cent detection rate of 45 per cent and the distribution of scores remain heavily in the direction of detection.

In summary, although some Ss did feel that they were participating in a test of memory, the results with the detection of such Ss continued to persist in the area of the overall detection rate of 47.5 per cent mentioned in Chapter III.

Several other efforts were undertaken to understand the data. The age of the Ss and its relationship to detection, the post-experimental comments of the nine

unaware, unmotivated Ss mentioned just above and the post-experimental comments from those easily detected as opposed to those given ranks of four and five were all examined. However, no significant differences or trends were in evidence.

One interesting phenomenon did develop, however. While reading Ss' post-experimental comments, it was evident that some Ss made distinctly negative or hostile comments about the experiment varying from the room being too cold and the experiment being boring to the experiment being poorly carried out. Others made distinctly positive remarks, such as, describing the experiment as being very interesting. All Ss post-experimental remarks were then classified as to whether they were positive, negative or neutral. A very interesting progression of such remarks was noted, as can be seen, in Table 8.

Table 8

Subjects' Positive, Negative or Neutral Evaluations as a Function of Group Membership

	Positive	Negative	Neutral
Group I	3	9	8
Group II	7	5	8
Group III	8	4	8
Group IV	12	2	6

Proceeding from Group I to IV, the positive remarks increased while the negative remarks decreased. That is, the Ss in Group I tended to dislike the experiment, those in Group IV tended to like the experiment. Table 9 presents the detection rates achieved as a result of grouping Ss according to such a judgment. Again, as with Tables 6 and 7, a breakdown according to groups is unproductive.

Table 9

Detection Rates as a Function of Positive, Negative or Neutral Comments

	Positive	Negative	Neutral
Ranked 1st	16	5	16
<u>Total</u>	<u>30</u>	<u>20</u>	<u>30</u>
Ranked 1st or 2nd	26	15	23
<u>Total</u>	<u>30</u>	<u>20</u>	<u>30</u>

The test for the significance of difference between proportions was significant. With those Ss who made negative comments, detection rates were no better than chance, while those Ss who made positive remarks or neutral remarks were detected at a rate of 53 per cent. Interestingly, the distribution of scores (for those ranked one or two) was skewed in the direction of detection for all three groups. These distributions were not significantly

different from each other.

In summary, Ss who made positive or neutral remarks about the study in the post-experimental questionnaires were detected significantly more often than were those Ss who made negative remarks. Those who did make negative remarks were not detected at rates significantly better than chance. Such a finding is, of course, tentative and should be cross validated.

Integration and Attempted Explanation

The major analyses demonstrated that two groups of Ss who were unaware of the fact that they were participating in a "lie-detection" experiment and were not motivated to deceive E were detected at rates significantly better than chance (Table 1). Similarly, there were no significant differences between the unaware groups, the unmotivated group (III) and the motivated group (IV) (Tables 2 and 3). (Actually, there was one isolated difference, in Table 3. That difference was the Chi-square for four independent distributions using Criterion I only. This difference is integrated below.)

The reanalysis did not contradict and in fact, supported the major findings. Ss who stated that they were unaware and unmotivated were detected at rates similar to those reported for the entire study. Similarly, the differences between motivated and unmotivated Ss remained

insignificant.

One serendipitous and completely unexpected finding was that Ss who made negative remarks about the study were not detected at rates significantly better than chance.

In summary, consistent evidence has been accumulated which points to the conclusion that, although "motivation" may be sufficient to elicit a systematic GSR phenomenon, it does not appear to be a necessary factor. Indeed, awareness that one is participating in a "lie-detection" experiment does not appear to be a necessary factor.

The question then comes down to which theory best explains the positive results found in Groups I and II. Of the five theories mentioned above, the "threat of punishment" principle seems to have been rendered superfluous given the non-significant differences between Groups III and IV in the major analysis and similar non-significant differences in the re-analysis. Theory one, it will be remembered, was a conditioned response theory. It depended upon the association of the critical stimuli with a strong emotional situation. Although this theory was not given an adequate test, it was felt that the present learning situation was not a particularly emotional or threatening one. Consequently, it was not felt to apply to the present experimental paradigm readily. Obviously, this theory has not been refuted. It was felt, however, that it simply

did not fit easily since a strongly threatening atmosphere was not present during the original learning for any of Groups I, II or III. The variation of this conditioning theory (i.e. theory two) depended on the necessity of a lie being present and the consequent conditioned association with punishment. In the present study there were no verbal responses. Unless one postulates subvocal responses, it is difficult to relate this theory to the present data. Similarly, theory three (the threat of punishment theory) mentioned above was felt to be an inadequate explanation. Theory four (the conflict theory) was subject to the same criticisms as theory two. With regard to theory five (ideomotor activity) it was difficult to make an assessment. From the negative point of view, it will be remembered that the stimuli were presented visually and tested in the auditory mode. Such a cross model switch could be expected to result in a decrease in or the absence of significant detection rates according to this theory. Otherwise, GSR arousal must be shown to have been present with the original stimulation and present with restimulation in another sensory modality. Again, this theory has not been refuted. It has simply been shown that it demands added assumptions. These included: first, the GSR was elicited during the original learning of the stimuli in combination with the visual-motor

activity; second, GSR response elicited by the auditory test stimuli was accompanied by the original visual-motor activity.

For the present, it was felt that the most parsimonious explanation of the obtained data would involve an attention principle as proposed above. There is a tendency on the part of the human organism to attend to and react to stimuli which are perceived as being more relevant than the surrounding stimuli. Since other explanations have not been completely ruled out, further discussion would simply beg the point rather than prove it.

However, there was more evidence to suggest that this theory best fits the data. An examination of Table 3 reveals one significant result. For Criterion I (the change in GSR from the point of the test stimulus to the highest level reached over the next ten seconds) there was significant trend toward greater detection proceeding from Group I through Group IV. This trend disappeared when Criterion II was adopted (measurements taken perpendicular to the straight line projection). This change in criterion, in effect, dealt with the problem of a rapidly rising or falling GSR. On several blocks of questions, the GSR was rising or falling so rapidly that interpreting them seemed meaningless. Nevertheless, under Criterion I they were scored or ranked in some order and figured in the results.

Under Criterion II, such a block of stimuli would all be given an equal rank or a score of three (in effect no guess was made using this criterion). Such a procedure is clearly demanded by the data. It simply ignores rapid and uninterpretable changes in overall GSR baseline. When this sophistication of the criterion was added, the significant trend disappeared. The tendency toward detection was increased in Groups I and II and decreased for Groups III and IV. The increase (four Ss after memory) was easily explained in terms of using a better criterion. The decrease (four Ss after memory) would not be expected. Inspection of these latter records indicated that the unscorable phenomenon were occurring with these Ss and seemingly by chance, enhanced their probability of being detected. With regard to the theory proposed, Table 10 was constructed. It can be seen from Table 10 that Groups I and II were more prone to make negative remarks about the study (derived from Table 8), forget items, make movements which interfered with the GSR recordings and exhibit difficult to score GSR records. There was a noteworthy relationship between two of these behaviours however, namely negative remarks and the the rapid or difficult to read GSR readings. Of the 20 Ss who made negative remarks, 11 exhibited the rapid rise or fall of the GSR mentioned above. Of the 60 remaining Ss only seven exhibited this phenomenon.

Table 10

Diverse Behaviours as a Function of Group Membership

	No. of Ss Making Negative Remarks	No. of Ss Forgetting Items	No. of Items Forgotten	No. of Ss Exhibiting Gross Move- ment (Criterion IV)	No. of Such Move- ments	No. of Ss Exhi- biting Rapid Rise or Fall in GSR	No. of Blocks of Stimuli Affected by Rapid Rise and Fall of GSR
Group I	9	8	12	4	8	9	17
Group II	5	8	14	4	7	8	16
Group III	4	3	3	0	0	7	11
Group IV	2	6	8	1	1	5	6

Thus, it was hypothesized that there was a relationship between negative attitudes expressed, rapid GSR movements and the relatively poorer detection rates obtained for Groups I and II. The detection rates increased and became more insignificantly different from Groups III and IV when such difficulties are overcome by the use of Criterion II.

Speculating still further, it was felt that such rapid GSR patterns were caused by the feeling states offered by the Ss themselves. They spoke of being bored, of their minds wandering, etc. and under conditions constructed in Groups III and IV, the experiment was less boring and more interesting. Concomitantly, there were fewer gross changes in the Ss' overall activation level and their records were more easily scored. Similarly, with their interest held, there were fewer gross movements and coughs which likewise interfered with the scoring, (i.e. the mild increase in detection rates between Criterion III and IV for Groups I and II, Table 3). Finally, the Ss' relative lack of interest in the test stimuli or the details of the case was reflected by the greater memory impairment evidenced by Groups I and II. (Again there was a slight rise in detection rates for these two groups between the before and after memory scores, Table 3).

In summary, it was hypothesized that a major factor

in achieving significant detection rates in the present study was the maintenance of interest or attention. Criterion II and IV and the correction for the possibility that an S might forget some items aided in maintaining detection rates when interest or attention failed.

Obviously, such theorizing demands the validation of further research. For the present, one more point was felt to be appropriate concerning the criteria used.

Criterion III, any rapid change in overall baseline reading following an item, was not found to be particularly helpful. During the entire experiment, it occurred 79 times. By chance alone, 15.8 occurrences would be expected for relevant items. In actuality, 19 such occurrences, just slightly better than chance, coincided with the relevant stimuli.

The Relationship of the Obtained Results to Other Research

It has been mentioned above that 47.5 per cent detection rate in the present study was less than the 66 per cent detection in the rate achieved by Day (1968). The latter study was similar to the present investigation in that a tape recorder was used in a relatively non-threatening situation. It differed in that the Ss were high school students and only one stimulus, a number, was used. However, the number was also presented by itself; it was not part of a story as in the present experiment. There

was no significant difference in detection between the items. The color was just as effective as the number, etc. It could be hypothesized, then, that the lowered detection rates were due to differences in populations sampled or the more complex experimental situation inherent in the present design. Theories in terms of greater threat posed by an older E or greater attentiveness in a short clear-cut stimulus presentation might be proposed. Without further evidence, such hypotheses simply duplicate points discussed above.

It was also mentioned above that the present results were significantly lower than those of Lykken (1959,1960). He obtained detection rates of 93 per cent and 100 per cent. There were two differences between his work and the present which were felt to be noteworthy. First, as mentioned above, Lykken utilized shock and a ten dollar prize as motivating devices. Although the motive factor did not appear to be important for any of the analyses in the present study, the motivators utilized by Lykken were different and perhaps, more efficacious in eliciting GSR phenomena. Secondly, Lykken did not use a tape recorder. After each test stimulus, he allowed "sufficient time.....for GSR activity to dissipate". In effect, he appears to have waited until the GSR readings were stable or easily scored. It will be remembered that the present

study used a tape recorder for stimulus presentation. The result was a standard time interval between test stimuli. Consequently, the testing could not take into account, as did Lykken's procedure, the vagaries of the GSR readings. It may be advisable to retain the standard stimulus procedure with further research and examine the possibility of holding the stimulus presentation or timing it to coincide with steady GSR readings.

Finally, it was mentioned that the failure to obtain a significant difference between Groups III and IV was in clear contradiction to the findings of Gustafson and Orne (1963). As with Lykken's research, their motivating conditions (ego involvement and a monetary reward) appeared more intense than were those in the present study. Nevertheless, the present study did achieve significant detection in an unmotivated group (III). These authors were not able to achieve such significant results in a similarly unmotivated group. This point leads to an examination of the type of measurements taken by these authors. They state that their "readings were made to the nearest 500 ohms", (1965). Without a greater familiarity with their equipment, conclusive comparisons cannot be made. At first glance, such readings appear to be more crude than the measures utilized in the present study. Consequently, it was felt that the above authors

were liable to overlook subtle GSR differences obtained in the present study. Indeed the possibility arises that the measures utilized were sensitive only to gross changes elicited by the more extremely motivating circumstances. An entirely different and more subtle phenomenon may have been measured in the present study. It would be appropriate to mention, at this point, that equipment which utilizes digital recording of GSR changes would be unsuitable for the scoring of the data, as was done with considerable effectiveness according to Criterion II.

Rather than examining (or taking refuge in) these technical difficulties, a completely different interpretation of their results could be made in view of the present findings. Their "unmotivated" group was "told to lie down and relax as much as possible". There followed a five minute interval and then the test stimuli. Since the subjects did not have to respond verbally and since they had nothing to lose, they may have simply wandered off mentally and paid little attention to the test stimuli. Finally, the obtained results were in the direction expected for detection and these authors did not report on the distribution of scores as was done in the present study.

In summary, differences in test stimuli (i.e. tape recorded questions) measuring techniques and theories

used to interpret the data were highlighted in an attempt to explain contradictions between the results obtained in the present research and those of other relevant studies in the literature.

CHAPTER V

SUMMARY AND CONCLUSIONS

The present study attempted to examine the question of why the Galvanic Skin Response (GSR) yields consistent detectability in "lie-detection" situations. The history of the procedure, variations in questioning technique, methods of measurement and the theories proffered to explain it were felt to be inadequate as general explanatory principles. It was felt that the maintenance of attention may be a sufficient condition for detectability.

Consequently, it was reasoned that the theoretical formulations previously offered would be shown to be severely limited if a group of subjects (Ss) who had no knowledge that they were participating in a "lie-detection" experiment was detected at a rate significantly better than chance.

The present study presented five pieces of "target" or "critical" information to each of eighty university students. This information was part of a larger communication, namely a story. The eighty Ss were divided equally into four groups. Groups I and II were told that they were evaluating a psychological case history and a newspaper story (about a kidnapping), respectively. Groups III and IV were informed that they were

participating in a "lie-detection" experiment. Ss in Group IV were given further instructions which were designed to increase the probability that "getting caught" would serve as a threat to their self-esteem.

After reading the story, each of the Ss listened to a tape recording of thirty stimuli. The five pieces of "target" information were contained in this group of thirty stimuli. A GSR recording was taken throughout the question period. Using this as the basis for judgement, E attempted to determine "blindly" which of five possible sets of "target" information had been communicated to S through the stories.

Relatively low (roughly fifty per cent) but significant (as compared to twenty per cent chance expectancy) detection rates were obtained for all four groups. There were no significant differences in the frequency of detection among the four groups.

Since the Ss in Groups I and II, who were not informed that they were participating in a "lie-detection" experiment yielded detectability rates not significantly different from those Ss who were so informed, casts considerable doubt upon the validity of the theoretical formulations offered as explanations for the "lie-detection" phenomenon. A theoretical formulation based upon small changes in apprehended significance, attention,

and/or arousal as sufficient to yield detectable GSRs must be seriously entertained.

Pending further investigation, no definitive conclusions were reached. Difficulties with and suggestions for further refinement in questioning and measuring techniques were highlighted. Finally, suggestions for further research were implied in a discussion of the applications of the present data to existing theories.

APPENDIX A
 Analysis I
 (From Table 1)

The Poisson approximation to the assumed binomial
 (20, 1/5).

$$N=20$$

$$P=1/5 \quad NP=4$$

$$Q=4/5 \quad NQ=16$$

$$P(X) = e^{-Np} \frac{(np)^x}{x!} = e^{-m} \frac{m^x}{x!}$$

where $m=NP$

and where $m=4$

(individual groups)

$$P(X) \geq 8 = .05$$

(Richmond, 1964,
 p. 591)

and where $m=16$

(Groups I through IV combined)

$$P(X) \geq 23.52 = .05$$

(Richmond, 1964,
 p. 594)

Analysis II

(From Table 1)

The Chi-square test ($\alpha = .05$, $df=1$) for goodness of fit.

$$x^2 = \frac{(|F_{o1} - F_{e1}| - .5)^2}{F_{e1}} + \frac{(|F_{o2} - F_{e2}| - .5)^2}{F_{e2}}$$

$$= \frac{(|12 - 8| - .5)^2}{8} + \frac{(|8 - 12| - .5)^2}{12}$$

$$= 2.59$$

which is less than
 3.84 (x^2 for $\alpha = .05$)

$$\text{but } x^2 = \frac{(|13 - 8| - .5)^2}{8} + \frac{(|7 - 12| - .5)^2}{8}$$

$$= 4.22$$

> 3.84 significant
 for $\alpha = .05$

Analysis III
(From Table 2)

The Chi-square test ($\alpha = .05$, $df=3$) for the significance of difference between proportions.

$$\chi^2 = \sum_j \sum_k \frac{(F_{ojk} - F_{ejk})^2}{F_{ejk}}$$

$$= \frac{(5 - 8.5)^2}{8.5} + \frac{(8 - 8.5)^2}{8.5} + \frac{(10 - 8.5)^2}{8.5} + \frac{(12 - 8.5)^2}{8.5}$$

$$= 3.8 < 7.82 \quad (\alpha = .05)$$

and not significant.

Analysis IV
(From Table 2)

The Chi-squares ($\alpha = .05$, $df=1$) for the significance of difference between individual groups.

$$\begin{aligned} \chi^2 &= \frac{(F_o - F_e)^2}{F_e} + \frac{(F_o - F_e)^2}{F_e} \\ &= \frac{(5 - 8.5)^2}{8.5} + \frac{(12 - 8.5)^2}{8.5} \\ &= 1.44 < 3.84 \\ &\quad \text{and not significant} \end{aligned}$$

Analysis V
(From Table 3)

The Chi-square test ($\alpha = .05$, $df=3$) for the differences between distributions.

$$\chi^2 = \sum_j \sum_k \frac{(F_{ojk} - F_{ejk})^2}{F_{ejk}}$$

Criterion I					
Before memory	=	8.604	>	7.82	($\alpha = .05$)
After memory	=	9.002	>	7.82	
Criterion II					
Before memory	=	2.25	<	7.82	
After memory	<	2.25	<	7.82	
Criterion III	<	2.25			
Criterion IV	<	2.25			

Analysis VI
(From Table 9)

The Chi-square ($\alpha = .05$, $df=1$) for the significance between groups.

$$\begin{aligned} \chi^2 &= \frac{\sum (F_{ojk} - F_{ejk})^2}{F_{ejk}} \\ &= \frac{(16 - 10.5)^2}{10.5} + \frac{(5 - 10.5)^2}{10.5} \\ &= 5.76 > (\alpha = .05 = 3.84) \\ &\quad \text{significant} \end{aligned}$$

ANALYSIS VII

(From Table 9)

The Chi-square test ($\alpha = .05, df=1$) for the significance of difference between distributions.

$$\begin{aligned} \chi^2 &= \frac{\sum (F_{ojk} - F_{ejk})^2}{F_{ejk}} \\ &= \frac{(26 - 20.5)^2}{20.5} + \frac{(15 - 20.5)^2}{20.5} \\ &= 2.94 \quad \text{not significant} \end{aligned}$$

APPENDIX B

The Psychological Case History

Presented to Group I

The five different sets of information are in brackets. In actuality, only one of the five would have been typed in at that point. The sets of stimuli which remained intact are denoted by their position. That is, three, blue, Crawford, Elm Hill and lamp were always together. Similarly, four, yellow, Monroe, Maple Valley and ashtray were the second unit and so on throughout five such units.

A Psychological Case History

The patient's name is Edward. He was born the (third, fourth, fifth, sixth, eighth) and last child in a family of (three, four, five, six, eight) children. He was the only male child and consequently, other than his father, the only "man" in the household. Now in his late adolescence, he was experiencing difficulties which warranted professional attention. Apparently, a pet which an uncle had given him had died. It was a rare type of fish, unusually responsive to human care. He himself discovered the dead creature and became so upset that his parents felt it necessary to call the clinic.

The social history indicated that this disturbance was more than the usual upset over a lost love-object. While his father was quite adept and very successful as a lawyer, his work made it almost impossible for him to spend any time at home. His professional success did however, place the family well off economically and earned them a home in the very exclusive (Elm Hill, Maple Valley, White Birch, Oak Park, Red Wood) community. Edward's mother provided for the majority of his upbringing. She was a strict disciplinarian and a firm believer in the more fundamentalist traditions of the Catholic church. Thus amidst the ease and affluence of (Elm Hill, etc.,) the patient was faced with the

constrictions of another ethic. It was not surprising then, that the present emotional outburst was preceded by several signs that everything was not as peaceful as the family would hope for.

As a small child he had a recurring nightmare which terrified him. The content was always the same. He was exploring a junk yard and after climbing into an old refrigerator which he found, the door slammed shut and he soon found himself unable to breathe. He always awoke just prior to what appeared to be certain disaster. During the last two years an interesting change had taken place. He still had only one nightmare which occurred with the same frequency. Its content was completely changed, however, Imminent death was still the theme, but now he was about to be devoured by a gigantic snake.

Similarly his behavior at school warranted more attention than either his parents or school authorities were willing to give it. He would often hide for hours at a time in the basement. Parents and teachers alike felt great comfort in attributing this behavior to the "excessive shyness of children." They must have felt the inadequacy of this explanation since everyone implicitly agreed that he should be sent to (Crawford, Monroe, Temple, Davis, Taylor) High School, a highly

selective and expensive institution. It was only with the death of his pet and the severely disoriented state it left him in, that his parents came to realize he needed to get over more than just his "shyness".

When he came to the clinic he was doubly upset, still shaken over the death of his pet and now worried that he might be "insane." While in the waiting room, he had apparently been nervously pacing about and inspecting the contents of the place. And as fear is apt to feed upon itself, he accidentally knocked over a rare oriental (lamp, ashtray, picture, bookend, statue). It was shattered along with his already precarious composure. The first few interviews proved to be similarly awkward. He invariably wore the same freshly washed, starched and uncomfortably stiff looking (blue, yellow, green, red, brown) shirt. The discomfort was appropriate but the symbolic significance of the color is still a mystery. At first he spent most of the time in forlorn silence, only gradually testing out the therapist. As he began to trust the therapist his superficial and halting remarks gave way to more meaningful statements about who he was underneath his mask of fear. At first he revealed some minor "sins" such as stealing an apple from the corner grocery store. From an analysis of change in the content of his nightmare, the therapist was able

to reach much more significant concerns which the patient felt to be "mortal sins". That is, the animal devouring him in his dream was symbolically associated with his uncle. This was the one person in the world who had been kind enough to give him such a precious gift. His strong feelings of love for him were too closely associated with those pleasures forbidden by the strict ethic of his religion. To entertain them, was to invite certain disaster. It was no wonder then, that the pet itself was the object of all his affection while other people, especially his uncle were to be avoided.

Dealing with this complex of emotions was very difficult for him. But with considerable effort, he was able to confront himself and his difficulties rather successfully. All of his problems were by no means solved, but he did feel confident in going off to college where he would interact with many new people. And as not all difficulties are solved, not all people are completely understood. He gave his therapist a bottle of Scotch as a gesture of gratitude. The color of the bottle was, however, all too reminiscent for the therapist of that shirt he had seen in front of him for so long.

APPENDIX B

The Newspaper Story Presented to

Groups II, III and IV

Again, the same five sets of stimuli to be tested
are bracketed.

The Newspaper Story

The following crime took place late last year. It involved the kidnapping of a teenaged boy named Edward. He was, according to friends, last seen at the (Crawford, Monroe, Temple, Davis, Taylor) High School playground. These boys were completely involved in their game at the time and could give little information about when or with whom he left. The only information that neighbors could give was that they had seen a boy with a brightly decorated (blue, yellow, green, red, brown) shirt drive off with an older man.

Some police officers theorized that a sexual motive was involved. He was, after all, a handsome boy and his flashy clothes made him all the more noticeable. Other officers felt that this was not the random act of a sexual deviate. They noted, for instance, that he alone among a group of boys on the playground came from across town, the very wealthy and exclusive (Elm Hill, Maple Valley, White Birch, Oak Park, Red Wood) community. His father had sent him to this school to look for his brother who played there often. These same policemen noted also that the victim's picture appeared in the paper a few weeks earlier. He and his father won a local golf tournament at that time and the proud father boasted that no amount of material gain could replace this

(third, fourth, fifth, sixth, eighth) and last child in his family of (three, four, five, six, eight) children.

Two ransom notes finally arrived at the boy's home but both contained errors concerning the details of the case and the police advised the father not to carry out their demands. A third note related to an incident in which the boy had broken an expensive (lamp, ashtray, picture, bookend, statue) in his home. He had confessed to his mother and the two kept the incident a secret. This note was obviously genuine and the father was advised to pay the ransom, which he did. The boy was not returned, however, and the police are still searching for him and the kidnapper.

APPENDIX C

The Post-experimental Questionnaire Presented to Each S.

Your Name _____ Age _____

Address to which a complete explanation of the purpose and results of the experiment can be sent, in late August.

You are invited to make any comments or share any thoughts you have concerning the present experiment.

If you have not already done so, please relate in your own words what you thought was the purpose of the present experiment.

Did you think, before the question period began, that you would react differently to the answers that matched the case history you read?

If you thought you would and have not already done so, please explain in your own words why you thought this would happen.

Did you feel that you were reacting differently to the accurate statements while the question period was occurring?

Why did you think this was happening?

Did you at anytime realize that the experiment dealt with a phenomenon known as "lie-detection"?

If so, when?

1. Before the experiment began.
2. During the first set of instructions (before reading the case history).
3. While reading the case history.
4. During the second set of instructions (just after reading the case history).
5. Some time during the question period. If so, when?
6. Other, please explain.

Please describe what you did, that is what you thought about or said to yourself during the question period.

If you have not already mentioned this, did you make or do anything "special" during the question period?

Following is a repetition of the questions. Go through them quickly circling the "right" answers. If you forgot the answer during the tape session, please mention this, even though you might now recall it. And feel free to indicate in the space provided next to each question, if anything special occurred to you during that question. That is, if such things as favorite colors, familiar names, or stupid answers struck you at that time, indicate it here.

Which child in the family was he?

7th
5th
8th
6th
4th
3rd

What color shirt did he wear?

Black
Red
Green
Blue
Brown
Yellow

Where did he live?

Rose Garden
Oak Park
Elm Hill
Maple Valley
Red Wood
White Birch

What did he break?

Window
Ashtray
Lamp
Statue
Picture
Bookend

What high school was he sent to?

Gibson
Taylor
Monroe
Temple
Davis
Crawford

REFERENCES

- Berien, F.K. Possibilities in the use of the ophthalmo-graph as a supplement to existing indices of deception. Psychological Bulletin, 1940, 37, 507.
- Berien, F. K. Ocular stability in deception, Journal of Applied Psychology, 1942, 26, 55-63.
- Berien, F. K. and Huntington, G. H. An exploratory of pupillary responses during deception. Journal of Experimental Psychology, 1943, 32, 443-449.
- Block, J. D., Rouke, F. L., Salpeter, M. M., Tobach, E., Kubis, J. F., and Welch, L. An attempt at reversal of the truth-lie relationship as measured by the psychogalvanic response. Journal of Psychology, 1952, 34, 55-56.
- Burack, B. A critical analysis of the theory, method and limitations of the "lie-detector." Journal of Criminal Law and Criminology, 1955, 46, 414-426.
- Burt, H. E. The inspiration-expiration ratio during truth and falsehood. Journal of Experimental Psychology, 1921, 4, 1-23.
- Chappell, M. N. Blood pressure changes in deception. Archives of Psychology, 1929, 17, 5-39.
- Davis, R. C. Physiological responses as a means of evaluating information. In A. D. Biderman and H. Zimmer (eds.). The Manipulation of Human Behavior, N.Y.: John Wiley and Sons, Inc. 1961.
- Day, D. A., The Role of the Lie in Lie-Detection, unpublished Major Paper, University of Windsor, 1968.
- Ferster, C. B., Perrott, M. C. Behavior Principles, Appleton-Century-Crofts, New York, 1968.
- Frank, Jerome D. Persuasion and Healing, Shocken Books, N. Y., 1961.
- Gustafson, L. A. and Orne, M. T. Effects of heightened motivation on detection of deception. Journal of Applied Psychology, 1963, 47, 408-411.

- Gustafson, L. A. and Orne, M. T., Method of stimulus presentation on the detection of deception. Journal of Applied Psychology, 1964, 48(6) 383-387.
- Gustafson, L. A. and Orne, M. T. Effects of perceived role and role success on the detection of deception. Journal of Applied Psychology, 1965, 49(6), 412-417.
- Gustafson, L. A. and Orne, M. T., The effects of verbal responses on the laboratory detection of deception. Psychophysiology, 1965, A, 10-13.
- Harney, J. W. Pupillary response during deception. Journal of Criminal Law and Criminology, 1943, 34, 135-136.
- Inbau, F. E. and Reid, J. E. Lie Detection and Criminal Interrogation. The Williams and Wilkins Company, Baltimore, 1953.
- Inbau, F. E. and Reid, J. E. Truth and Deception, The Williams and Wilkins Company, Baltimore, 1966.
- Kelley, D. M. Psychophysiological methods in police detection. Journal of Nervous and Mental Disease, 1953, 118, 385-390
- Kugelmass, S. and Lieblich, S. Effects of realistic stress and procedural interference in experimental lie detection. Journal of Applied Psychology, 1966, 50(3), 211-216.
- Kugelmass, S., Lieblich, I., Bergman, Z. The role of "Lying" in psychophysiological detection. Psychophysiology, 1967, 3(3) 312-315.
- Kugelmass, S. and Lieblich, I. Relation between Ethnic origin and GSR reactivity in psychophysiological detection. Journal of Applied Psychology, 1968, 52(2), 158-162.
- Kugelmass, S., Lieblich, I., Ben-ishai, A., Opatowski, A., Kaplan, M., Experimental Evaluation of Galvanic Skin Response and Blood Pressure Change Indices During Criminal Interrogation. Journal of Criminal Law, Criminology and Police Science, 1968, 59(4), 632-635.
- Larson, J. A. Modification of the Marston deception test. Journal of Criminal Law and Criminology, 1921, 12(3), 390-395.

- Larson, J. A. The cardio-pneumo-psychoqram and its use in the study of emotion, with practical applications. Journal of Experimental Psychology, 1922, 5, 323-328.
- Lee, Clarence, D. The Instrumental Detection of Deception-The Lie Test. C. C. Thomas Company, Springfield, Ill. 1953.
- Lykken, D. J. The GSR in the detection of guilt. Journal of Applied Psychology, 1959, 43, 385-388.
- Lykken, D. J. The validity of the guilty knowledge technique: the effects of faking. Journal of Applied Psychology, 1960, 44, 258-262.
- Malmo, R. B., Boag, J. J. and Smith, A. A. Physiological study of personal interaction. Psychosomatic Medicine, 1957, 19, 105-119.
- Marston, W. M. Systolic blood pressure symptoms of deception. Journal of Experimental Psychology, 1917, 2, 117-163.
- Meehl, P. E. Structured and Projective Tests: Some common problems in validation. In Handbook of Projective Techniques. (Murstein, B. I. (ed.) Basic Books, Inc., N. Y. 1965, pp. 83-88.
- Oberman, C. E. The effect of the Berger rhythm of mild effective states. Journal of Abnormal and Social Psychology.
- Orne, M. T. and Thackeray, R. I. Group GSR technique in the detection of deception. Perceptual and Motor Skills, 1967, 25(3) 809-816.
- Richmond, S. B. Statistical Analysis, The Ronald Company, New York, 1964.
- Rosenthal, R. On the social psychology of the psychological experiment. American Scientist, 1963, 51, 268-283.
- Steinbach, R. A., Gustafson, L. A and Colier, R. L. Don't trust the lie detector. Harvard Business Review, 1962, 40(6) 127-134.
- Summers, W. G. A new Psychogalvanometric technique in criminal investigation. Psychological Bulletin, 1937, 34, 551-552.

Trovillo, P. V. A history of lie detection. Journal of Criminal Law and Criminology, 1939, 29, 848-881

Trovillo, P. V. A history of lie detection. Journal of Criminal Law and Criminology, 1939, A30, 104-119.

Woodworth, R. S. and Schlosberg, H. Experimental Psychology (Rev. Ed.) Holt, Rinehart and Winston, N. Y., 1965.

VITA AUCTORIS

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