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USE OF POLYGRAPHS AS "LIE DETECTORS"
BY THE FEDERAL GOVERNMENT
(Part 3—Panel With Scientists)

HEARINGS
BEFORE A
SUBCOMMITTEE OF THE
COMMITTEE ON
GOVERNMENT OPERATIONS
HOUSE OF REPRESENTATIVES
EIGHTY-EIGHTH CONGRESS
SECOND SESSION

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USE OF POLYGRAPHS AS "LIE DETECTORS" IN THE FEDERAL GOVERNMENT

(Part 3—Panel With Scientists)

WEDNESDAY, APRIL 29, 1964

HOUSE OF REPRESENTATIVES,
FOREIGN OPERATIONS AND
GOVERNMENT INFORMATION SUBCOMMITTEE
OF THE COMMITTEE ON GOVERNMENT OPERATIONS,
Washington, D.C.

The subcommittee met at 10 a.m., pursuant to call, in room 304 Cannon Office Building, Hon. John E. Moss (chairman of the subcommittee) presiding.

Present: Representatives John E. Moss, Porter Hardy, Jr., Henry S. Reuss, John S. Monagan, George Meader, Robert P. Griffin, and Ogden R. Reid.

Staff members present: Samuel J. Archibald, staff administrator; Jack Matteson, chief investigator; Benny L. Kass, subcommittee counsel, and Marvin F. Weinbaum, staff investigator.

Mr. Moss. The subcommittee will be in order.

(Members of the subcommittee present at time of convening: Representatives Moss, Reuss, and Griffin.)

Mr. Moss. This is a continuation of the subcommittee's inquiry into the use of polygraphs—so-called "lie detectors"—by the Federal Government.

We have heard testimony from non-Government experts in the field of lie detection and from Army, Navy, and Air Force witnesses who are familiar with the use of the polygraph in Government. Additional Government witnesses will be heard at a later date.

Testimony so far reveals several significant areas of interest to the subcommittee. These include the training and qualifications of polygraph examiners, the reliability and accuracy of the instrument in measuring emotions, and the widespread use of the instrument by the Government for criminal investigations and in certain security agencies for preemployment examinations.

In reviewing the testimony on training and qualifications of Federal polygraph examiners there is strong evidence of a complete lack of standardization in setting minimum requirements. There is a wide variation among Federal agencies in the requirements for classroom polygraph training—ranging from 5 days in some instances to 7 weeks in others. The hearing record shows that the experts sharply disagree on desirable requirements for polygraph examiners.

The type of polygraph generally in use by the Federal Government records physiological functions in the subject being tested. The graphs depict pulse and blood pressure, respiration, and minor changes in skin dampening. It is stated that these physiological changes are generated by emotional reactions. By interpretation of these recordings the examiner claims to be able to determine the guilt, innocence, or moral character of the person being examined. So far there is no adequate showing in the hearing record to indicate that the conclusions reached by the polygraph examiner are based on scientific fact. To further explore this problem, the subcommittee today has convened a panel of specialists in the field of psychiatry and psychology who have done research in the use of polygraphs. They are:

Dr. John I. Lacey, chairman of the department of psychophysiology-neurophysiology, Fels Research Institute, and professor of psychophysiology, Antioch College, Yellow Springs, Ohio;

Dr. H. B. Dearman, psychiatrist, Johnson City, Tenn.;

Dr. Joseph F. Kubis, professor, department of psychology, Fordham University; and

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It is difficult to answer how accurate the lie detector is in terms of the probabilities of falsely diagnosing guilt or falsely diagnosing innocence. Given an accuracy of say, 50 percent in a balanced situation designed to maximize correct answers, you can choose to set your cut-off point in such a way as to minimize either error.

I would like to separate the scientific issue of accuracy from the almost administrative decision of what you will do with the data. This is much the same thing as college board data predicting college performance. A very high score on the college boards predicts reasonably accurately that an individual will do well in college; however, a low college board score does not predict at all well that an individual will do badly. This information is available to the dean who makes the decision. If he has to choose a very few students from a large number of applicants, he may well decide to take only students with good college board scores knowing full well that he may be eliminating some very good potential students. By so doing, he will be reasonably certain of eliminating false positives at the cost of making a high proportion of false negatives decisions. By the same token, under different circumstances with fewer applicants, the dean may feel it is essential not to lose any potentially good students and in that case, of necessity, he will choose a different cutoff point therefore also admitting more students who are potentially unable to do the work. All the educational testing services can do in this instance is to obtain the data and report the findings to the dean. The administrative decision is a separate issue. It may be useful to look at lie detection data in a similar way.

Mr. KASS. Dr. Kubis, you have done studies in polygraph work as lie detection; is this correct?

Dr. KUBIS. That is right.

Mr. KASS. How scientific is this method?

Dr. KUBIS. Well, if you would consider method, you would have to consider the instrument, the individual, and his operation of the instrument. Now, in terms of instrumentation, as Dr. Lacey has pointed out, the field has not progressed as it should have from a scientific point of view. There have been many opportunities for it to progress. There may have been a great investment of money in the types of instruments that have been manufactured, and those instruments are still in operation. There have been some minor improvements but they are not very great.

In terms of some of my own research, it seems conceivable that people now are relatively knowledgeable about these various procedures and can, as it were, fool the lie detector operator. They don't fool the machine. The machine only records what it records but they may fool the lie detector operator who is interpreting the curves that are generated by the machine. In other words, people—once they know what is being recorded, especially if they are guilty, or if they are playing a game as in experimentation—will try to find methods of beating the procedure—not the machine—beating the procedure which involves the interpretation of the examiner.

In this particular case, we have machine which only records the physiological responses and an individual who tries to interpret the recordings of the machine.

When you ask how scientific is this procedure, it would seem that in terms of the exacting criteria of science it is not so very scientific. These men are practically oriented and are trying to make practical decisions. They have a number of hunches, a number of criteria or ways of interpreting data which are peculiar to them. And having had some success, which was probably above chance, they are acting according to this procedure.

Now, if they were scientific—and it depends on what we mean by scientific—they might try to put all of this data into some numerical form. They would then try to integrate these sets of numbers, to get a single number. Then they would try to compare this single number with a number that they feel is a critical point. At that point they should make the decision whether he—the suspect—is or is not saying what he believes. I am trying to get rid of the notions, as Dr. Orne has been trying, of guilt or innocence. I think it is a matter of verification of what the suspect knows of what he believes he knows.

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We have done a fair amount of work on what you might call the voluntary control of the read-out. This has nothing to do with lie detection. It is basic psychophysiological work.

I am sure Dr. Lacey will confirm this kind of phenomenon, that the control, the voluntary volitional control of these parameters is considerably greater than we normally give them credit for.

Dr. DEARMAN. I can't quite agree with that for the simple reason that if you cut the sympathetic nerve to the heart you get a slowing of the heartbeat. When Dr. Orne says you tell a man to think about something, being afraid, certainly it is going to speed up. It is going to speed up automatically because this is a stress situation. In other words, if he thinks of the death of a family member, this is the thing that causes the autonomic nervous system to kick up. In other words, without an emotion, it wouldn't work if you could be entirely objective.

Dr. LACEY. What wouldn't work?

Dr. DEARMAN. You could be entirely objective about something and say, being scared and knowing about scaring. I don't think you would get an autonomic response because, as Cannon said, the autonomic nervous system is the nervous system used for the "fight or flight" response. Just like a football player getting ready for the kickoff, he is very nervous until this happens. When he kicks the ball, then he settles down.

Dr. LACEY. I think at this moment in time you have opened a Pandora's box. You are at the point of considerable disagreement among those engaged in the daily study of the problem of the relationship of autonomic functions to the central nervous system, of what the autonomic responses are there for. The Cannon theory of fight or flight, I am afraid, Dr. Dearman, is not one that holds up in daily laboratory investigation. I think most people investigating this area today would not feel that this formulation even begins to encompass what we see. It is perfectly possible, for example, to administer a word association test in which as carefully as possible one eliminates all words with "emotional" connotation: success, mother, love, feces, and so on. Eliminate all these words, administer the words calling for the first association that comes to mind and one will elicit, for example, beautiful GSR's. If one tries to find what this correlates with, one can find as did Berlyne, for example—

As did Berlyne, that the magnitude of the GSR elicited depended

Mr. KASS. Excuse me, Dr. Lacey, as did—

Dr. LACEY. Berlyne, B-e-r-l-y-n-e, University of Toronto.

Dr. LACEY. Berlyne, B-e-r-l-y-n-e, University of Toronto. Upon what is known as the response uncertainty of the word. Words which in our culture evoke a multiplicity of responses, elicit larger GSR's than words which in our culture do not evoke a multiplicity of association.

If I give you a word association test and I say "black," you will say "white." That is an extremely popular response; it will not be accompanied by a large GSR.

Dr. DEARMAN. It might be if I had some sheer animosity toward a colored person.

Dr. LACEY. That is correct.

Dr. DEARMAN. If you say something is irrelevant or relevant, you have to say irrelevant or relevant to whom? Do I drink coffee? This guy got a beating every time he drank coffee. Well, anybody would get a response to that.

This thing has meaning to a person that we don't know.

Dr. LACEY. That is correct. I am giving you a group result. By the very fact that it is a group result, it bears with it a little more certainty than the study of any single case.

The single-case study always elicits dramatic leads in hypothesis for further test.

All I am saying is, as you can already see, we are now in an area of disagreement. I think the committee had better be aware that there is disagreement.

Mr. KASS. You say we have opened up a Pandora's box of disagreement. Isn't this same disagreement possible to come up practically in the polygraph situation?

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Dr. LACEY. Absolutely, I would think so.

Dr. ORNE. Just one thing. I don't think we are really disagreeing this much because there is an empirical basis for answering the question. I am not talking about data off the top of my head, the data is available, it is public. I refer you to a paper from our laboratory in the Journal of Psychosomatic Medicine which reported the study I am talking about. What we were doing specifically was comparing the effect of hypnotically induced emotions on heart rate, GSR respiration, and so forth, with the change individuals could evoke at will. The remarkable finding was the extent of autonomic changes which individuals could produce without any special procedure.

I don't think that it matters, and I am perfectly willing to take this as a scientific controversy, what the intervening variable is; namely, how you do it. From the point of view of this committee, it is relevant that you can do it and it is not automatic. In other words, if I ask you to please be afraid, you can make your own heart beat more rapidly within two beats and most normal persons have this ability, I would therefore say for our purposes we may view it as a fairly voluntary response and it would be giving the wrong idea to present it as an involuntary response even though it may be mediated by recalling past experience.

Since we all have this ability at all times, we may consider the ability of the individual to produce a GSR response at will, to inhibit respiration at will, to increase his heart beat at will as within the repertoire of the normal intact human being.

Dr. LACEY. This is one of the areas of disagreement I am referring to, that the old line autonomic nervous system is entirely automatic. I just think it is so clear today that it is not. Dr. Orne has contributed a great deal of information in this field in studies of what he calls "The Demand Characteristics of the Experiment." It is so clear that whatever the mediating process, as Dr. Orne says, the organism has methods at its disposal for augmenting or inhibiting a variety of physiologic responses.

Mr. KASS. Dr. Lacey, if I understand you correctly—and I am not a scientist—you are saying that in the individual, some individuals, or within the same individual, the autonomic nervous system may be automatic and at other times not?

Dr. LACEY. No; the word "autonomic" is something of a misnomer. It arose because of certain structural peculiarities of the nervous system seen when one opens up, say, a dog or cat or man, and looks to see how the nerves are distributed. There are certain definite structural and functional peculiarities to that branch of the nervous system which has come to be given a separate chapter discussion in the textbooks on physiology. This is what we mean by the autonomic nervous system.

Today, at the frontiers of psychophysiology and neurophysiology far less attention is being paid to these structural and functional peculiarities and much more to the functional similarities and to the interconnections between the central nervous system and the autonomic nervous system.

All autonomic functions with which I am familiar are integrated at all levels of the nervous system. You can elicit them in an anesthetized animal from the cortex, subcortex, from the brain stem.

These are all interconnected and these interconnections provide the physical basis for the kind of phenomenon that Dr. Orne has presented in his work so very convincingly.

Let me give you an extremely simple example to show you how sensitive these responses can be to—I will use Dr. Orne's phrase, I like it—to "the demand characteristics of the experiment."

Any new intrusion in the environment, any new stimulus, will evoke quite a few physiologic responses. Our Russian colleagues have it, for example, that a novel stimulus will evoke vasoconstriction in the digit, vasodilation in the temple and GSR. This is one of their criteria for what they call the orienting reflex. Repetition of this stimulus, if no particular meaning is given to it and if it does not change, if the organism has nothing to do with that stimulus, repetition of that stimulus will rapidly result in a diminution, indeed a disappearance of these physiological aspects of the orienting reflex.



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Mr. REUSS. If I may say so, that is a responsive answer to the question I was asking: Using your best knowledge of the art of lie detection as practiced in the United States today, is this, in your opinion, a currently valid procedure in terms of crime detection, in terms of employees screening, and in terms of individual rights, taking all those together?

Dr. ORNE. I guess I should return to you.

Dr. ORNE. I think many of the points which Dr. Lacey made quite earlier are the reasons for my difficulty. Unfortunately, the question of validity implies does it work. Now, if you were to ask is it valid to tap wires, I would have to say, well, it gives you the information; there is no doubt about that. If you were to say do I agree that it should be done, I would say no. I would not say it is invalid. I would say it is not right, it is improper, I don't like it.

Mr. REUSS. Let us take your example. I, too, have a view on wire-tapping which is irrelevant here. But, as you say, if you tap a wire and make a recording of what the suspect says, this is most helpful. This accurately records what he said and particularly if, in the course of it, he is plotting a crime or confesses a crime, this is—moral considerations aside—handy to have. However, what is your view, moral considerations aside, of the efficacy of the so-called lie detector as practiced in the United States today for the purpose for which it is practiced, employee screening and detection of wrongdoing? Does it do a good job or poor job?

Dr. ORNE. This is what I want to separate. I would say we have relatively little data on the practice of lie detection in the United States today. We have data that indicates under proper circumstances in the laboratory you can assign reliable probabilities to, whether you can categorize people. There is no doubt about this. I think all of us would agree on that.

Mr. REUSS. However, my question was not concerning laboratory tests which admittedly show a considerable degree of success by the so-called lie detector indicating whether somebody has turned over a red card or a black card, and so on. I am concerned with how it is actually practiced today. You have been studying this, as have your colleagues, for years and have, if I may say so, a unique knowledge of it. That is why you are here today. This brings me to my question.

As practiced today, having regard for the training or lack of it, of the operators, having regard for the claims of success of its proponents, having regard for the uses for which the tests are conducted, is it a valid procedure?

Dr. ORNE. Allow me to give you the data and the reasons for it. In the laboratory, we know that the more motivated the subject is the easier he is to pick up. In other words, if you do not care about being picked up in the laboratory situation, you are very difficult to detect. If I give you \$10—if you fool me—you become very easy to detect. It is an interesting paradox; that what makes the detection of deception possible is the attempt to deceive. Since this is the case, one would expect, because we have no data from the field really, the statistics are just not useful, therefore we have to extrapolate. One would say on the one hand, well, because in the real life situation the suspect is much more motivated, the detection of deception should be easier. On the other hand, the conditions in real life are imperfect, the data may be contaminated. It is easily possible to bias this kind of data.

If I ask you, let us say, is it number 1, is it number 2, is it number 3, is it number 4—in a loud voice—I am going to get a response regardless of anything else. Just by changing the tone, by changing emphasis, and so on. This is on the negative side of the ledger.

How these two variables in fact work out—I mean there are reasons to believe it should work better in real life if conditions are not well controlled. However, we know that this is not always the case and, therefore, it is difficult to weigh these factors. No one has yet taken the data of real life and analyzed it properly.

On the one hand, the lie detection people would like to say: Every time we make a decision, this is right. So they arrive at, you know, 99 percent accuracies which, in our view, are not correct.

At the same time—if you take, as was done, where decisions have been verified and compare this to the total sample, analyzed—it does not tell you anything, either.

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Mr. REID. Are you aware of anything in the Federal Government where this kind of administrative decision is made where there is a standardization as to professional standards and some understanding of what we are really doing? Are you aware of anything in the Federal Government which attempts to do what you are talking about?

Dr. LACEY. In lie detection or in other areas?

Mr. REID. In lie detection.

Dr. ORNE. No. I would say this kind of observation has never been made in the literature. This is why I am trying to make this point. It is because people have kept trying to talk about accuracy rate without recognizing that you can shift these by an administrative decision which leads you to very different conclusions, given the same data.

Mr. REID. And perhaps very erroneous conclusions.

Dr. ORNE. Yes.

Mr. MOSS. Mr. Reid, it might interest you to know that on April 27, the Department of Defense acted by memorandum directed to each of the service secretaries, to the Chairman of the Joint Chiefs of Staff, and to the Director of the National Security Agency to at least clarify some of the policies governing the use of polygraphs. The instruction is as follows:

No examination with the aid of a polygraph shall be conducted without advising the subject to be interviewed (1) that he has a right under the fifth amendment to the Constitution or, as appropriate, article 31 of the Uniform Code of Military Justice to refrain from doing anything that may tend to incriminate him; (2) that the polygraph examination will be conducted only with his prior, written consent; (3) whether the area in which the polygraph examination is to be conducted contains a two-way mirror or comparable device, and (4) whether the examinations will be monitored or recorded in whole or in part by any means.

It is signed by the Deputy Secretary of Defense, Cyrus Vance.

Mr. REUSS. What is the date of that?

Mr. MOSS. April 27.

Mr. REUSS. This is news to me and most welcome news. I certainly want to commend the Defense Department for that directive.

Mr. MOSS. Mr. Meader.

Mr. MEADER. Dr. Dearman, you may be aware that a letter that you sent to the chairman under date of April 5, 1964, was inserted in our record. It appears on pages 44 and 45 of the hearings. (See pt. I, hearings.) I interrogated the witnesses, one of whom was a Mr. Inbau, I believe he was a professor of law at Northwestern University, and I wanted to read a paragraph from your letter. It bears on the directive that the chairman has just read. You said, and I quote:

In my opinion, the use of the polygraph violates the fourth amendment as regards search and seizure. I am also of the opinion that its use violates the fifth amendment. I am aware that proponents of the use of the polygraph fall back on the statement that no one is forced to take a polygraph test and use this as a means of satisfying the constitutional requirements. However, this is of little or no avail because the examinee does not realize that not only will his conscious thoughts and his autonomic responses to them be recorded but his unconscious thoughts will also be delved into and consequently he will give autonomic responses to unconscious thoughts or, to put it another way, he will be giving autonomic responses to thoughts of which he is totally unaware. This is never explained to the examinee and I doubt if the examiner himself is aware that this is taking place.

Dr. DEARMAN. Yes, sir.

Mr. MEADER. I don't know if you have read our record but the law professor thought you ought to stick to psychiatry and not pronounce constitutional interpretations.

Dr. DEARMAN. Yes, sir.

May I say something here, sir?

Mr. MEADER. Yes. I want you to develop this because the question of the invasion of an individual's rights is one that is very important to me. You make the point of the unconscious thoughts.

Dr. DEARMAN. Yes.

Mr. MEADER. Now, if the examiner advised the examinee that not only were his conscious thoughts but his unconscious thoughts to be recorded and he still consented, would you think that was a violation of the fifth amendment or the fourth amendment?

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Dr. DEARMAN. It is according to how much explaining you went into with him. In other words, if you could explain to him that you were going to find out things about himself that he was not aware, and after this if he wanted to take it, then I would not think that was a violation. But you would have to go into great detail to do this.

May I say here that Professor Inbau also said that the use of the lie detector was no more an intrusion into the mind than that of the psychiatrist.

So I would just like to read you something here. When the polygraph examiner comes in he tells him he can take the test or not take the test. When I see a patient who is involved with the law or that I think will become involved with the law, I read him these seven statements: (1) That I am a doctor who is specialized in psychiatry; (2) that I am interested in understanding how he happens to be sent to me; (3) that I will take notes or make a tape recording of what you tell me; (4) that I will send a letter stating my opinion to your attorney or representative; and if the attorney or representative requests it, I will send a copy of the complete psychiatric workup; in case of court action, the judge or anyone he designates in the court, may also get a copy of the letter or complete record if they so desire; (5) that I may have to testify in court; (6) that you do not have to answer questions; that if you would rather not have a certain answer written down or recorded you should explain that you would prefer not to answer that particular question, and that it is all right for you to do so; and (7) that I will give my opinion, based on my examination of you, and that it may or may not be to your liking; that even though you may be paying my fee I will give as objective an opinion as is humanly possible for me to do, and in cases in which I appear in any court I consider myself an expert for the court and not for any individual.

After I have read him the statements, then, of course, the questions come. I explain to him my reasons for doing so.

I explain to a patient he, in effect, is putting himself in the position of testifying against himself.

At this point he usually tells me that he has nothing to hide and he will tell the truth.

I then further explain that in talking to me he is going to reveal to me things about himself of which he is unaware, that in effect he is going to tell more of the truth than he himself realizes.

The polygraph examiners do not do this.

Mr. MEADER. You, in effect, say that if a polygraph examiner did instruct the examinee in accordance with the instructions that you give to your patients, and the examinee thereafter consented to the examination, there would be no violation of the fourth amendment or the fifth amendment?

Dr. DEARMAN. Correct, sir, but the examiner has to know enough about human personality to explain what might happen. He has to give an example. Let us take a person who is involved in some psychopathic act. This is the first time it has ever happened. He comes in to see me. In talking to me, he might tell me when he was a small child he used to pull the heads off cats or rats and what great delight he took in doing this. He would think this has nothing at all to do with what I was seeing him for, when in effect, it has a lot to do with it.

Mr. MEADER. In other words, you are saying, aren't you, that unless a psychiatrist gives the polygraph examination, it would be unconstitutional because no one but a psychiatrist has the capacity to explain to an examinee that his unconscious thoughts may be recorded?

Dr. DEARMAN. I agree with you, sir.

Mr. MEADER. I see a little disagreement here.

Dr. ORNE?

Dr. ORNE. Speaking as a psychiatrist, also, I would think this is a very interesting statement to read to a prospective patient whom you are evaluating for the court.

I think as far as current psychiatric practice in the United States, it should be clear for the record that I would venture there are only a very few or a small group of psychiatrists who would be explicit in this form. I think all psychiatrists who have done any evaluation of patients somehow communicate this, and this is certainly within

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the ethics of the profession. Nobody disagrees with it. But, and I think this should be made explicit, if one is following this logic one gets to a very difficult position because, as a psychiatrist, it should be clear that the fact that you read this kind of statement to a prospective patient and the fact that you in good faith try to explain, we know enough about selective perception, about people hearing what they choose to hear; that one can argue that there is no way you can communicate it to him following the same path of logic, and that the fact that you go through the motions of reading this kind of document is not really the crucial thing at all. I could read somebody this and then proceed to violate his rights by using information against him maliciously, a whole bunch of things, from which he would be in no way protected by this. He is protected by my own ethics, if you will, and he is protected by these whether or not I read the statement, because this, for the most part, has been explained to him before he even gets to see me if he has an attorney. The attorney certainly has explained this to him because this is the standard position.

I think that we may be kidding ourselves and I would like to make this explicit. I, personally, do not think that it would really protect the individual any more to tell him this. Fine. By all means let us tell him this, but it would not protect him from subtle pressure to take the examination, it would not protect him from the way he is asked, and the perfunctory reading certainly would not do it. Even if the individual were equipped to explain, and I would object to the fact that this would have to be a psychiatrist to explain it, I think other people are competent to explain this kind of statement, but even if it were explained to him, the only protection would be in the ethics of the individual explainer.

Mr. MEADER. Let me ask, Dr. Orne, you listened to my reading of the paragraph from Dr. Dearman's letter, do you agree with that?

Dr. ORNE. I am not competent to make moral judgments. I do not choose to make them as a scientist. I am merely trying to testify on points of fact, what I view to be observations of the present practice.

Mr. MEADER. Do you agree with this statement, then, as a scientist:

The examinee does not realize that not only will his conscious thoughts and his autonomic responses to them be recorded but his unconscious thoughts will also be delved into and, consequently, he will give autonomic responses to unconscious thoughts.

Dr. ORNE. I would say that this is a possibility which occasionally occurs. I think that Dr. Dearman has written up a very interesting example where this occurred. I do not think this is the usual thing that occurs.

There is one problem I would like to ask rather than answer and I wish Dr. Dearman would explain it—what we do when we examine somebody with an IQ of 90 who just does not understand this. Do we then have no right to examine him?

Dr. DEARMAN. Obviously, you have the right to examine him. How can you say a man with an IQ of 90 could not understand this?

Dr. ORNE. Let us say you have run into a patient who does not understand it and you know he does not understand it, but he agrees.

Dr. DEARMAN. Then I would talk to his lawyer.

Dr. ORNE. Let us say the lawyer agrees but he does not have the ability to judge that he gives consent to his lawyer to agree. You get into a thorny question which is an impasse. I do not know the way out of it.

I just would like to raise the point I do not know the way out of it and we should be aware of the questions we are raising.

Do you see the essential problem?

Dr. DEARMAN. Yes; but, you see, if he does not have consent enough to give me this or his lawyer this, he does not have consent enough to go to court and know why he is there.

Dr. ORNE. Right. You have to testify to that and he has not given you consent for that and you do testify to that in that case.

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Dr. DEARMAN. Right, but I say in my opinion this man does not have the ability to recognize what is going on but I don't write up the report and tell all the things he has told me. I do not violate his confidence. I say this man is a sick man. That does not violate his confidence.

Dr. ORNE. I think you can see the ethical problem I am pointing to which I don't know the way out of.

Mr. MEADER. I would like to have the other two witnesses comment on that paragraph from Dr. Dearman's letter.

Dr. MOSS. Dr. LACEY.

Dr. LACEY. Which aspect of the paragraph, sir, do you wish me to comment on?

Dr. DEARMAN. Shall I give him a copy of it?

Mr. MEADER. Yes.

Dr. DEARMAN. The third paragraph.

Dr. LACEY. You mean does it violate the fourth amendment and the fifth amendment?

Mr. MEADER. Right.

Dr. LACEY. I am not equipped, sir—I am aware that to develop an appreciation of constitutional law one has to be familiar with a great many cases and a great many fine distinctions. I am not in the least bit familiar with them.

Mr. MEADER. Primarily, I was concerned with the matter of the unconscious thoughts and the recording of the response.

Dr. LACEY. The polygraph, Mr. Meader, in any of its forms records only physiological responses. From that point on, one engages in an inference. Where Dr. Dearman might see an unconscious thought, I might see something else. One will almost always detect physiological changes. It is hard to appreciate unless you have been in a laboratory, unless you have been doing it all the time—I have been doing it since 1942—it is hard to realize how ubiquitous physiologic responses are. It is difficult for me to conceive of any piece of behavior in which the organism will engage which will not be accompanied by a physiologic response.

There is a picturesque phrase used by the late Dr. Davis, which I think depicts this. He calls it the sea of response. If you have proper instrumentation this is what you see, a sea of response, a constantly restless moving pen, whether you are looking at blood pressure, heart rate, electrodermal activity, brain waves, pupillary dilation, blood flow—you name it. These things are always changing.

When we impose a stimulus on an individual and a response occurs we say the response occurred because of our stimulus. We cannot be sure that that is true because a piece of spontaneous activity, some shift in attention, some random thought could at the very moment of time produce that response.

We have then to insure by repetition—repetition itself brings along its own problems—but we have to assure by repetition that that response is indeed timelocked to our administration of the stimulus. A variety of things occur. I do not think—I will put it in another way—I will retire to my laboratory and generate a polygraph record. I will give it to Dr. Dearman, Dr. Orne, Dr. Kubis, and myself, and I will say, "What has happened?" They can only tell me. "Look at that interesting increase in blood pressure, look at that GSR, look at that vasoconstriction." All they can say is something has happened.

Then I will say, "Well, at this point in time, I was talking to the individual about his sex life."

"Oh," they will say, "yes, indeed, this is exactly what happened." I will say, "I was kidding you. What I really did was to ask the individual to multiply 7 by 11, and then add 54." The records are indistinguishable.

Dr. DEARMAN. Don't put words in my mouth. You don't know what I would have said.

Dr. LACEY. The point I am trying to make is that one cannot look at a polygraph and say what the circumstances were that produced this change. This is an inference. It is an inference drawn, as I pointed out before, from the background of the administration.

I have done experiments on "unconscious thoughts" and you may remember I put those words in quotes before. I will still keep them in quotes, but I have done experiments on them and I am willing to admit that—as a matter of fact, I am convinced it will happen—

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don't publish that last statement in any scientific paper—I think it is certainly true that I can get a response to the administration of a symbolic stimulus and the subject cannot verbalize to me why that disturbance had occurred.

In lay language, he will say: "No, I am not emotional about this." Under certain circumstances—and as with the polygraph, I will not give a figure, I don't know how common the occurrence is—under certain circumstances persistent and skillful questioning might reveal that this symbolic stimulus had some special differential significance to the individual.

In this case, we say, it was unconscious and we were very bright because we gradually made it conscious. To be modest about it, under an equally large number of circumstances, we will not be able to elicit the special differential significance of that wiggle on the page.

Sometimes extensive investigation may tell us, may convince us we know why but that is no more proof than is a confession, let us say, unsupported by other things.

Have I answered your question, Mr. Meader?

Mr. MEADER. Well, I am not sure.

Dr. LACEY. It is such a difficult question. Let us say this. Unconscious thoughts—and we will accept the meaning of that—can be revealed on the polygraph but deciding that they have been so revealed is as knotty a question as deciding on the validity of the polygraph. Does that answer the question?

Mr. MEADER. Let me reread Dr. Dearman's statement:

However, this is of little or no avail because the examinee does not realize that not only will his conscious thoughts and his autonomic responses to them be recorded but his unconscious thoughts will also be delved in and consequently he will give autonomic responses to unconscious thoughts.

I take it you agree with that statement?

Dr. LACEY. No, sir. He may give autonomic responses to stimuli which in one school of thought at least is labeled as an "unconscious thought."

I am sorry, I don't want to be unresponsive, but you are touching on very difficult questions of interpretation, theoretical languages of different people.

Mr. MEADER. Are you saying there is no such thing as an unconscious thought?

Dr. LACEY. No, sir; I am saying there is disagreement about this. Let me try it again. Accepting the concept of an unconscious thought, and incidentally I do, as Dr. Orne, at least, knows, accepting that concept it is possible to get physiologic disturbances, when one administers symbolic stimuli related to this complex of feelings. But it is also possible not to, as is documented in both the experimental literature and in the psychoanalytical literature.

May I give you an example?

Dr. Franz Alexander, a very eminent analyst and one who has spent a great deal of time investigating physiologic responses in his patients—I think I have the right paper—

Dr. ORNE. Yes.

Dr. LACEY (continuing). Was studying—my memory is a little vague, he was either studying blood pressure or gastric secretions in a fistula patient. He was studying blood pressure generally, and after the intensive investigations of a single case, followed by investigations of others, he said that the physiologic responses have to be interpreted in the light of a long sequence of seven or eight different judgments that had to be made. Perhaps Dr. Alexander could make those judgments. I certainly could not. He gave one very interesting example concerning patients engaged in defensive maneuvers, who may misperceive what you are saying, may misperceive the import of their environment. This may be a definition of a psychiatric patient.

Dr. Alexander's words were, I believe, something like this: If the patient develops a delusion of mastery, if he feels that he has things licked, that he understands what things are all about and he temporarily feels comfortable, then you will not evoke a physiologic response when you discuss this tender sensitive network of interpersonal and intrapersonal relationships.

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Here, then, are unconscious thoughts. Here, then, is the mobilization of a variety of attitudes and defensive maneuvers which eliminate the physiologic response.

Perhaps I can make this even clearer in something that is a lot simpler to describe.

Dr. Dittes did a study in which he was evaluating the GSR as an indicator of the course and progress of psychotherapy. In discussing sexual matters with his patient, he observed, no surprise to any of us, that there was quite an increase in the rate of GSR as one began to approach the sexual problem and delved into a discussion of it. Again, no problem. The simple and obvious interpretation is: see how upset this subject is, how involved he is with sexual problems. Here is a physiologic indication that this is a problem to him. He has a homosexual problem, let us say. Very careful ratings by independent people, independent observers, were made of the therapist's attitude that day, that session, and, even more dramatically in short intervals of time—say the last 10 minutes. As you observe a therapist and a patient interacting, you will observe that the therapists, themselves, even the best trained of them, exhibit a change of mood, exhibit disapproval, or at least the patient feels he sees some disapproval or approval. The therapist can be very gentle with his patient; lower his voice, select the most innocuous of words to keep the patient talking, or the therapist's voice rises, for example, and he rephrases in a very sharp manner what the respondent is saying.

Let us call the variable gentleness and friendliness. In the exploration of sexual matters, in 10-minute segments during the interview when the therapist was gentle and friendly, the GSR's were not evoked. In 10-minute segments, where the therapist shifted a little bit—mind you these would not be tremendous shifts, a trained therapist does not change from a friendly, accepting, understanding, wise person to a hostile interrogator in the course of 10 minutes. These are subtle changes. Such subtle changes in his behavior, which move away from gentleness and friendliness, increase the GSR rate.

What are we observing? Conscious and unconscious thoughts? Or are we observing the response of the organism to the total social interpersonal situation in which he finds himself?

Dr. Orne has documented that he is responding to the total situation, to his perception of the total situation.

Drs. Silverman and Cohen, two psychiatrists, were able by being gentle and friendly to decrease the violent autonomic response to the word "vagina." In the same interview, however, they did nothing when the word "intercourse" came up. A week later, when they took the patient in and administered the analog of the lie detector test, gave him a word association test, the word "vagina" elicited no GSR. The word "intercourse" elicited just as strong GSR's. In other words, an hour's manipulation of the "emotion" surrounding a single word, diminished the response, whereas the related word had just as big a response.

Now, both elicited many unconscious thoughts in psychoanalytical lingo—one elicited as many as the other.

The polygraph in physiological measurement reveals physiological changes. These physiological changes are known to be a function of a great variety of variables, not simply unconscious effects, not simply response uncertainty, not simply anything you want to name.

Dr. DEARMAN. But you can't rule out the unconscious part of it, can you?

Dr. ORNE. You can't rule it out, you can't rule it in.

Dr. DEARMAN. I agree. You can't rule it out, you can't rule it in, but you know the possibility is there. You know the possibility, you don't accuse the man of something he didn't do.

Dr. ORNE. That could be jumped at. I think if we went from the issue of what it could be to the question of false positive, which I think is a statistical issue that can be researched on that basis and only on that basis, I think that we tend to mix moral issues with empirical data which is available or needs to be available.

What I am trying to do is separate the empirical questions which can be researched and need to be researched from moral ones on which decisions have to be made by people other than research workers.

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Dr. DEARMAN. Would not an emotion have two components, a psychic component as well as the physiologic component?

Dr. ORNE. You can't pick up the psychic component on the polygraph.

Dr. DEARMAN. I agree. All he knows is the blood pressure, pulse, respiration, and the GSR. That is all he knows.

Dr. ORNE. Actually, he also observes—

Dr. LACEY. He should know more than that. He should know what stimuli are being administered, what kind of contact.

Dr. DEARMAN. Yes. I am talking as far as reading the polygraph. It tells him nothing about what type of emotion produced this. Are any emotions really true emotions? Do you get an emotion of love, fear, or an emotion of fear, anger? The guy that is stopped by a policeman for running a red light, this fellow usually gets angry, mainly because he is frightened. So you have two emotions.

Dr. ORNE. Nobody would argue that you cannot separate emotions, that you get into very difficult scientific issues when you try to do so.

Dr. DEARMAN. We need to do this. This is important.

Dr. LACEY. No, many feel we need never consider this concept.

Dr. ORNE. This is exactly it because we can do this on a strictly empirical statistical basis. If you base your judgment on one case, you have a lot of trouble. We also did research on psychotherapy on polygraphs. These were not lie detector polygraphs but sophisticated instruments where we had both the therapist and the patient in the polygraph.

You may recall the work. We can document the kind of phenomena that Dr. Lacey talks about nicely. It was not merely the content that was talked about, the therapist changes. His activation level had a lot to do with how the patient responded. This is why we emphasize so much. It makes a difference how you ask your questions. There is no doubt about this. I think if you get a situation like "You drink coffee?", which is your example, and you get a big response to it, there is no question that this is an idiosyncratic response which is related to something in the man's past. This is an inference but is one on which I think most people will agree. It is a kind of commonsense inference.

Dr. LACEY. That is right. It is something you can find.

Dr. ORNE. Right. Now, let us say we have not 1 question but 50 questions which we ask, of which, let us say, 10 relate to information that the individual should have or would have, if he is guilty of something, and 40 do not relate to it. You are going to get among these 50 questions a couple of random idiosyncratic responses because of past associations. There is no doubt about that. But the odds are very high they should not come only on those 10 questions. They should come randomly distributed and wash out in this much data.

If you get significant differences between these 10 and the other 40 which should be about matched in an emotional content, which should be asked the same way, then you have a fairly solid basis for saying something is going on in these 10 questions which is different from those 40 questions.

If you know enough about the individual's past that he could not have known this information except by being involved, let us say, and you know it was asked in such a way that these questions should not evoke a different response in a random individual, then you have fairly strong bases for statistically saying, this individual is responding differently, therefore he must know something.

Dr. LACEY. No. This guy is responding differently, therefore, something is going on.

Dr. DEARMAN. Exactly.

Dr. LACEY. It may be guilt, it may be some distortion, such as Dr. Dearman described in that one case.

Dr. ORNE. No. Something is going on not in terms of his individual idiosyncratic past but in terms of his having this knowledge. You would have to know more about the situation before you can make the next jump but you can make this statement that he has more knowledge than he should have.

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Then perhaps in a somewhat shorter time and in a more decisive way, we could give you some evidence of the range of validities to be expected for different kinds of crimes under different kinds of circumstances, and indicate what kinds of decisions may be made.

Is it true, sir, that the decision is always black and white?

I mean, guilty or innocent. Are those the terms in which they are placed usually?

Mr. REUSS. I wouldn't know until I had made the test and until I had seen what the polygraph operator says. He must have some end product. Some of the people who testified before us indicated that they could pinpoint this with uncanny accuracy, to use their adjective.

Dr. DEARMAN. May I say in the 200-page report that I gave you on this patient for your use, the polygraph operator's report was in there. He specifically stated, after lengthy questioning and so forth, this man did finally confess he was guilty. Not only that, but the polygraph operator who came to the University of Virginia, and she knew nothing about what was going on except she took the questions and she asked them. After asking them she said, "this man has been stealing money from the bank."

So they do say either innocent or guilty in the two cases of polygraph operators that I have known.

Mr. REUSS. One was the case of theft. What was the other case?

Dr. DEARMAN. They were the same case. This was the man who was asked the question, "Have you stolen any money from the bank or its customers?"

Then the vice president was sent to me. I worked this case up, made a hypothesis of what I thought would happen if you gave him another polygraph test, and that is exactly what happened.

Mr. REUSS. Let me get this straight, because I am not familiar with this case. The polygraph operator from the University of Virginia asked the question: "Did you steal the money from the bank?"

Dr. DEARMAN. Let me start back at the first. This man was given a routine polygraph examination in the bank. In fact, he was given three, then another one called the peak of tension test. Each time they asked him, "Have you stolen money from the bank or its customers?"

On any question in which the word "customer" was used, he got a positive response. So, he finally signed a confession.

Well, before he signed the confession, he said, "Tell me how much money I have stolen." The operator said, "You will have to tell me. You will have to give me some figure to start with," because some of the things he had said about 50 cents for parking and \$5.50 for taking a trip that he didn't take for the bank, that he kept. He finally added up and he said, in his mind, and said it was \$300. So they started with \$300. When they got to \$1,100, he got a positive response. He said "No" and the machine said "Yes." He went as high as \$3,000 with no other response. Then the polygraph operator tore the paper off the machine, walked over to the vice president and said: "I just wonder when you sat down in the chair did you have any other figure in mind?"

The man said, "Yes, I did; \$800."

The polygraph operator put these two together, wrote out a confession for \$1,000 and the man signed it.

Mr. REUSS. Did he steal the \$1,000?

Dr. DEARMAN. No, sir, he didn't steal anything.

Mr. REUSS. Who did?

Dr. DEARMAN. Nobody did. No money was stolen.

Mr. REUSS. This is the only case I know of where the results of a polygraph test have been subjected to ex post facto analysis and from your testimony it would appear that the polygraph operator, who I gather was a reputable one—

Dr. DEARMAN. Yes, sir; recommended by the bonding company for the bank.

Mr. REUSS (continuing). Found a guilty response to the key question as to whether the suspect had stolen money from the bank?

Dr. DEARMAN. Yes, sir.

Mr. REUSS. And it turns out that this was an incorrect judgment on the part of the polygraph operator. While the line may have wiggled, if it did wiggle, it wiggled for other—

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Dr. DEARMAN. Yes, it wiggled the next time on other questions.

Mr. REUSS. I would say this is the kind of study we need to make as the retrospective part of the total study. We would now start out with the lie detector batting zero as a result of test No. 1.

Then there are several thousand more cases that would have to be looked into. When we do that, with competent people making the study, we would then have some idea of the efficacy of lie detection as presently practiced.

Dr. LACEY. Mr. Chairman, this very case demonstrates the reliability of the polygraph.

Mr. REUSS. Of course, the polygraph accurately records blood pressure, galvanic—

Dr. LACEY. Two separate examiners separately said there is an area here which exhibits disturbance. This, I think, we can all do with much greater than chance. Then comes the inference, what does the disturbance mean? That is why I asked the question: Do they say guilty or innocent?

I think we would all agree that one should not say guilty or innocent.

Mr. REUSS. Here, however, the operator did and thus I think we can—

Dr. LACEY. But if the operators had only said there is evidence of real disturbance, here both would have been in agreement, we would have had a very good case.

Mr. REUSS. You don't need an operator to say that, do you?

Can't any one make a visual observation that the wiggles after a particular question are wider than the wiggles after other questions?

Dr. LACEY. Yes, when taught what to look for, some would be more apparent than others.

Mr. REUSS. So I would think that this one test that Dr. Dearman describes, so far as it went, was what needs to be done on a very wide scale.

So far as you know, this is the only case?

Dr. DEARMAN. This is the only case ever reported in the world.

Mr. REUSS. The only time anybody has ever taken any trouble to go back and take an independent look as to whether the readers of the polygraph have had much luck or not.

Dr. LACEY. As long as we stick only to the lie detector test, you are cutting off from consideration a great deal of other information that we have. For example, your very strong distinction between the laboratory situation and "the real life" situation may not be quite as dichotomous as it seems. This too is real life.

Mr. REUSS. I have one other question of the panel. What about the use of drugs, particularly more modern drugs, by guilty people in order to depress their reaction to questions put to them by a lie detector operator? Are there such drugs and could their use render the lie detector less effective than it otherwise is? Does anyone have any knowledge?

Dr. LACEY. A parasympatholytic agent could destroy cardiac responses during the conduct of the polygraph examination. This would be immediately detectable upon recording heart rate and blood pressure. One would know that either this individual's cardiovascular system has been rather atypical or he has been under a drug.

Are there any drugs being used specifically as adjuncts?

Dr. ORNE. I believe the question is addressed to the issue of could you give a drug which you wouldn't detect?

I presume you are thinking of tranquilizers of various kinds, barbiturates, this kind of drug. I don't know what the answer is. We just casually looked at it a bit. There is a tremendous amount of work which would have to be done to give a real answer. But you have two problems essentially. You have a signal and you have got background noise.

Now, if you take a drug which will quiet you down, as it were, you are going to diminish not only the signal which you are looking for but also the background noise.

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There are some circumstances with an anxious subject, in an experimental situation admittedly, but with an anxious subject where he becomes much easier to recognize in case he takes a calming drug because you not only have diminished the signal itself but you have much more diminished the noise, there is no drug that we know of, at least that I am familiar with, which would eliminate the signal, in other words, which would act so differentially on the emotional response without eliminating extraneous emotion to an equal or sometimes greater extent. This would be a guess at the present state of knowledge.

Now, the drugs which eliminate sweating, for example, these would not help you because they would be recognized. You would know somebody was taking a drug.

Mr. REUSS. Mr. KASS.

Mr. KASS. Dr. Dearman, you stated earlier that no money was stolen from the bank.

Dr. DEARMAN. No. I would like to add one thing. When the examiner asked the man if there was any other amount he had thought of, the man said \$800. The examiner then said: "Well, you got a reaction at \$800." So he got a reaction at \$800 and \$1,100.

Mr. KASS. You stated no money had been stolen.

Dr. DEARMAN. No money had been stolen.

Mr. KASS. Are you satisfied that no money had been stolen?

Dr. DEARMAN. I had a 2-hour interview with the president of the bank the third night after I saw the patient the first time. He said, as far as he was concerned, he was fully satisfied no money had been stolen.

I said: Is there a possibility even that money could have been stolen? He said, it would have taken a \$10,000 audit to find that out. He said, "With our audit and the place where he could have stolen the money, all the books check, no money has been missing in that account for 5 years."

Mr. KASS. So the bank president, himself, was satisfied that no money had been stolen?

Dr. DEARMAN. That is right; and the man went back to the bank.

Mr. KASS. You stated there were two polygraph examiners. You only told us about one. Can you go into the second polygraph examiner situation also?

Dr. DEARMAN. Yes. After I had gone over over this case for several hours, including a sodium amytal interview, at the end of my study, I then hypothesized if I was right, if the \$800 and the \$1,100 had meaning in connection with mother and wife, which I found out that they did have, then if you ask the man the same nine questions, he had been asked before, he would get the same reaction that he did the first time. Then if you break these questions down so that you leave the word "customer" out, give the question the same meaning, every time "customer" was in the question, regardless of the man's answers, he would get a positive response. And every time that you left the word "customer" out he would get a negative response in regard to stealing. This is exactly what happened.

Mr. KASS. Did the examiner have an opportunity to conduct what she thought was a complete polygraph examination or did you just give her a list of questions?

Dr. DEARMAN. I gave her the list of questions. I said: I want you to conduct this as you would conduct any polygraphic examination.

We watched the procedure through a one-way mirror—Dr. Smith and I did. We did not listen. We didn't have anything fixed up for tape recording. She, I suppose, conducted it as she usually conducts an examination.

Mr. KASS. With all the questions that this polygraph female operator or examiner would normally ask?

Dr. DEARMAN. Yes; in fact, there were some questions I did not have down and she asked permission to ask two control questions, to see how high a response she would get. For instance: "Did you have any intention of lying to me when you sat down to take the test?" She said this will always give you a positive response. This is testing the maximum lie—we would test the minimum on what we would call questions that had no meaning.

Mr. KASS. Did this polygraph examiner at any time during the experiment or after, to this date, ever complain to you that she had not been given an opportunity to conduct a proper examination?

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Mr. KASS. In a military situation, the rank of an individual, for example?

Dr. ORNE. Yes, the rank of an individual and the rank of the fellow who is testing him, obviously. It is always the interaction.

You are getting a physiologic response which is the result of very complex stimuli of which the questions are only a part.

However, hopefully, you are getting differential responses to questions. Since you have neutral ones, you should be able to form some judgment about this.

Now, I do not know, because the work has not yet been done, the accuracy of field situations. I would guess, based on laboratory studies, where it is very much more significant than chance, this holds true in the field also. This needs to be tested, needs to be evaluated. But, as an article of belief, I would say I am quite sure it will turn out to be significantly better than chance.

Given this fact, if this turns out to be a fact, then Dr. Lacey's point which he made, and which I tried to make also, which I think all of us agree upon, all you need is an instrument which is significantly better than chance.

If you have a large enough sample, it will be an asset to you to use it. Sure, it would be nice if you had 100-percent accuracy, then you would no longer need an actuarial kind of prediction. We have no such instruments at all in any part of science. If you have an instrument which is 80 percent effective in terms of any kind of discrimination, this is fine, and then depending upon where you place your cutoff points it can make this decision which Dr. Lacey was talking about earlier, selecting 10 people out of 1,000, very effectively. However, you will have lots of wrong positives which you will toss out. You have to be certain to protect these individuals. This is why I would completely agree with Dr. Lacey's point. As long as you know that you are going to have false positives, as long as this is clear but it is part of the game as it were, because the stakes are high and we can't make errors, then I would say if it is better than chance we have to use it.

Mr. KASS. Dr. Orne, on another matter, you worked and have done some studies on hypnosis?

Dr. ORNE. Yes.

Mr. KASS. Can you perhaps tell us how hypnosis would affect the lie detection? Is it possible to beat the machine or the operator, whichever the case is, through hypnosis?

Dr. ORNE. The answer to that is by no means clear. You can, under certain circumstances, give a very flat record under hypnosis. I don't know whether you would call this beating the machine. All you can say then is that you can make no decision whatsoever about the individual; he is nonresponsive. He not only does not talk, his physiology does not talk. Whatever that means, then, is an inference beyond that point.

Mr. Moss. Isn't the machine as reliable at that point as it is at any other time? The machine itself?

Dr. ORNE. The machine is telling you that the man's physiology is not responsive at this time because of some intervention.

Mr. Moss. If anybody is fooled, it would be the operator and not the machine?

Dr. ORNE. Right. The read-out is the read-out. Unless there is something wrong with the tubes or transistors, it is there.

Mr. Moss. Talking about the tubes or transistors, this is an electronic device using such components. What effect does it have if you have a weak tube or a somewhat faulty transistor?

Dr. ORNE. This should not present a real problem because there is no reason that this transistor should selectively go on the blink every third question which happens to be the important one. This should be random noise.

First of all, you should be able to pick it out.

Secondly, it would not selectively affect things since in each case you are comparing the individual response with his own response to other things. It is either a uniform artifact or random. If it is uniform, it does not matter. If it is random, it should wash out.

LINO MAS 55

Mr. Moss. Providing the response is sufficient to be visually discernible on the graph. Now, could there be a lessening of the response on the graph if your machine has, say, a weak tube?

Dr. ORNE. Certainly.

Dr. LACEY. One should run calibrations before in the lab.

Dr. KUBIS. You put in a standard stimulus and expect a certain type of response. If one does not occur, you have trouble.

There are two problems in our discussion about the value that we are to place on the lie detector's judgment. Is this in a sense final? Does this have much weight in a final decision, or is this advisory, that is, merely ancillary evidence?

We talk about lie detection and often consider it as giving a final type of decisions. We have quite a different orientation if it is just going to be some partial evidence to be added to the body of evidence that we have. We have to distinguish these types of uses for the lie detector. There are very few instances where the lie detector can be used as the sole source of evidence.

The only one that I know of is if two people get into an altercation where there is no observer and then one calls the other a liar. This is about the only situation I know where the lie detector operator is the only one that can make a decision since there are only two witnesses and each one is accusing the other.

The other point is that we have to discriminate very carefully between man-machine decisions and pure measurements taken from the machine itself.

These are two different problems. In one case in talking about the value of the lie detector we actually mean the lie detector as applied and interpreted by an operator. In other instances, we may be talking about the value of the lie detector when we refer only to machine itself. Then we talk about its reliability and whether it is a true reflection of the physiological state of the individual.

To what do we attribute the accuracy, to the machine or to the man-machine system that is involved here. This distinction will help us with the basic issues that we have to talk about and which, I am sure, the committee is interested in.

Mr. KASS. Dr. Orne, getting back to hypnotism for a minute. It is possible that under a posthypnotic suggestion, a person would be told to suppress emotion at the point of mention of a word, for example, "communism"? Is this possible?

Dr. ORNE. It is possible to tell him this and the result probably, because we have only casual data on this, by so doing you would guarantee a bigger response because this would become much more conflict ridden and you would be picking up the conflict. Not only this but at times—and on this we do have some data—it is possible to pick up responses to stimuli which you do not have a conscious awareness of, which is very much Dr. Dearman's point, we can demonstrate this in a laboratory situation by giving you data in hypnosis for which you have amnesia, you do not have a conscious awareness.

This information we can elicit on the polygraph without the individual being able to identify why he is responding.

So, at least, as it looks today, if you are asking the question would hypnosis be an effective countermeasure, the data is very unconvincing, it probably would not be. You would probably make sure you got bigger and better wiggles.

Mr. KASS. I have no further questions.

Mr. Moss. Gentlemen, I want to thank you. It has been a rather lengthy day for you. I regret that other commitments made it necessary for me to be absent for part of this afternoon's hearings.

Dr. Orne, I want to particularly thank you. I understand that you have to return home this evening.

The committee will now stand in adjournment until 10 o'clock tomorrow morning, at which time we will reconvene in room 1501-B, in the Longworth Building.

The committee is now adjourned.

(Whereupon, at 4:30 p.m., the subcommittee adjourned, to reconvene at 10:00 a.m., Thursday, April 30, 1965.)

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USE OF POLYGRAPHS AS "LIE DETECTORS" IN THE FEDERAL GOVERNMENT

(Part 3—Panel With Scientists)

THURSDAY, APRIL 30, 1964

HOUSE OF REPRESENTATIVES,
FOREIGN OPERATIONS AND
GOVERNMENT INFORMATION SUBCOMMITTEE
OF THE COMMITTEE ON GOVERNMENT OPERATIONS,
Washington, D.C.

The subcommittee met at 10 a.m., pursuant to call, in room 304 Cannon Office Building, Hon. John E. Moss (chairman of the subcommittee) presiding.

Present: Representatives John E. Moss, Henry S. Reuss, and Ogden R. Reid.

Staff members present: Samuel J. Archibald, staff administrator; Jack Mattison, chief investigator; Benny L. Kass, subcommittee counsel; Marvin G. Weinbaum, staff investigator.

Mr. Moss. The subcommittee will be in order.

Mr. Kass.

FURTHER TESTIMONY OF DR. JOHN I. LACEY, CHAIRMAN, DEPARTMENT OF PSYCHOPHYSIOLOGY-NEUROPHYSIOLOGY, FELS RESEARCH INSTITUTE, AND PROFESSOR OF PSYCHOPHYSIOLOGY, ANTIOCH COLLEGE, YELLOW SPRINGS, OHIO; ACCOMPANIED BY DR. H. B. DEARMAN, PSYCHIATRIST, JOHNSON CITY, TENN.; DR. JOSEPH F. KUBIS, PROFESSOR, DEPARTMENT OF PSYCHOLOGY, FORDHAM UNIVERSITY; DR. MARTIN T. ORNE, SENIOR RESEARCH PSYCHIATRIST, MASSACHUSETTS MENTAL HEALTH CENTER, AND ASSOCIATE IN PSYCHIATRY, HARVARD MEDICAL SCHOOL

Mr. KASS. Dr. Lacey, could you describe the polygraph that is being used in both the Federal Government and commercial practice today? What are the component parts? How do they operate?

Dr. LACEY. Dr. Kubis would be a better man to address that question to. I repeat that I don't have any personal experience with the polygraphs as used in lie detecting.

Mr. KASS. Dr. Kubis?

Dr. KUBIS. The usual polygraph has three components, one of which measures the cardiovascular responses, another which measures the respiratory response, and the third which measures the psychogalvanic response.

Mr. KASS. For our record and for our own understanding, can you explain what you mean by cardiovascular, and the other two?

Dr. KUBIS. The cardiovascular response that is usually monitored is an analog of the blood pressure response that a doctor gets when he put a cuff around an individual. A cuff around the upper arm is not essential. You can get a similar response from a finger.

Dr. LACEY. Are they still using a cuff pressure midway between systolic and diastolic?

Dr. KUBIS. That is right. Also the plethysmographic response can be listed as another indicator of the cardiovascular response.

Mr. KASS. My own understanding is completely negative at this point. Dr. Lacey, I have one question for you. You asked "Are they still using this technique?"

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Dr. LACEY. It is not a sound physiologic technique, although it might serve a practical purpose.

Mr. KASS. Why is it not a sound physiologic technique?

Dr. LACEY. The usual indirect technique for the measurement of blood pressure with which we are all familiar in clinical practice, wrapping the cuff around the arm and inflation of the cuff upward and letting it go back, depends briefly—how deeply do you want me to go into this?

Mr. KASS. As fully as you can, so that everybody understands.

Dr. LACEY. It depends briefly on the following picture, if you will. The injection of blood into the arterial tree when the heart contracts produces a forcible wave of pressure transmitted down the arterial tree. This wave of pressure, being impressed upon the elastic walls of the artery produces audible sounds.

When the pressure is so high that the sounds disappear, this means that one has imposed an external pressure upon the artery just strong enough to prevent the wave of blood from being transmitted down the arterial tree. This is what is known as systolic pressure.

Then one drops the pressure slowly until either the sound again disappears or until there is a characteristic muffling change, and this is taken as diastolic, a steady state pressure in the cardiovascular system in the absence of the pumping action of the heart.

These, it must be emphasized, are themselves indirect measures of blood pressure. They do not correspond very accurately, although they are very suitable for clinical purposes. This is a point one should make over and over and over again; that things that don't correspond accurately to the physical phenomena we are measuring may still be of clinical usage. This technique does correspond very accurately with what we might get with an indwelling arterial catheter. However, it serves its purpose.

Now then, it is very difficult to continuously monitor blood pressure, either in the case of an investigation in psychomatic medicine or in the case of investigation in lie detecting; first of all, because the continual application of pressure causes pain. One has to release the pressure quite commonly. Secondly, the application of that pressure repeatedly is itself a stimulus and will produce other autonomic responses, such as GSR, if you will, since that seems to be a favorite one.

The technique developed early in psychophysiological investigations was to inflate the cuff to a degree of pressure relatively comfortable for the patient, or the subject, midway between these two end points of systolic and diastolic blood pressure. What one gets is a record something like the plethysmographic record in the pages of Dr. Kubis' report, a pulse with an arch coming up and down superimposed upon waves which are thought to reflect blood pressure.

Actually, this record is an extremely complicated admixture of changes in blood pressure and changes in arm volume which, itself, reflects still another underlying physiologic measure.

There are now other and better techniques available. That is why I asked, Is this technique still being used? There are now relatively innocuous techniques available. For example, the monitoring of digital blood pressure continuously. I won't go into the principles of it, but it is much more comfortable for the subject, and one at least gets something that is much more clearly interpretable in terms of underlying physiological processes. In this case one would get relatively continuous measures of systolic blood pressure. It would probably serve better.

Mr. KASS. Do you think that the current methods being used today on this component are practical and will get the same results, or at least will get adequate results for the purposes they are trying to achieve?

Dr. LACEY. That is asking me for a value judgment that I am not prepared to make. Let me answer the question in this way. They certainly are primitive techniques. We have much more sophisticated techniques available today for acquiring and displaying the information. The matter of display is an extremely important one, because what one sees with the naked eye is a matter of how one has transformed the measurements.

I could, without much trouble, itemize three or four different ways, for example, of getting at heart rate and heart rate changes, of which I would consider only one suitable to the problem such as lie detecting.

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Mr. KASS. Not as a scientist for a moment, but as a private individual with 22 or 25 years experience using these components, could you make that value judgment?

Dr. LACEY. You want to force me to make a value judgment?

Mr. KASS. Yes, sir.

Dr. LACEY. I have to be what Mr. Reuss calls responsive. I would say, Mr. Kass, in all likelihood, assuming a certain degree of validity under certain circumstances, which would have to be defined for the so-called, lie-detection procedure, I would say it is probably practical but falls far short of what we could do today. That they are practical is evidenced by Dr. Kubis' investigation, to which I must refer. I keep on going back to it. I think it is one of the best studies in the field I have ever read.

You are welcome, Dr. Kubis. We will come to terms later. That is meant very seriously. That they are practical you can see by referring to the monograph by which, with one change, using a finger plethysmograph—we can define that for you later, but it is another form of cardiovascular measurement related to the rate that blood is flowing in the digit—using essentially similar techniques, he was able with his trained graduate students and himself using techniques very similar to it, using techniques which I would still consider rather primitive in terms of display, they were able to do a respectable job, at least in the first of the three studies.

Mr. KASS. In other words then, your analysis would be that this component—one of the three that is being used in the polygraph today as a lie detector—although primitive is rather practical.

Dr. LACEY. It is the least practical of the three, but it has some degree of practicality.

Mr. KASS. Now what about the instrument or component that measures—

Mr. Moss. First, let us find out if Dr. Kubis is in agreement or disagreement with what we have just heard.

Dr. KUBIS. Yes. There are better and more sophisticated techniques that can be used. These usually cannot be packaged for sale at a reasonable price. There is also a hesitancy among manufacturers to try to change, but I don't know what the reason for this is. It may be an investment of money in the types of instruments that are available. It may be the natural lag of manufacturing that always follows advances in science. There are better procedures available, but this is historically the one which has been used; and I would gather that many people feel comfortable with it and have been getting good results with it.

There are a number of good investigators and they continue working with an instrument and with devices that they are comfortable with.

Mr. Moss. Now when you used the term "There are a number of good investigators who have been getting results with it." Are you talking of the average, typical examiner operating in this country today, not in a laboratory, but out in the field?

Dr. KUBIS. Usually the ones that I have come in contact with have been very good investigators, both from a psychological viewpoint and in terms of operation.

I have a strong feeling that there are a number of individuals who buy these instruments, do not take any training, set up, as it were, a shingle, and operate with this instrument. I came in contact with one around the New York region who, after buying an instrument and working on his own, wanted to sell it to the University at a reduced rate because he was not interested in it any more. He had no training.

These instruments can be bought by practically anyone. Anyone, any university can buy them, because they have been used for scientific purposes in the early history of psychophysiological research. It is these men, without training, without adequate experience, that I have a strong feeling against. I feel there are more of them than we can see and can identify.

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thinking about what the lie-detector people call the "peak of tension" method. Since blood pressure is a constantly changing thing if one monitors it carefully, since the blood pressure cuff is uncomfortable even when set midway between systolic and diastolic, since one person might be quite responsive to this discomfort, might be much aware of it, might resent it, and so on, it is conceivable that this could feed into other channels, let us say the GSR channel which could show a steadily dropping curve of resistance. This could reflect just the increase in discomfort, physical discomfort attendant upon the examination.

May I say, Mr. Kass, that these are not to my mind the more serious disadvantages of the inexpensive polygraph machine, to take acknowledgment of Dr. Kubis' comments. There are many more serious ones. The technique employed by the—I wish there were another name besides calling them polygraph operators or lie detectors—the techniques employed, whether based intuitively or empirically, or on sound scientific reasoning—I am not sure how these have arisen—of repeating questions which resulted in suspicious physiologic perturbations, of juxtaposing critical and noncritical questions, of trying to eliminate surprise responses, novelty responses, these techniques arrived at, as I say, I don't know how, intuitively, empirically, or rationally, do represent to my mind a considerable degree of protection against this kind of artifact.

These artifacts, due to movements, random thoughts, sudden changes in the environment, this kind of artifact—responses evoked by things other than those aspects of the situation in which you are interested—these techniques do provide a considerable degree of protection against them. So, I repeat, what could really be implemented in this field is considerably increased physiologic sophistication, considerably increased physiological instrumentation.

I don't think the matter of cost or ponderosity or pounds of equipment should really enter in here. There are much more serious costs, as we mentioned yesterday, in terms of human lives, human reputations, important decisions to be made for the security of our Nation that, for me, far outweigh the fact that to buy a Fels cardiometer costs about \$2,500—which, I take it, is several times the cost of a polygraph machine. I am sure the Yellow Springs Co. would be glad to transistorize the equipment so that it may be made into a small package. Now I really feel very strongly about this; that the so-called polygraph machine could be updated markedly. Now this would result in an increase in physiologic sophistication. I would feel much more comfortable interpreting physiologic changes I see on the record. Whether it in fact would increase the validity of the lie-detecting procedure is an empirical matter. I don't know. I do know, in pursuit of my own scientific objectives, which is the understanding of autonomic participation in brain processes, in behavioral processes, that improved instrumentation and display techniques have simply moved us further ahead.

So I think it is possible that it would move the lie detection further ahead.

Mr. KASS. Dr. Dearman, do you agree with the statement made by the other gentlemen?

Dr. DEARMAN. This is more or less out of my line what they are talking about now. I would say any refined technique for taking blood pressure, respiration, will give better results.

Mr. KASS. Your experience with the polygraph or lie detector has been only in that one example you gave yesterday?

Dr. DEARMAN. That one case, yes.

Mr. KASS. One other question about this component, Dr. Lacey. You say that the pressure curve is relatively comfortable on a person. Are there any side effects which prolonged use—

Dr. LACEY. You mean relatively uncomfortable?

Mr. KASS. Uncomfortable. Are there any side effects which could happen to the person?

Dr. LACEY. You are talking about adverse side effects, medically dangerous?

Mr. KASS. Yes.

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Dr. LACEY. You could cut down the blood supply to the extremity after the cuff, to the point where some slight acute problem arises in a predisposed individual, with a preexisting disorder, let us say an early Reynaud's disease, which is characterized by extreme vasoconstriction in the fingertips where the blood supply is completely cut off.

It is possible that such discomfort might trigger an episode such as that. In general, I would not consider this a major hazard. I would be very surprised indeed if, in the run of the mill polygraph examination, if the operators of these machines have run into them very much. Nevertheless, the possibility exists, and there should be some degree of caution exercised.

Mr. KASS. Can anyone recognize these symptoms?

Dr. LACEY. That symptom would be readily recognized, because the patient would say "I hurt. Look at my hands."

Mr. KASS. Dr. Lacey, is it always possible to read the chart of that component?

Dr. LACEY. Definitely not.

Mr. KASS. Could you explain? We have a blackboard here, if you wish to use it.

Dr. LACEY. Yes. Well, you are hitting one of my hobbies.

The polygraph machine—I knew this, but I wanted to defer to Dr. Kubis who has had vastly more experience with the machine than I—the polygraph machine has no direct writeout representing one of the important components of the cardiovascular responses; namely, heart rate. What they do is to use the repetitive bumping, which can be seen in this curve—the same sort of thing, if you have Dr. Kubis' report, shown in a plethysmograph—a bumping due to the onslaught of blood into the area underlying the cuff.

They use this as a measure of heart rate. Now it is a measure of heart rate. What is the usual paper transport speed on a polygraph, 5 millimeters a second, or what?

Dr. KUBIS. There is no uniform rate. It depends on what you want to measure. I don't know what the rates are now.

Mr. KASS. We have been informed that it is about 6 inches per minute; whatever that means.

Dr. LACEY. Six inches, did you say?

Mr. KASS. Yes, sir; this is a unverified statement. We will get it for the record.

Dr. LACEY. A minute, did you say?

Mr. KASS. Yes.

Dr. LACEY. That is fairly slow paper speed. Standard recording techniques would be about 25 millimeters a second, 6 inches a minute is less than 3 millimeters a second. Good, now my argument becomes even more applicable. The 25 millimeters a second is a fast paper speed. This means that one produces miles and miles of swiggles in the course of a day's investigation. Twenty-five millimeters per second is still a slow enough paper speed so that changes in heart rate cannot be apparent to the naked eye. I would quarrel very much, I think, with the simple casual scanning of a record without measurement techniques, and this simplifies what I mean.

Let us suppose that the heart rate were to change from 60 beats per minute in a few cycles to 70 beats per minute. In some individuals this could be a rather—that change in rate at 10 beats per minute could be—significant indication of perturbation. I am trying to find neutral words to describe what is happening. Sixty beats per minute is one per second. Therefore, one would get one bump saying that the heart has contracted and expelled blood into the arterial tree. One second later, or 25 millimeters later, which is approximately 1 inch, one would get another bump.

Now then, let us say that in the very next cardiac cycle—and this could happen, frequently does—what we call the "RR" interval is shortened. This means the interval of time between the electrical signs of contraction of the left ventricle. Within one cardiac cycle that RR interval could be changed to correspond to 70 beats a minute, I think I said.

Mr. KASS. Could this be changed as a result of the stimulus of a question?

Dr. LACEY. Yes. It also could be changed due to respiration, also changed by a stimulus coming into the environment, and so on. Let us say they were examining a young male adult, age 25, 22 years old.

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Individuals of this age typically are characterized by what is known as sinus arrhythmia, a benign physiologic condition in which there is continuous variation of heart rates in synchrony with the respiration. The heart will accelerate as one breathes in, decelerate as one breathes out. With a typical display such as "EKG" or these bumps, this sinus arrhythmia would hardly be detectable unless one sat down with a plastic ruler and measured these intervals; translated them into periods between heart contractions.

Mr. KASS. But is it a constant thing in the individual?

Dr. LACEY. Yes. What do you mean by "constant"?

Mr. KASS. In other words, will he continually get the same ups and downs, whether it is 60 beats per minute or 70 beats per minute during the 4 minutes he is on the polygraph chart? Or will it be erratic?

Dr. LACEY. There will be variation in the amplitude of this sinus arrhythmia; respiratory synchronous variation. I am not trying to obscure the issues; I am trying to communicate them.

Mr. KASS. The point is that—

Dr. LACEY. There will be variations. This happens to be one of our research objectives at the moment. In our opinion our experiments show that this, itself, is a very important psychophysiological variable. The degree of cyclic variation in this sinus arrhythmia is a characteristic that needs to be taken into account in interpreting the record to discover something about psychophysiological status.

This is very interesting. Sinus arrhythmia is supposed to be rather low-level reflection in the sense that the brain mechanism involved are low down in the hierarchy; and yet we find that this has pronounced significance in terms of personality and behavior of the individual.

Mr. KASS. You stated this occurs in persons 21, 22, 23 years old?

Dr. LACEY. It is more typical of individuals in young adulthood.

Mr. KASS. Is it also possible at older ages?

Dr. LACEY. Yes, indeed.

Mr. KASS. It is not unique, therefore, in younger ages? It is a common occurrence also in older age?

Dr. LACEY. Yes, indeed.

I think I can communicate the sense of my argument without actually going through the computation. The change in a given cardiac cycle that corresponds to a rate of 60 beats a minute to, in a subsequent cardiac cycle, a rate of 70 beats a minute represents, in terms of a paper speed of 25 millimeters per second, a rather small change. One would have to have the paper speed going very, very fast in order to detect this change with the naked eye; and it would go so fast it would be spread out over such a large part of the paper that one would still miss it. We can demonstrate exactly what I mean—

Mr. REUSS. Doctor, is a document being passed around? What about identifying it?

Dr. LACEY. I was identifying it, Mr. Reuss.

Mr. REUSS. As what?

Dr. DEARMAN. This is a polygraph record taken by the second polygraph operator on the case I talked about yesterday. This is the actual record.

Mr. REUSS. This is the piece of paper from which they found this fellow guilty?

Dr. DEARMAN. No, sir. Let us back up a little. This is the piece of paper that showed the same reaction at the University of Virginia as he got at the bank.

Mr. REUSS. From which the polygraph operator, I think you testified, said "This is the guy who stole the money"?

Dr. DEARMAN. Yes. In other words, the polygraph operator who came to the University of Virginia after she had run these two records, said "This man is guilty of stealing money from the bank."

Mr. REUSS. Can you show me in this historic document where we have the cry "Eureka" here it is?

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Dr. DEARMAN. There is one place here. Here is one place here. Here is one place here, and I don't know whether there are any more or not.

Mr. REUSS. Do you have the questions?

Dr. DEARMAN. I have everything.

Mr. REUSS. When you are through, I would like to have you tell me what the questions were which produced all this.

Dr. LACEY. If one would care to glance at this record, this heavy band of red color that one sees here is, I would assume, the so-called blood pressure record.

Is that correct, Dr. Dearman?

Dr. DEARMAN. That is correct, and pulse.

Dr. LACEY. Now if one gets a close look at this, one sees very closely spaced here, no more than a millimeter or two apart a series of spikes in a curve. Each one of the spikes represents a contraction of the heart. It is impossible in this display to look at it and say "Ah, hasn't the heart rate changed," because one is making visual discriminations of a spatial extent which is extremely small.

Mr. KASS. At this point, since you are interpreting something, would you read the number underneath there?

Dr. DEARMAN. This is the question number. This is question No. 6, the first one. (See exhibit 20, p. —.)

Mr. KASS. Dr. Dearman, before we continue, is there any objection on your part, as the psychiatrist who participated in this interrogation and this analysis with the individual, to our stating the question for the record?

Dr. DEARMAN. Not at all. The only thing I ask not be stated in the record is anything about the personal life of this man.

Mr. KASS. Thank you. Question No. 6, for the record—and this is the material which was supplied by Dr. Dearman in "Federal Lie Detector Case, H. B. Dearman, M.D.," confidential report of the entire case which has been documented in an earlier record—question No. 6, "Do you know anyone who has been stealing money from the blank blank branch,"—and this is an identification of the bank—"or its customers?" (See exhibit 20, p.—.)

Mr. REUSS. What was his answer?

Dr. DEARMAN. His answer was, "No," verbally. The polygraph said, Yes.

Dr. LACEY. At this point, I cannot resist pointing out once more that the polygraph record is neutral. I can look at this record and I can say there is a pronounced physiologic response. This is a point that I think needs to be made over and over again.

Mr. REUSS. What do you mean by saying it is neutral?

Dr. LACEY. It is neutral with respect to the causes of that response. Beyond that point, it is an inference. For example, take the example I gave yesterday. Somebody could give this record to me and say, "Here I administered the cold pressor test," which is a cardiovascular test, as a presumed measure of the predisposition of this individual to develop essential hypertension in later years. If you were to tell me deadpan, without a polygraph being hooked up to you, that this was a record of an individual undergoing the cold pressor test, it would be completely acceptable to me. That is what the response to the cold pressor test looks like.

If you were to tell me that this was a response to a mental arithmetic test that, too, would be completely acceptable to me. That is what the response to the mental arithmetic test looks like.

In other words, a great variety of stimuli qualitatively and quantitatively different from each other produce responses which, by this method of display, are indistinguishable one from the other.

Mr. REUSS. Let me ask some questions, if I may, Mr. Chairman, at this point.

Mr. MOSS. Certainly.

Mr. REUSS. There is before me a document bearing the name, "Associated Research, Inc., Chicago, Ill." Is that the name of the polygraph?

Dr. DEARMAN. No, sir; just the people who make the paper.

Mr. REUSS. At any rate, we are looking at the squiggles which Dr. Dearman tells us ensued the asking of the question, "Do you know anything about the stealing of this money from the bank?" And

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the answer, "No." And those squiggles, to the naked eye of myself, who is not a trained polygraph operator, looks as if there is a bulge upwards there.

Dr. LACEY. In 5 days you would say there really was a bulge.

Mr. REUSS. Yes. Anybody could see that.

Now, Dr. Dearman reports that based upon that bulge upward the polygraph operator in this particular case drew the inference that the man was lying and that he did know that money had been stolen from the bank, and that he himself had therefore probably stolen it. On the basis of this, the man was presumed guilty and a confession was extracted, and it looked as if the crime had been solved. It turned out later that there was no crime at all; that no money had been taken.

Now, Dr. Lacey, you point out that the polygraph shows a reaction at this point, but that the polygraph is—as you say—neutral; that it is up to the operator to make the diagnosis of what this means; and that in this particular case the fact that the polygraph operator went too far and made a mistake is neither here nor there on the validity of this particular polygraph reading. Is that a fair recapitulation of what you just said?

Dr. LACEY. Perhaps so. Precise communication is very important at this point. So, may I correct that?

Mr. REUSS. I want you to be precise.

Dr. LACEY. The polygraph operator didn't make a mistake on the validity of the record. The polygraph operator made an inference of some kind. I would suspect this early in the record that any well-intentioned polygraph examiner would have said, "Aha, this is something which should be followed up." I just doubt that anybody who has had any experience in this field, has any good intention or understanding, would say "Here is guilt." He would say, "Here is something to check."

Dr. DEARMAN. There are, I believe, five positive responses, I am not sure, and what she said that day after finishing the test is, "Doctor, this man is guilty of stealing money from the bank and has knowledge of it." On her report to me, she said what Dr. Lacey said. She said that these reactions indicated that this should be gone into further.

Mr. REUSS. Dr. Dearman, I would like to pursue this with Dr. Lacey.

Would you not expect a perfectly innocent man, that is, yourself or myself—

Dr. LACEY. I am not perfectly innocent, sir.

Mr. REUSS. On robbing money from this bank, both of us are. Wouldn't you expect some reaction when a glowering cross examiner says "Was some money stolen from the bank? The reason you are taking the lie detector test is that you are one of the suspects." Would you not expect a bulge at that point or at least not be surprised if you saw one?

Dr. LACEY. Yes.

Mr. REUSS. And therefore what is the use of all this? What is the use of this particular question and of getting excited about the answer? If somebody told him he was a suspect and that for his own good he had better submit to the lie detector test, and then he is asked the \$64 question involving the very wrongdoing that he is suspected of, I would suspect that he would get some kind of reaction, either anger at being asked this, or, "My God, I did do it," kind of reaction.

Dr. LACEY. Yes, this is exactly—

Mr. REUSS. Therefore, what does all this prove? Why bother with this? Why not find out whether the bank sustained a robbery by more classical methods, like inspecting the bank books and finding out whether money really disappeared?

Dr. DEARMAN. Let me say this to clear up the record. When these tests were made at the bank, no money had been stolen. This was a routine check made at the bank. No money was missing. Everybody was going to take the lie detector. When the vice president was asked these questions, he got these responses. This record is not the record made at the bank. This is the record made at the University of Virginia on February 28, 1962, which is about 3 months later.

Mr. REUSS. After he had been under suspicion?

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Dr. DEARMAN. He was not under suspicion at the time he took the test, but it was after he got the positive responses. No money was missing. This was just a routine check. The bank had had some people steal from this bank, some of their employees. The bonding company recommended to the bank that they hire a lie detector agency to come in and do this work for them on a routine basis. I believe this was to be done twice a year. This was the first routine check.

Mr. REUSS. This document you have in front of you is a second check of this man?

Dr. DEARMAN. That is right.

Mr. REUSS. Taken 3 months after the first check?

Dr. DEARMAN. That is right.

Mr. REUSS. Didn't the first check show some suspicious bulges?

Dr. DEARMAN. The first check showed exactly what this shows.

Mr. MOSS. Let us clarify this. In this particular case, Mr. Reuss, following the first polygraph examination, this particular officer of the bank—because of the readings of the polygraph and the interpretation placed on those by the examiner—confessed to having taken money. He subsequently was placed under the care of Dr. Dearman for psychiatric treatment. This second test at the University of Virginia was given following approximately 3 months of treatment where he had, through careful analysis, become aware of personal problems going back many years. These problems had apparently caused the autonomic reactions which led to a conviction on the part of the operator in the first instance and the subject in the second that he had in fact taken something.

Dr. DEARMAN. Yes.

Mr. MOSS. At this point, the second test was part of your treatment of the individual?

Dr. DEARMAN. Not my treatment.

Mr. MOSS. Further analysis?

Dr. DEARMAN. That is right. I made a hypothesis of what would happen if he took another polygraph test, and I was checking on my hypothesis.

Mr. MOSS. This test was one prepared by you?

Dr. DEARMAN. I took the nine questions that were asked the man the first time and asked them again. The reactions we got here are the reactions to the first nine questions.

Mr. MOSS. In the second instance this test was not prepared by the second polygraph operator?

Dr. DEARMAN. No, sir; prepared by me.

Mr. MOSS. And it was administered in accordance with your instructions?

Dr. DEARMAN. No, sir. I told the polygraph operator that I wanted her to carry out this examination as she would any other examination.

Mr. MOSS. But to the extent that she carried out this examination prepared by you, she was not exercising her own judgment as she might have in a case not prepared by you.

Dr. DEARMAN. That is right, except she did ask permission to ask two or three other questions which I told her she could.

Mr. REUSS. At the time of the second polygraph examination which we are discussing, did the subject of this polygraph examination have some idea that he was in trouble?

Dr. DEARMAN. No, sir. He felt like he was not in trouble. He felt like we had found the answer to why he got the reactions on the first test. But even though he felt this, the autonomic nervous system still responded like it did 3 months before.

Mr. REUSS. I note from the polygraph operator's notes which are coordinated with the chart which we have just been using that question 6, which I believe is the question that adduced the—

Dr. DEARMAN. That is one of them.

Mr. REUSS. That is one of the questions that adduced the reaction that Dr. Lacey has just been describing. I note the following entry. Here's a question, "Do you know anyone who has been stealing money from the blank blank branch or its customers?"

Then there is a notation by the polygraph operator, "Blood pressure, pulse positive, strong. Breathing pattern positive. Sweat gland activity positive. Conclusion," and this is checked, "specific reaction indicative of deception, without verification through interrogation." (See exhibit 20, p. —.)

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Dr. DEARMAN. Yes.

Mr. REUSS. Well, this, it seems to me, is a very plain straightforward case of a polygraph operator who came to a wrong conclusion.

Dr. DEARMAN. That was my conclusion.

Mr. REUSS. That is to say, the operator concluded that the subject was guilty of deception at this point when, in fact, later evidence shows that he was not guilty of deception. Is that not so?

Dr. DEARMAN. Yes.

Mr. REUSS. This seems to be the case, is it not, Dr. Lacey? Assuming the man was innocent, as is strongly hinted by the fact that there wasn't any wrong doing for him to have been guilty of, this conclusion that he was guilty of deception was wrong, was it not?

Dr. LACEY. Will you permit me to answer that question at some length and in my own terms, sir?

Mr. REUSS. Yes.

Dr. LACEY. This is an extremely interesting example of two things; first, the fact that the so-called polygraph examination in proper hands turns out to be an extremely reliable thing; secondly, it illustrates one of the reasons for the impassioned speech I made yesterday that the inference to be made from the polygraph records is just that, an inference, that it must be checked by other investigative means, that a decision of—I hate to use the words “guilt” and “innocence,” I will explain why—a decision of guilt and innocence remains, as it properly should be, in my view, a legal matter.

Now then, the fact is that on two separate occasions 3 months apart, if I understand this case correctly, on two separate occasions 3 months apart, excessive physiological reactions were obtained through a certain set of symbolic stimuli, a certain set of questions. In semilay, semi-scientific language this would mean that these questions had some specific differential value to that person.

Now let us see what inferences can be made from this.

It raises the presumption of what the lawyers would call guilt; that is, a presumption that this man did in fact steal money, but only a presumption. It raises the possibility of a second inference, one that Mr. Reuss was trying to elicit before, that this individual is so sensitive to all kinds of accusations that any question given to him by a glowering examiner, I think was Mr. Reuss's phrase, that any question which the subject perceived as questioning his integrity, as leading to a bad attribute, would produce these physiological responses and, as any psychophysiologicalist would know, and as Dr. Dearman apparently has demonstrated in this case, it raises a third presumption that possibly there is some neurotic interconnection of affect and ideation concerned with this question.

A properly trained and supervised polygraph operator, in my mind, should have said nothing more, just as my technician will report to me nothing more than the numbers that result from a test or as the nurse in the clinic will report only the result of how much sugar is in the urine, and so on. They must never make the diagnosis. I don't like the word “diagnosis,” but the analog.

The polygraph operator should have said simply: “There is an excessive physiological reaction to these things.”

Now, in my view, a properly utilized polygraph examination, shown in this case to be reliable, you see, in the sense that the results are reproducible—that is what should be meant by reliability—a properly conducted investigative network, if I may use that phrase, would have said, “Aha, let us go check. There is too much affect about this case, may I say?” Indeed, that is what happened. People did check. You, yourself, went to the president of the bank, I think you said.

Dr. DEARMAN. Yes.

Dr. LACEY. A check of the books now revealed this man could not have stolen the money in the way he so stated, because the books showed no such tampering. The money was not missing. Wonderful. Now, then, it seems that by more classical means—by other means, I would prefer to say—one of the presumptions of the three

LINO MAS 68

Mr. REUSS. If that is all the test can elicit, namely, a bump in the squiggles, which could lead to the inference that a man has stolen something or is guilty, or that he is innocent but angry about the questions being asked or, thirdly, that there is some neurotic interconnection there, the three hypotheses you suggested, it really does not seem worthwhile for a bank to give this kind of test, quite apart from the human rights and indignities involved, does it?

Dr. LACEY. That is a kind of loaded question.

Mr. REUSS. The information you get is so vague that—

Dr. LACEY. Sir, that is not vague information. Those are all specifically testable hypotheses. Were they not, Dr. Dearman would not have been able to publish his paper.

What you mean is that there are several possibilities which must be ruled out. An X-ray examination, a gastrointestinal examination, all of these raise several possibilities.

It is the job of a good clinician—in this case it would be the job of a good legal staff—to arrive at the conclusive significance of this indication.

Mr. REUSS. You know beforehand that the sample, let us say, of 20 people that you are going to give this lie detector test to at the bank contains some potential criminals. You could have said without any lie detector test that of a thousand employees, let us say, one or two or three will have criminal tendencies and larceny in their heart. It seems to me that giving them lie detector tests which show that some of them may either have (a) larceny in their heart; (b) a feeling of anger about having their integrity questioned; or, (c) some neurotic intervention, really does not accomplish very much.

Mr. MOSS. Could we permit Dr. Dearman to make a response?

Dr. DEARMAN. I want to point out that this shows something more sensitive than Dr. Lacey has recognized in the fact that he said, I believe, the glowering examiner brought up in regard to stealing.

This man only got positive responses to the questions which had the word "customers" in them and both mother and wife were customers of the bank. He felt that he had symbolically stolen money in the amounts they said from mother and wife.

If you asked him about stealing from the bank, he gets a negative response. If you put "customers" in there, he gets a positive.

Dr. REUSS. That is the neurotic interconnection that Dr. Lacey mentioned.

Dr. DEARMAN. Yes. But he would not respond to all things about guilt, is what I am trying to say.

Mr. REUSS. Let me ask Dr. Kubis a question. You said, I think, Dr. Kubis, that quite apart from these laboratory tests—the make-believe situations which have produced good results in a number of cases—that in the field in actual practice there have been some investigators who have been getting good results.

Did I understand you right? Were talking about the field, in actual lie detection?

Dr. KUBIS. That is right.

Mr. REUSS. Would you give me the names and addresses of all investigators and polygraph operators whom you feel have been getting good results, and tell me on what you base your opinion that they have been getting good results? Just list them. Let us get their names and addresses first. Then we will go back over and ask you for the basis on which you form your conclusions.

Dr. KUBIS. Right. There is a former director of the State police laboratories, Mr. Kirwan, K-i-r-w-a-n, William.

Mr. REUSS. New York?

Dr. KUBIS. New York. And there is Dr. Fabian Rouke, R-o-u-k-e.

Mr. REUSS. Where is he?

Dr. KUBIS. He is in New York.

I will stick to those for the moment.

Mr. REUSS. If we can, I would like to have you name all of those, if there are any others. Then I would like to take you back through them.

Dr. KUBIS. I would prefer to stick to those first.

LINO MAS 69

Mr. REUSS. Stick to those two?

Dr. KUBIS. Yes, sir.

Mr. REUSS. What is your observation of William Kirwan and the results he has obtained?

Dr. KUBIS. He had been doing work in the State police, examining individuals who had been suspected of various types of crimes. In discussing the cases with him, in studying the records that he had produced, and in evaluating the postexamination by the police department of the additional facts that had been adduced, it is my opinion that he was getting results that have been well above chance. He had been getting not only confessions but verifications of some of his results by additional evidence obtained after the examination.

Mr. REUSS. Have you examined into these specific cases, so as to make a judgment both ways? That is, was there an absence of inference from the polygraph test which imputed guilt to people who, in fact, turned out not to be guilty, and was there a presence of the reverse; namely, the polygraph inference of guilt when the person in fact later was found to be guilty?

Dr. KUBIS. In the records that I have looked into, I have examined those which had been verified and I have not been too much interested in those which still were awaiting the gathering of additional evidence.

In those which have been verified and which I have examined, he had not made any mistakes.

Mr. REUSS. How many did you examine?

Dr. KUBIS. I examined about 30 records.

Mr. REUSS. Did you select them or did he select them?

Dr. KUBIS. I asked for a set of records that had data on them, pre and post.

Mr. REUSS. However, as far as you know, he could have just handed you 30 that worked and not handed you an equal number that had not worked?

Dr. KUBIS. I don't know the complete basis of his selection, although I do know that on other cases he has submitted material on which he could not make a judgment and both of us evaluated the records and found that both of us could not make a judgment.

Mr. REUSS. But in those cases, he did not make a judgment that turned out to be the right judgment?

Dr. KUBIS. That is, he should not have made it. In the work of lie detection, there should be a nondecision region for those cases where the records are indeterminate. It would be expecting too much of a machine of this sort to always obtain exceedingly good records, uncontaminated by the excitement of such examinations, uncontaminated by the suspect's present state and emotional condition, uncontaminated by other influences over which he may not have had control. Consequently there will always be a number of records on which the examiner will be in doubt as to the judgment he is supposed to make.

Mr. REUSS. As to Dr. Fabian Rouke, did you examine any of his cases?

Dr. KUBIS. Yes.

Mr. REUSS. How many?

Dr. KUBIS. I should say about the same number of cases.

Mr. REUSS. As in the case of William Kirwan, did you simply accept from him a sample of cases which he handed you for examination?

Dr. KUBIS. Yes; and I went to his laboratory and looked at them, myself. There I looked into the files and selected those that I wanted to look at. In effect, it was an examination of those records that he showed me, himself, and those that I selected from his files.

I should like to bring a point very strongly to the attention of the committee and those who are interested in this work. There will never be a perfect instrument. We will have to live with the fact of error and the fact that we are limited, human individuals. Not only are we working with machines that have an instrumental error, but with human individuals who are susceptible to human error. We have to accept these facts.

What we have to look for is whether these types of procedures, as adjuncts to any investigation, will give us significant information over and above the amount of information that we already have. To expect perfection of an instrument when we do not expect perfection of ourselves or to expect perfection of an operator when we ourselves are fallible in our decisions, I think is an unfair expectation.

LINO MAS 72

Has Mr. Kass the question?

Mr. KASS (reading).

Do you know anyone who has been stealing money from the (blank) bank or its customers?

Dr. KUBIS. Yes. This could involve many things. Do you know whether anyone has been stealing from the bank? Do you know whether anyone has been stealing from its customers?

I presume there are lots of customers of the bank. It is a twofold question, therefore, first, with respect to the bank and with respect to the customers. Further, a question of this type is poor from another point of view. It could be used as an introductory question, because if money is ever missing people have suspicions. We have to distinguish between a suspicion and definite knowledge. Consequently a question of this sort should have been preceded by—does he suspect, and thereby—does he know? If the examiner equates the two words "know" and "suspect," he is going to get the same type of answer. Suspicion is not knowledge. In this particular case, the second alternative, namely "customer," as Dr. Dearman pointed out, was the essential point in his question. If an interpretation were to be made of this issue, it should have been partialled out into at least four components and studied singly thereafter. It is a very bad type of question, and I think everybody would agree that it encompasses too many things. As for the bank situation, I have been given to understand that there are small loans—I would say they are not pilferings for I have been told that they are loans—that some tellers make from a bank over a short period of time, say a day or two. They usually return this loan to the bank. I understand that this practice is more prevalent than the banks are willing to admit. These people, when examined, will give high reactions to such questions as: "Did you ever take or do you know if anyone has taken any money or stolen any money?"

Dr. DEARMAN. Let me say this: this question No. 6 is one of five questions in which a positive response was obtained. This is not the only question. I would like to answer Dr. Lacey on one thing. Let me see if I heard you right.

Did you say last night you were talking with members of labor? How did you phrase that?

Dr. LACEY. This man referred to the fact that he was talking to labor representatives.

Dr. DEARMAN. They said they had no objection to its use?

Dr. LACEY. That is as I understood the reply.

Dr. DEARMAN. In 1961, an employer here in Washington, D.C., was giving polygraph examinations to prospective employees. In this they asked questions which, in their mind, would determine whether or not this person was pro-labor or anti-labor. Every time they found that the answer would seem to indicate the fellow was pro-labor, they would not hire him. Somebody caught on to this and went before the National Labor Relations Board and they outlawed the use of the machine in this type of work.

Maybe they don't object to it, but they did in this case.

Mr. KASS. Did they outlaw the use of the machine or did they outlaw the use of that specific question?

Dr. DEARMAN. They outlawed the use of the machine in preemployment in this manner.

Mr. KASS. Do you have that citation?

Dr. DEARMAN. I don't have the citation, as such.

Mr. KASS. Do you have the brief?

Dr. DEARMAN. I can get it for you. I don't have it with me.

Mr. KASS. Can you supply it for the record?

Dr. DEARMAN. Yes.

Mr. MOSS. Is it a National Labor Relations case?

Dr. DEARMAN. Yes, 1961.

Mr. MOSS. You have the reference to the case? I think it would be more convenient for the staff to secure that for the record than it would be to place the burden on Dr. Dearman.

LINO MAS 73

Mr. KASS. For the record, Mr. Moss, may I supply it?

Mr. MOSS. I am pleased to see that the staff has anticipated the requirement of the committee.

Dr. DEARMAN. No, sir; I don't have it. I can get it.

Mr. KASS. Was that a 1961 case?

Dr. DEARMAN. 1961.

Mr. MOSS. We will hold the record at this point to receive the citation and the summary of the facts of the case.

(The information referred to follows:)

Mr. MOSS. I think now if we can get back to Dr. Lacey, to the discussion we had over the interpretation of the graph you have now before you, some of the problems of visual interpretation.

Dr. LACEY. Yes. If you were to examine this closely, Mr. Moss, you would see a series of spikes on this record. Each of the spikes represents a moment in time, somewhat later due to the technique, in which the left ventricle of the heart contracted. You will see they are extremely closely spaced, that at that time when the blood pressure went up quite markedly, there was also a diminution, a decrease in pulse volume, I am certain that there are cardiac rate changes in here. That is to say, a proper display would have shown increases in heart rate. They are extremely difficult, even impossible for me to see here by the naked eye, simply because my eye would have to resolve extremely small spatial distances and would have to contrast extremely small spatial distances.

If one also looks at this record, I notice above it a tracing which must be the skin resistance tracing.

Dr. DEARMAN. Yes.

Dr. LACEY. This skin resistance tracing does not show any such pronounced perturbation. This raises several issues. Somewhat later I am certain I can go through here and find skin resistance changes and not find blood pressure changes.

This raises many, many issues in an area that I have called response specificity, namely, the possibility of the existence of favored channels of expression between individuals.

One individual may be primarily a blood pressure reactor; another individual, a skin resistance reactor, and another individual blood flow reactor. In another kind of specificity, we also speak of the specificity of the pattern of response to the actual stimulus situation.

Some stimulus situations can be shown to evoke a characteristic pattern of activity. Nobody has been able to demonstrate to date—perhaps because nobody has really studied it yet—that there is a pattern of activity characteristic of that complex of states we call lying.

It might be possible, Mr. Moss—I emphasize the "might"—that the lack of a skin resistance response here to this same question—even at very close inspection I am not sure that there is a very marked heart rate change here—that the lack of two additional indicators of response, right then and there should have raised the suspicion that there was something funny here, that this was not, let us say, the typical kind of response to be expected of an individual who had stolen from the bank. One would have to have extensive norms in the proper utilization of this technique through all kinds of questions. One channel failed to respond, the skin resistance channel.

There are changes in respiration which don't look very much different, by a quick scan, from the changes in respiration that occurred to other questions.

Mr. KASS. Excuse me. Are you reading from question No 6?

Dr. LACEY. I was looking at question No. 6 and contrasting it, Mr. Kass, with the respiratory changes—I was looking at that moment at questions 8 and 10.

I notice question 8 did give a skin resistance change.

Mr. KASS. Could you analyze question No. 6?

Dr. LACEY. Yes. This is the question where I am saying we have a marked blood pressure response. A heart rate response is either absent or is difficult to discriminate. There is a lack of skin resistance response. A response in respiratory volume, at least, which is no different from the response in respiratory volume in other questions as I glance down here. In other words, the big change is this one blood pressure change.

LINO MAS 74

Mr. KASS. What you normally call GSR, or what is called sweat gland activity, is negative at that point.

Dr. LACEY. It is negative. Let us not call it a sweat gland activity. But it is negative.

Mr. KASS. Sweat gland activity was quoted from the polygraph examiner.

Dr. LACEY. That is a fairly outmoded interpretation of what is skin resistance.

Mr. KASS. Dr. Dearman, you included in the material that you supplied the subcommittee a list of questions. The question is stated on one side of the page. Blood pressure, pulse, breathing pattern, sweat gland activity is listed in three separate columns. In the second column over is positive, positive, positive. The third column over is "Strong" and that is in parenthesis opposite "blood pressure, pulse." Is this the record submitted by the polygraph examiner in your experimental case? (See exhibit 20, p. —.)

Dr. DEARMAN. This is a copy of it.

Mr. KASS. This is a copy of it?

Dr. DEARMAN. Yes.

Mr. KASS. Let the record show at this point that all three responses—blood pressure, pulse, breathing pattern, sweat gland activity—are noted here as positive.

Will you continue, Dr. Lacey?

Dr. LACEY. Yes; I got sidetracked. We were talking, I believe—Mr. Moss and Mr. Kass—about the display problem. I cannot distinguish the heart rate response here. It may be in here.

Now, if I understand the intent of your question, Mr. Kass, that skin resistance was rated as positive, it may well be positive in other questions.

Mr. KASS. No; it is listed specifically at question No. 6 in the second test which, I believe it was stated for the record, is that chart you have now.

Dr. LACEY. I would not view the skin resistance change I see here as a positive response. It is a perfectly normal spontaneous reaction of skin resistance, as I see it.

We are talking about the display problem. The mere fact that this inexperienced witness looking at the record did not detect skin resistance response, did detect a respiratory response which, on casual visual investigation of the record, is not diagnostic of anything, and did detect only the differential blood pressure response. All this raises the presumption that increased coverage and more precise display of these physiological responses might result in some increase in precision of the technique.

I would be almost certain, seeing this large blood pressure response, which looks to me as a large blood pressure response—I have no calibration here to tell me how big a response in numbers of millimeters of mercury, but this is a big response—I would assume that a simultaneous record of heart rate would have added corroborative or noncorroborative evidence.

Now, the display of heart rate that must be chosen is one that is not dependent upon paper speed, you see. It is one which must be as interpretable as the skin resistance response is.

Typically, this is a very clean-looking thing at this degree of sensitivity so that one sees big responses in skin resistance.

Mr. KASS. To clarify one additional point, could the skin resistance activity or GSR and the positive reaction from it have been visually noted from the interrogation room? In other words, can you see skin resistance other than through your components?

Dr. LACEY. You have to have a meter. Properly, it is measured in an electrical unit, either ohms or in the preferred way, the reciprocal of ohms, conductance. It is an electrical measure. It reflects certain electrical properties of the skin which are of great interest to the psychophysicologist.

Dr. DEARMAN. Dr. Lacey was talking as to his knowledge. He didn't know about the fact that the examinee was told that the machine was perfect, that he couldn't beat the machine.

LINO MAS 78

It is fairly obvious this should be repeated later and determined whether it is a consistent reaction.

Mr. KASS. Dr. Kubis, could we continue on those questions, then, with the next number. What is the next question number on there? (See exhibit 20, p. —.)

Dr. KUBIS. Seven.

Mr. KASS. Is there a positive response on GSR?

Dr. KUBIS. I would have to know the calibration on this and see what the natural perturbation of the system is. There seems to be a small response here. That might be before 7.

Mr. KASS. The next question is question No. 40?

Dr. KUBIS. That is question No. 7.

Mr. KASS. But the next question after that, is that No. 40? The next question circled?

Dr. LACEY. Fourteen. There are other things circled. But 14 is totally circled.

Mr. KASS. What would you read the GSR to be there?

Dr. KUBIS. I would read this negative or nonsignificant.

Mr. KASS. What other questions are there that you think would have a nonsignificant GSR?

Dr. KUBIS. It may be easier to pick out those that are significant.

Mr. KASS. OK, sir.

Dr. KUBIS. I don't know what this question is, it is 7, 8, in comparison to the rest of the tracing. We are in difficulty here because there are lots of numbers, 12, 7, and 4.

Mr. KASS. You say before 11?

Dr. Kubis, let me ask one other question, though. Is it not also possible that these responses were created not because of the questions asked but because the individual examiner was a female and the individual subject was a male? Is this also possible?

Dr. KUBIS. I could be facetious and say that it depends on the question that is asked of a male by a female.

Mr. KASS. I am talking about the GSR response.

Dr. KUBIS. Yes.

Mr. KASS. Based on the studies that Dr. Lacey has done and you have done, isn't it possible that the mere presence—

Dr. KUBIS. We would have to be careful about that. If this was a female examiner, we should expect this influence throughout the record. It should not occur at specific points unless we can identify those points and the questions at those points. Therefore, we have to assume the influence of femininity throughout the examination, since a female person is present throughout the examination. We cannot say and pick out one spot and say this is due to a female examiner and this other spot which is not large is not due to the female examiner.

Mr. KASS. Couldn't certain questions that were asked, however, stimulate greater responses?

Dr. KUBIS. Yes. It depends on the meaning that the individual attributed to those questions and the implications of those questions.

Mr. KASS. Would not the examiner also have to know what meaning was derived by the individual?

Dr. KUBIS. Yes, and the examiner would have to phrase her questions so as to be objectively and directly relevant to the issues under investigation. These should be spoken in a voice that is relatively indifferent to the femininity that that examiner exerts on any of these questions.

Mr. KASS. If the question asked by the examiner was "Have you ever stolen from the bank's customers?" would that have been a better question to ask?

Dr. KUBIS. Have you ever stolen any money from the bank's customers?

Mr. KASS. From the bank's customers. Strike the "money."

Dr. KUBIS. Have you ever stolen from the bank's customers?

Yes, it could have been a better question because it would have implied stealing. It would have implied stealing from a specific subclass.

LINO MAS 79

Mr. KASS. What about the word "customers"?

Dr. KUBIS. I would presume that those would be the people who would be coming to the bank.

Mr. KASS. You would presume this?

Dr. KUBIS. That is right.

Mr. KASS. So perhaps would the examiner, but can we presume that?

Dr. KUBIS. I think this is the ordinary interpretation that is given to this term.

Mr. KASS. But is it also possible that the subject had another interpretation of the word "customers"?

Dr. KUBIS. Yes, and we should always be on the alert for such individuals. This individual apparently was very disturbed because I cannot see how an innocent individual, an executive of a bank, presumably intelligent, presumably having many dealings with ordinary people, and seeming to have been functioning well up to that point, going to the extreme of admitting that he had done something which he had never done.

This is a difficult thing for me to accept, for any normal individual to accept, that a man who has not taken money would admit taking it. In the admission, and I cannot interpret it in any other way, he would have said it was money from the bank's customers, I think he would have meant that if they were the customers who were coming to the bank.

Mr. KASS. Dr. Kubis, what would happen at that particular point if the bank vice president really was not concerned because he had had some assurances from his president that he believes him. At that particular point he looks at the examiner who is asking the question and says she is a very attractive young woman, I would like to take her out for a drink tonight?

Dr. KUBIS. I don't think he would do that under these circumstances. The question about stealing is a threatening question. And the fact that he later admitted this type of action would not indicate that this would gain for him the access to the young lady in question.

It is very difficult psychologically to interpret his reactions and to understand him from the point of view of the normality that we would expect in respectable, efficient individuals who are operating at an executive level.

Mr. KASS. Now we are assuming executive level. The vice president of the bank, I believe, was 27 years old. I don't know what significance you can attach to that. I know I am 27 years old and I have had some thoughts in this hearing room today that would probably evoke great GSR's despite the fact that I am sitting here trying to get certain information about the use of polygraphs in the Federal Government. Is it not also possible that this bank vice president, whether 27, 47, 67, had extraneous thoughts?

Dr. KUBIS. Yes.

Mr. KASS. Or exciting imagery, as I think you called them in your study?

Dr. KUBIS. Yes. We have to postulate highly improbable situations, then. If I understand the meaning or the implication of your question, then these highly exciting thoughts would have come up only in one class of questions and not in the other class of questions. I would presume that if these were highly exciting thoughts and if they were not specifically related to the question, that they should also occur in questions that have nothing to do with taking of the money from the bank. They should occur under these circumstances, in these other questions.

Mr. KASS. If the subject in this particular case in his own mind, twisted as it may be—I don't know—assumed or brought the examiner, who happened to be a female, into his mind as his mother or his wife, and every time he used the word "customer," he associated it—and I assume these associations can be rapid—with customer, with his wife, could you not have a constant at that particular question which would evoke great GSR's only at that particular point?

Dr. KUBIS. With regard to customers?

Mr. KASS. With regard to customers.

Dr. KUBIS. Yes; he could have done that. That is why I say the question originally as formulated was a poor one.

LINO MAS 80

Mr. KASS. But we did agree earlier that even the question that would have been a better question asked, "Have you ever stolen from customers," that even this question could have caused serious problems.

Dr. KUBIS. Yes; in a disturbed individual, but in ordinary circumstances, these individuals are not so numerous.

Mr. KASS. Are you saying that most individuals are not normally disturbed? I have been reading that all of us have a few neurotic tendencies.

Dr. KUBIS. I say that most individuals are not disturbed in the sense of pathology.

Mr. KASS. Is this a pathological disorder or a neurotic disorder or just being a red-blooded individual?

Dr. KUBIS. Who would admit to having done something which he didn't do? A red-blooded individual?

Dr. DEARMAN. That he admitted to having done something he didn't do, but in his own unconscious mind he had felt he had done to the customers of the bank; namely, wife and mother.

Mr. KASS. Is this possible?

Dr. KUBIS. This is an inference which Dr. Dearman has made. I have not studied the case and I cannot make such an inference. In a hypothetical case, if you gave me full details and all the relevant information I would have to agree with certain types of conclusions under certain circumstances.

Mr. KASS. Dr. Kubis, this is one inference that is made by Dr. Dearman. You have made another inference or you could make another inference, based on reading the case. Would you come to a conclusion immediately that specific reaction indicative of deception is present?

Dr. KUBIS. Not when I know that he says that he stole money and he didn't. I would say this is a disturbed individual. I don't know what is in the mind of a disturbed individual because by definition a disturbed individual has certain types of disturbances which are hard to interpret.

I should like to point out that this is an exceedingly unusual case where the man admits something that he didn't do.

Dr. DEARMAN. May I say this. He says I inferred. Let us look at it a little bit. What is the scientific method, and if I am wrong, correct me. A man observes a phenomenon and he wonders about it, why would this thing happen? He has seen the thing happen but he still can't figure out why. So, he says, all right, let us do it again under the same conditions as nearly as we can duplicate them, and let us make us a hypothesis that if such and such things are done, this will follow. This is the hypothesis I made.

Would you call that an inference?

Dr. KUBIS. Because you have access to information in your psychiatric work, which we haven't and which could not be obtained until—

Dr. DEARMAN. As you know it, would you call that inference? If you set up an experiment, you made a hypothesis, and you proved the hypothesis, is this inference?

Dr. KUBIS. Let us say if your hypothesis is a legitimate hypothesis, you have shown that your hypothesis has been verified by the experiment, provided everything else there is legitimate and well controlled.

Dr. DEARMAN. Sure.

Mr. KASS. Dr. Kubis, without the psychiatric examination, without the background investigation, without all the other information needed to make a determination, could you or would you recommend making a determination of guilt or innocence or truthfulness or falsity?

Dr. KUBIS. In what situations?

Mr. KASS. In this particular case.

Dr. KUBIS. I would have to know the situation, I would have to examine the case; I would have to know under what circumstances it was done; I would have to know something about his reactions.

Mr. KASS. Would you recommend to the bank president at that particular moment that this man is perhaps "rotten"?

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Dr. KUBIS. Of course not. I would just say that he gives large cardiovascular responses. He is apparently cardiovascularly disturbed at certain points where certain questions have been asked.

Mr. KASS. You made one other point, that people don't normally confess.

Dr. KUBIS. If they have not done it.

Mr. KASS. If they have not done it. Could you document this?

Dr. KUBIS. I think I could ask any one in the room, that this is a phenomenon that all of us observe in life.

Dr. DEARMAN. That people don't confess at times to things that they don't do?

Mr. KASS. How many people go into a police station after a crime has been committed and for various reasons say, "I did it."

Dr. KUBIS. I would like to know the figures.

Mr. KASS. So you don't know the figures?

Dr. KUBIS. That is right.

Mr. KASS. So you can't say as a matter of fact that people don't normally run and confess if they don't do something.

Dr. KUBIS. I think newspapers like to report these things.

The incidence of such instances is relatively small.

Mr. KASS. Based on—

Dr. KUBIS. What I have read in the newspapers; yes. Now, if we have access to other information, I certainly would like to know that as anybody else would. There are such people, there is no doubt about it.

Mr. KASS. Dr. Kubis, what other means are there of beating the instrument or beating the examiner or beating the operation or technique. How do you beat the lie detector?

Dr. KUBIS. There is an inveterate tendency in individuals to protect themselves against threat. The individual tries to avoid threat in various ways and in the case of the threat of being found out as a culprit, a number of individuals that I have examined have thought about ways of fooling the lie detector examiner. They want to avoid being discovered. So they utilize several types of procedures. I think there are, in general, two types of procedures. Either they flood the record, that is, fill up the record with irrelevant reactions so that there are many large reactions. This makes it difficult to compare the response to the significant question, such as: Did you kill John Jones, with the others? Technically, a lot of "noise" is put into the system. Another method of defending oneself is getting the examiner on the wrong track, by trying to elicit responses that are large to questions other than the important question. These are the two basic approaches to the problem of evading detection.

Mr. KASS. Are either of them possible?

Dr. KUBIS. Yes, they are possible. In point of fact, if the individual squirms too much, I don't think you can get valid records. So it would be a very simple procedure for an individual to say that he wants to cooperate but still move a lot and exasperate the operator by such movements which would be reflected throughout the record.

Mr. KASS. Now, there is a difference between much movement or trying to get too many things on the chart where the examiner would say, you are trying to beat me, you had better sit down and be quiet.

Dr. KUBIS. The person would say, "I am very nervous." You have no defense against this.

Mr. KASS. Then is it possible for the examiner to come up with the wrong conclusion?

Dr. KUBIS. If he is a good examiner, he should not examine that individual.

Mr. KASS. Is it possible to beat even a good examiner through other means?

Dr. KUBIS. Yes, I think it is.

Mr. KASS. How?

Dr. KUBIS. There are types of procedures that should be studied by all people interested in lie detection so that individuals can be detected if they deliberately use them. Whenever they legitimately occur, these sources of disturbance and, therefore, sources of error, should be eliminated.

One procedure which is classic, and, which I am sure every one has thought about, is to induce excitement in oneself at points other than the significant questions. This excitement is manifested in the record

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and would be introduce "noise" or extra reactions in a part of the record where the examiner does not expect it. At the least, this will cause doubt in the mind of a good examiner, for he would be off the main track in trying to explain these large reactions. Therefore, the person being interrogated would have a good chance of eluding the examiner because he has forced him into side alleys.

It is very expensive from the point of view of time to check out these other large reactions which seem to indicate quite a bit of disturbance. As to how often this technique is used, I would surmise that the ordinary first offender, in the excitement of being examined, cannot mobilize either his energy or his thinking, to very adept at this. Consequently I would expect that most of the individuals who are being examined do not use this procedure in a systematic way.

Mr. KASS. But can a person who, to use your own words, is adept and is not ordinary, can a person—not induce responses at other points to fool the examiner but—suppress his response at the question so that it would appear that there is no deviation from the so-called norm?

Dr. KUBIS. This is very difficult because the task that the individual gives to himself, of suppression, gets him into a heightened state of reactivity. When the critical question is asked, he may say to himself, "I have to suppress," and this puts him in an alerted condition, and probably elicits more tension than it should. He might even evoke a large reaction. This is a dangerous procedure. I would not recommend it.

Mr. KASS. Is that Dr. Orne's research, that the more you try to deceive the more you are caught?

Dr. KUBIS. This is partly verified by an experiment that I had done. If evolved by the use of the "Yoga" technique where the individual tries to be as calm as possible and tries to suppress his reactions. What happens is that he gets to a much lower level of general responsiveness throughout the record and when these other disturbing questions come in, even a small response looks flagrantly large in comparison to the suppression he has been able to achieve elsewhere.

Mr. KASS. What about the classic case, mentioned in Mr. Inbau's and Mr. Reid's book, when the question was asked: "Did You Kill Mabel?" the suspect—who it was later verified did in fact kill Mabel, was thinking of another Mabel and he said, "No, I did not kill Mabel," and there was in fact no deviation from this norm.

Dr. KUBIS. This, again, is a difficult procedure. If he has done it, I have to give him credit for it.

Mr. KASS. It is possible?

Dr. KUBIS. If it has occurred, then I guess it is possible.

Mr. KASS. Dr. Lacey, you have done some work in suppression of behavioral characteristics, if this is the scientific term to use, is it possible to suppress your physiologic response?

Dr. LACEY. A few years back, I got interested in what was known as Yogi.

Mr. KASS. Yogi, or Yoga?

Dr. LACEY. Choose your own form, Mr. Kass. I don't know. Actually, an eminent psychophysicologist, Dr. Wenger, of the University of California at Los Angeles, and Dr. Bagchi from the University of Michigan, went on a scientific expedition to India to study Yogi on the spot. The question of expenses and transportability did not bother them. I also was interested in it. They were doing field investigations to determine whether in fact this kind of thing did exist.

You are all familiar with the reports of suspended animation, cessation of cardiac activity and whatnot.

About the same time I started a series of investigations in the laboratory to see if I could just begin to reproduce in the laboratory any sort of control. I could not in the laboratory. That, however, is a statement you will have to take with a very large grain of salt. I did not make a very intensive effort and there are a lot of secrets we don't understand.

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Yoga or Yogi is probably the best or most extensive evidence we have that even raises the presumption of rather successful dramatic suppression of ongoing autonomic activity.

I have to be really responsible for this conclusion, I just am not sure. Certainly, the evidence was unimpressive that it did in fact exist in India.

I think Dr. Wenger's conclusion was that all instances that he was able to observe were due to control of respiration, which, of course, we can all do. This was not a direct suppression of autonomic activity.

Let me state that they had great difficulty in locating true advanced Yoga. In other words, if it does exist, it exists in only a few highly trained individuals who have some physiological secrets that we in the West certainly do not have. Even there, there are only a few individuals and they are hard to locate. I would say within all practical limits, there are no known techniques for the widespread dramatic suppression of autonomic activity that we are talking about there. Whether suppression of this sort could occur in this kind of lie detection, I don't know. However, there are more subtle things involved, more subtle than voluntary suppression.

There are some reports in the literature which raise some very interesting hypotheses capable of testing, that the nature of the interaction, social interaction, between the examiner and the examinee has some effect on the channel of somatization, that is, whether one should be looking at blood pressure, skin resistance, or blood flow perhaps which are never included on these records. I refer to what we call in our field, situational stereotypy, stimulus specificity. Perhaps the most relevant study is a study by Dr. Reiser and his colleagues. Dr. Reiser is now professor of psychiatry at Albert Einstein Medical School in New York. These studies were done by him at the time he was a captain in the Medical Corps. He was studying the effect of interview techniques on cardiovascular physiology.

In one case, he, Dr. Reiser, personally took the blood pressures. The individual also was being measured on a ballist cardiograph, which is a record of the ballistic recoil movements of the body as blood is expelled forcibly into the arterial tree.

In another instance—I can't remember whether it was a sergeant or a private—a technician of lower rank took the blood pressures while the ballist cardiograph was also being taken. Now, then, the content of the interview, the formal interview, I think, was about the same, but obviously the informal interaction surrounding the interview was very different when a private or a sergeant examined the soldiers than when a captain of the Medical Corps examined the soldiers. For example, griping, very common in the Army, was quite freely done when the private was around. A more formal, much more pleasant, nongriping atmosphere was generated when the captain took the blood pressures.

The interesting thing was that if one wanted to detect physiological changes consequent upon the symbolic stimuli in the interview situation, one would have chosen different physiologic measures to look at, depending on whether the captain or the private was doing the measuring.

I don't remember which way it went, which is simply another way of stating that theory in this field is still very primitive. We are all hard at work trying to arrive at generalizations that make sense. When I say to you I don't remember which way it went, I am simply admitting I have no general principles, I would have to remember this little detail. But it might have gone something like this, trying to think about general principles—I will be interested to check myself later—that in the presence of the captain, the measured blood pressure response did reveal differential impact in the interview material on the soldier being examined but the ballist cardiograph record did not.

In the presence of the private, the blood pressure response did not reveal any differential impact in the interview, whereas the ballistocardiogram record did.

The important principle is that the nature of the surrounding socialization may determine, by mechanisms we do not yet understand, that suppression of differential physiologic perturbation to symbolic stimuli will automatically occur and that one has to look elsewhere to another somatic channel which you see may not even be represented on here.

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Mr. Kass. Thank you, Dr. Lacey. I have no further questions.

Mr. Moss. First, I would like to ask both Dr. Lacey and Dr. Kubis if they will comment on the article read earlier by Dr. Dearman, written by an official of the Virginia State Police, where he strongly emphasized the importance of convincing the examiner of the infallibility of the polygraph. Would either of you relate this to proper procedure?

Dr. LACEY. I think I have already answered that partially when I said I think—well, it is a lie, it is a deception of the public. I feel very strongly this should not be done. I stated that if the public were properly informed this might decrease the validity of the lie-detection procedure.

My answer to that is, too bad, but that is what the democratic ethic requires. I don't want to live in a police state. It is not an infallible technique. When one says it is, one is using a club.

Mr. Moss. On the contrary, it is a relatively fallible technique?

Dr. LACEY. It is a fallible technique; yes, sir.

Mr. Moss. Dr. Kubis?

Dr. KUBIS. Yes, I would agree. We would not use lies either to intimidate people, or to appear as if we are very truthful individuals. Deception ultimately will destroy the individual who uses it. In time he will become worse as an examiner, because as he comes to believe his infallibility he gets closer and closer to the position of God; and when one does get that close, he does not belong with us mortals. He belongs elsewhere. This procedure is to be condemned and should not be utilized.

Mr. Moss. Now, very briefly, what happens if we have a person of average or less intelligence—perhaps a very meager education—who is convinced by one of these examiners that this machine is infallible. It is going to find out rather quickly whether he is lying or telling the truth; and he responds truthfully to the best of his ability, and the operator says he is lying? What happens to the individual at that point? Does he then start to try to defend himself, to beat it by whatever means might be available? Does he become confused? What actually happens to that individual? How will it affect him?

Dr. KUBIS. I don't think many individuals believe this, if they have to answer this question outside of the interrogation. They might in the height of the emotional confusion that exists at that time. But I would suspect that such an individual, if he is innocent, will claim that he is innocent and will not admit to the situation. But at the same time he may be fearful of the consequences of such a decision which may be put into his record. I have heard at a meeting of polygraph operators one representative who gave a speech saying that "I don't even look at the record; I accuse him of it, and then study his reaction." These are techniques that some people may use to try to elicit confessions, but my point on this is that if you use such tactics why use a machine. Accuse him immediately of the crime, and if the individual has actually committed the crime, and if he is susceptible to such types of pressures, he may confess.

This is a technique that sometimes a number of interrogators might like to use. I don't know how frequently it is used in actual interrogation.

Mr. Moss. You indicate you feel it would be rather infrequent that a person would actually believe the machine was infallible. Yet I have read within the past week in connection with a campaign for high public office in one of the States of this Union where one of the principle candidates has challenged the other to take a lie detector test which, at best, would be nonconclusive.

Dr. KUBIS. Yes.

Mr. Moss. Now is he hippodroming, or does he believe it? I grant that he believes they are relatively infallible instruments.

Dr. KUBIS. I wonder whether he is just trying to bring up an issue that may be completely irrelevant to the campaign.

Mr. Moss. That has been known to happen. My reday response to such a challenge would be very polite, but I have not read the response in the case I have in mind.

Dr. KUBIS. Certainly it is an inappropriate, uncivil procedure to use.

Mr. Moss. We read frequently in much of the press and news media of the country where there is almost a public attitude of scorn be-

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Institute for Defense Analysis in Research and Engineering Support Division with regard to the objective measurement of autonomic responses for use in lie detection. As part of that study I believe at one point—

Dr. LACEY. I don't know, isn't this classified?

Mr. REID. This is not now classified. This has been declassified. All I wanted to place in the record, with whatever comment you might want to make, is that at one such meeting in July 1961 there were eight areas of suggested study that you thought would be pertinent.

Dr. LACEY. Not individually. There was a group of psychophysiologicalists at that conference.

Mr. REID. I take it that would still be your view, that those studies should be carried out.

Dr. LACEY. I don't remember what the eight areas were.

Mr. REID. I understand that, but in general you subscribe, I take it, to the views of that committee with regard to additional study, and there are a list of eight.

Dr. LACEY. Perhaps with one exception, Mr. Reid, one qualification; that I think I came away from that conference feeling that my colleagues were a bit more optimistic about the potential success of this technique than I was. That is the only qualification I made. As a member of the group advising IDA, I was in agreement with the general tenor of the report. Certainly it says there is lots of research that needs to be done.

Mr. REID. Mr. Chairman, I would like to ask unanimous consent that this list of possible areas of study be included in the hearing and any other sections of the report counsel feels may be relevant.

Mr. MOSS. Without objection, it may be included in the record. (See exhibit 21, p. —.)

Mr. REID. My final question is the simple one of the overall validity of the lie detector. I think we have heard a lot of testimony from those who are sophisticated in its use, such as psychologists and members of the law. I think you have said that you do not favor its use in the Federal Government. Is that a flat statement, or do you feel that it could be used in certain instances?

Dr. DEARMAN. I was in agreement with Dr. Lacey yesterday that if you have these 1,000 men and you need 10, you know some of them are going to show false positives and false negatives, but you want to get as good 10 men as you can get; but of the other 990, all those records be burned, nothing is left, expunged from the record. In other words, there is nothing to show that these men had ever had anything. I would agree with that.

Mr. REID. Could we have a concensus of you, Dr. Dearman, Dr. Kubis, and Dr. Lacey just what you think the use of a lie detector is? As I understand it—and I will try to paraphrase what I think you have all said in substance—you would only use it in cases of serious national security, and not under any circumstances for trivial purposes or trivial inquiry.

Dr. DEARMAN. I would only use it in connection with other psychological examination.

Mr. REID. I would like to narrow it. Do you want to see widespread use of the lie detector in the Federal Government throughout the depths of the Government, or do you wish to narrow it to serious matters of national security?

Dr. DEARMAN. I would say serious matters of national security, but I would want, as Dr. Lacey said yesterday, that this would be just one part of it. I want the other psychological tests that went along with it.

Mr. REID. I understand that, and a series of safeguards. But in general are all three of you agreed that widespread use in untrained hands should not be pursued and that its use should be limited to highly trained persons, to serious cases, and finally with full protection for the rights of the individual, legal and otherwise?

Dr. DEARMAN. With other psychological testing.

Mr. REID. And with any other psychological testing, or safeguards that might be pertinent.

Dr. DEARMAN. Yes; I would agree with that.

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Dr. DEARMAN. You mean my recollection of what happened? I remember what happened.

Mr. MOSS. Do you have no reason, then, to want to change your recollection?

Dr. DEARMAN. No, sir.

Mr. MOSS. Then, would you supply for the committee a photostat of the original report signed by the operator?

Dr. DEARMAN. I will be glad to do so. (See exhibit 20, p. —.)

Mr. MOSS. So that, as that report reflects conclusions it be accurately stated on this record?

Dr. DEARMAN. Yes, sir. Let me say this, that what she put in the report is not the same as what she said that day. I would go by what the report said. This was her way of writing up the report. But I do remember what she said. Dr. Smith was there. He remembers what she said. On page 1018 of the article it states what she said.

Mr. MOSS. For the purposes of the committee, it is relatively irrelevant to the committee; but just to indicate that there has been express disagreement, I would like the record to reflect the nature of the disagreement.

Dr. DEARMAN. Yes, sir.

Mr. MOSS. I ask also at this point, Mr. Reid, if there is no objection, that the staff be permitted to include in the record of these hearings those documents pertinent to it or referred to in connection with the hearings. (See exhibits 22 p. —.)

Mr. MOSS. Gentlemen, I can assure you that I have had a most interesting and, I think, profitable 2 days. I wish we could continue. But the schedule of the Congress does not permit us that luxury.

I thank each of you for your appearance. I hope that we can call upon you again should it become a desirable matter for the committee.

Mr. REID. Mr. Chairman, I, too, would like to thank Dr. Lacey, Dr. Kubis, Dr. Orne who is not present, and Dr. Dearman for their thoughtful and pertinent testimony which I think has been extremely helpful on a subject that I know is complex; but I think they shed light on it, and I think we all appreciate it.

Mr. MOSS. This will conclude this series of hearings. Others will be announced later as the committee develops firm planning. The subcommittee is now adjourned.

(Whereupon, at 1:25 p.m. the subcommittee adjourned subject to call of the chairman.)

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APPENDICES

(Exhibits 1 to 18 appear in pts. 1 and 2 of these hearings.)

EXHIBITS 19A-19D—BIOGRAPHICAL SKETCHES SUBMITTED BY SCIENTISTS APPEARING BEFORE THE SUBCOMMITTEE

EXHIBIT 19A—H. B. DEARMAN, M.D.

General:

H. B. Dearman, M.D. (psychiatry), 208 East Watauga Avenue, Johnson City, Tenn.; telephone 928-4517
Born, May 14, 1921, in Wingate (Perry County), Miss.

Education:

Finished high school in April 1939, New Augusta High School, New Augusta, Miss.

Received B.A. degree May 1942, University of Southern Mississippi, Hattiesburg, Miss.

Received medical certificate in February 1945, University of Mississippi, Oxford, Miss.

Received M.D. degree December 1946, University of Tennessee, Memphis, Tenn.

Internship, 1 year (January 1947-January 1948) Methodist Hospital, Memphis, Tenn.

Two and one-half years preceptorship in surgery, January 1948-July 1950.
One year preceptorship in anesthesiology, 1951-52.

Professional status:

Private practice of medicine (general practice) January 1948-July 1950, Columbia, Miss.

Private practice of medicine (general practice) August 1951-July 1959, Carthage, Miss.

Psychiatric residency, July 1959-July 1962. Chief resident, July 1961-July 1962. University of Virginia Medical Center, Charlottesville, Va.

Private practice of psychiatry, July 1962 until the present time, Johnson City, Tenn.

Military service; Navy, active duty, rank lieutenant senior grade, October 1950-August 1951, honorable discharge, 1955.

Associations:

At present, member of the American Medical Association and affiliated State and local societies, associated member of the American Psychiatric Association.

Formerly member of American Academy of General Practice and the American Society of Anesthesiologists.

EXHIBIT 19B—JOSEPH F. KUBIS

Joseph F. Kubis, 37-18 88th Street, Jackson Heights 72, N.Y.; TW 9-7057.
Birth, March 13, 1911 (Brooklyn, N.Y.); married (two children); business address, Fordham University, Bronx, N.Y.

Education:

1924-28: Bushwick High School, Brooklyn, N.Y.

1928-32: St. John's University, Brooklyn, N.Y.; B.A. degree.

1932-37: Fordham University, New York City; M.A., Ph. D., (major field:

Psychology:

Member, scientific organizations:

American Association for the Advancement of Science.

American Psychological Association.

American Society of Criminology.

American Statistical Association.

American Personnel & Guidance Association.

Biometric Society.

Mathematical Association of America.

Medical Correctional Society.

New York Academy of Sciences: Chairman, Division of Psychology.

Psychometric Society.

Sigma XI.

Consultant status:

Present:

National Aeronautics and Space Administration (Washington).

Veterans' Administration (Brooklyn).

Catholic Charities (New York).

Intermittent: City and State police authorities on criminal interrogation.

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Recent:

Institute for Defense Analyses (Washington).
Office of the Director of Defense Research and Engineering (Washington).

Professional status:

Assistant and teacher, Fordham University, 1934-36.
Instructor, Fordham University Graduate School, 1936-39.
Assistant professor, Fordham University Graduate School, 1939-44.
Associate professor, Fordham University Graduate School, 1944-53.
Professor, Fordham University Graduate School, 1953-present.

Research interests: Emotional reactions, their measurement; stress and anxiety; interrogation and interviewing.

EXHIBIT C—JOHN E. LACEY

John E. Lacey, born April 11, 1915, Chicago, Ill. B.A., Cornell University, 1937; Ph. D., Cornell University, 1942. Chairman, department of psychophysiology-neurophysiology, Fels Research Institute, and professor of psychophysiology, 1946 to date.

Susan Linn Sage scholar in psychology, Cornell University, 1937-38. Susan Linn Sage fellow in psychology, Cornell University, 1938-39. Junior graduate assistant in psychology, Cornell University, 1939-40. Senior graduate assistant in psychology, Cornell University, 1940-41. Research associate, the Psychological Corp., New York, N.Y., 1939-42. Instructor in psychology, Queens College, N.Y., 1941-42. Induction station psychologist, 1942. Personnel consultant, the Adjutant General's Office, 1943-44 (second lieutenant, ASC). Aviation psychologist (second lieutenant to captain, Air Force), 1944-46. Lecturer in psychology, Ohio State University, 1950-59. Lecturer in psychopathology, University of Louisville, School of Medicine, 1955 to date. Member, National Psychological Research Council for the Blind of the American Foundation for the Blind, 1955-57. Commonwealth Fund postdoctoral fellow in neurophysiology, 1957-59. Consulting editor: Journal of Comparative and Physiological Psychology, 1953 to date; Psychological Review, 1958 to date; Journal of Psychosomatic Medicine, 1962 to date; technical contributions, editor and consulting editor, 1962 to date. Member, mental health study section, NIMH, 1957; behavioral sciences study section, NIMH, 1958; experimental psychology study section, NIMH, 1958-60. American Psychological Association, board of scientific affairs (chairman), 1959-61. Advisory committee on graduate laboratory development program, National Science Foundation, 1961. Behavioral sciences training committee (psychobiology), Institute of General Medical Sciences, U.S. Public Health Service, 1962-65. Midwestern Psychological Association, American Psychological Association, Psychosomatic Society, American Academy of Neurology, American Association for the Advancement of Science, Society for Psychophysiological Research (president, 1961-62), American Psychosomatic Society, Sigma XI, Phi Kappa Phi.

EXHIBIT 19D—MARTIN THEODORE ORNE

General:

Address: Harvard Medical School, Department of Psychiatry, 74 Fenwood Road, Boston, Mass.

Telephone: Aspinwall 7-0910 (area code 617).

Date of birth: October 16, 1927.

Present position:

Senior research psychiatrist, Massachusetts Mental Health Center.
Director: Studies in hypnosis and human ecology projects.
Associate in psychiatry, Harvard Medical School.

Education:

Undergraduate: Harvard University, A.B., cum laude, 1948. Major: Social relations.

Graduate:

University of Zurich, 1948-49.

Harvard University Graduate School of Arts and Sciences, A.M., clinical psychology, 1951.

Tufts University Medical School, M.D., 1955.

Internship, Michael Reese Hospital, Chicago, 1955-56.

Residency in psychiatry, Massachusetts Mental Health Center (Boston Psychopathic Hospital), 1956-59.

Harvard University Graduate School of Arts and Sciences, Ph. D., 1958.

Teaching appointments:

Visiting lecturer, Department of Psychology, University of Mainz, Germany, summer, 1953.

Teaching fellow in psychiatry, Tufts Medical School, 1957-58.

Teaching fellow in psychiatry, Harvard Medical School, 1957-59.

Lecturer, Department of Social Relations, Harvard University, 1958-59.

Research associate, Department of Social Relations, Harvard University, 1959-60.

Instructor in psychiatry, Harvard Medical School, 1959-62.

Visiting lecturer, Department of Psychology, University of Sydney, Australia, summer, 1960.

Associate in Psychiatry, Harvard Medical School, 1962-

Visiting lecturer, Department of Psychology, University of California, Berkeley, summer, 1962.

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Current consultant appointments:

- Member, Advisory Committee on Behavioral Sciences Research of the Air Force Office of Scientific Research, Washington, D.C.
- Consultant, psychotherapy study at the Henry Phipps Psychiatric Clinic, Johns Hopkins Hospital.
- Consultant, Institute for Defense Analysis, Washington, D.C.
- Consultant, Committee on Research in Hypnosis, Office of Naval Research, Department of the Navy, Washington, D.C.
- Research consultant, experimental psychiatry, Boston State Hospital.

Research grants:

- Postdoctoral fellow, National Institute of Mental Health, 1956-57.
- Principal investigator of grant from Society for the Investigation of Human Ecology in Special States of Consciousness, 1958-63.
- Principal investigator of contract No. AF49(638)-728 from the Air Force Office of Scientific Research for an investigation of the nature and uses of hypnosis as a control technique, 1959-62.
- Principal investigator of research grant No. M-3369 from the Public Health Service, National Institute of Mental Health for studies in hypnosis, 1959-
- Principal investigator of research contract No. Nour-3952 from the Office of Naval Research for an empirical investigation of basic research problems in hypnosis and related states, 1962-
- Principal investigator of research grant No. AF-AFOSR-88-63 from the Air Force Office of Scientific Research for a scientific investigation of personality attributes of good hypnotic subjects, 1962-
- Principal investigator of research contract No. DA-49-193-MD-2480 from the U.S. Army Medical Research and Development Command for a scientific investigation of studies in the detection of deception, 1963-

Professional society appointments:

- Editor, International Journal of Clinical and Experimental Hypnosis, 1961-
- Secretary-treasurer, Society of Psychophysiological Research, 1962-
- Steering committee, New England Psychological Association, 1962-

Professional society memberships:

- American Association for the Advancement of Science.
- American Group Therapy Association.
- American Medical Association.
- American Psychiatric Association.
- American Psychological Association (fellow).
- Massachusetts Medical Society.
- New England Psychological Association.
- New York Academy of Sciences.
- Society for Clinical and Experimental Hypnosis.
- Society for Psychophysiological Research.

EXHIBIT 20—LETTER FROM MAXINE BELL RIEGER, POLYGRAPH EXAMINER, TO
DR. H. B. DEARMAN, APRIL 1, 1962

Dr. H. B. DEARMAN,
Department of Psychiatry,
University of Virginia Hospital,
Charlottesville, Va.

DEAR MR. DEARMAN: Regarding your letter of March 26, I have rewritten the report in an effort to simplify it for printing—I fear this is easier said than done. I retyped your format because I only give positive or negative results: a good polygraph examiner does not know the meaning of the word "inconclusive." I also reworded the conclusions—the polygraph doc. not tell whether the subject is lying or telling the truth—if only shows physiological reactions to verbal stimulus. This physiological reaction may be indicative of deception, reflective thought, emotional feeling for the question, etc., and it is foolhardy of any examiner to pass judgment on an individual without interrogating him to determine just what these physiological reactions indicated on the polygram mean.

In my first report I listed all the questions on which I would interrogate _____ because even though question 12 was negative on the second polygram, I do not feel the perfunctory remark he made after the first test was sufficient to completely remove it from the chart. As you notice in this report—he reacted on question 10 in the second test and I believe that No. 12 became No. 10 to him in the second test. I know this sounds real stupid, but that is the feeling I have about this question.

In the accompanying report this is the way I see the questions lined up in brief:

FIRST TEST

6. Do you know anyone who has been stealing money from the _____ branch or its customers?

49. Are you 27 years old? (This reaction probably implies he feels some emotional connotation to his being 27 years of age—either he is approaching 30 too fast, may be feeling impotent, or any number of things.)

7. Have you ever stolen any money from the bank or its customers?

12. Have you ever stolen any money from the customers of the bank other than your wife or mother?

14. Have you in fact stolen any money from the customers of the bank?

3. Do you drink coffee? (This reaction probably implies he had a cup of coffee recently he didn't like the taste of.)

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SECOND TEST

He reacted to 16 and 50 which are control questions and which I expected him to react strongly—everyone does.

4. Do you smoke cigarets? (This reaction may imply that he feels he smokes too much, or has received some criticism recently in that area, or he may have smoked a cigaret that day that he didn't exactly enjoy the taste of.)

a-6. With the exception of what you just told me, do you know anyone who has been stealing money from the _____ branch or its customers?

7. Have you ever stolen any money from the bank or its customers?

10. Have you ever stolen any money from the bank? (We have a delayed reaction which is indicative usually of reflective thought which might be as I suggested earlier a revamping in his mind of question 12—since we had cleared up in our discussion any theft of money from his mother in childhood, he might have recalled the imagined theft in his own mind of his wife's money to repay his father-in-law. Lord knows what it could be—without discussing it with him it is impossible to know for sure.)

11. Have you ever stolen any money from the customers of the bank?

14. Have you, in fact, stolen any money from the customers of the bank?

I still believe because of the strong reactions which I indicated as such on the accompanying report, that your hypothesis still holds firm despite question 10 rearing its ugly head.

I hope I have not made my report too long, but the polygraph technique is not simple and all the additional information I included has to be there for one unpardonable sin for a polygraph-examiner is to assume anything, from an examination. The polygraph is used only as an aid to interrogation enabling the examiner to know which areas need to be exploited further through interrogation—would that it were as simple as the layman thinks it is.

Please don't think I am lecturing you over your ideas of the polygraph—I appreciate your inexperience with the machine and your exposure to some pretty lousy polygraph technique with the past examiner you worked with—I am only attempting to clarify the accompanying report and enable you to get some sense out of it because it is sometimes difficult to do—even for the polygraph-examiner.

I would like an opportunity to come to Charlottesville and speak with the doctors in the department of psychiatry to enlighten them on just what the polygraph does accomplish so they may know just how it may be used in any future research regarding human personality, etc.

Please excuse the typographical errors in this letter, but it is 10 p.m. and I am pooped. I do hope I have made my report a little clearer, but if not please don't hesitate to send it back and I will be glad to do what I can to clarify it for you. If you wish you may call me at my home phone—UL 5-2984 for any quick information you might desire. I am leaving for North Carolina tomorrow for a week's testing but should be back home by Friday.

The best of luck to you on the publication of your article, and I shall be looking forward to receiving a copy of it. Let me say again what a pleasure it was working with you on this, it marks one of the highlights of my polygraph work this year.

Sincerely,

MAXINE RIEGER.

NORFOLK, VA., March 9, 1962.

ARRANGEMENTS

At the request of Dr. H. B. Dearman, of the University of Virginia Hospital, Charlottesville, Va., _____ was examined on the polygraph, a detection of deception technique. He was examined for the purpose of determining his physiological reactions on the polygraph to certain questions prepared and numbered in advance by Dr. Dearman and unknown to the polygraph examiner prior to the test.

After surveying the list of questions the polygraph examiner requested permission of Dr. Dearman to obtain some additional irrelevant questions directly from _____ so as to follow routine polygraph procedure in the questioning technique. Permission was granted and the following irrelevant questions were asked, with the accompanying information that was obtained:

What is your age?—27 years.

What is the date of your birth?—March 11, 1934.

What is the place of your birth?—_____.

What education do you have?—B.A. degree in English.

Where do you live at present?—_____.

After the first test, the polygraph examiner consulted briefly with Dr. Dearman outside the polygraph room and asked permission to add two control questions:

16. Do you have any intentions of trying to lie to me during this test?

50. Have you deliberately lied to any of these questions?

Permission was also granted to discuss a couple of the questions from the first test briefly with _____. The questions and his answers are stated below:

6. Do you know anyone who has been stealing money from the _____ branch or its customers?

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Answer. He knew _____ who worked in the _____ branch of the bank, who had placed 25 cents left by a customer in an envelope and when the customer returned later neither _____ or he could locate the money—it was missing from the envelope. This incident was the only thing that came to his mind when asked this question—and he wondered who could have taken the 25 cents.

12. Have you ever stolen any money from the customers of the bank other than your wife or mother?

Answer: The thought occurred to him he might have stolen something from his mother as a child and couldn't recall it at this moment.

The examiner informed _____ that in the second test she would rephrase questions 6 and 12 with the expression "With the exception of what you just told me" so as to be sure they had made allowances for the information already obtained in the discussion following the first test.

_____ remarked at this time that every time a question had been asked by the examiner during the first test, he had felt as though he couldn't breathe. The examiner rechecked his pneumograph chest tube, and he remarked it had not felt too tight during the test.

CONCLUSIONS

It is the opinion of the examiner, Maxine Bell Rieger, that had interrogation been permitted, it would have been conducted on the following relevant questions which showed such specific reactions indicative of deception:

FIRST TEST

6. Do you know anyone who has been stealing money from the _____ branch or its customers?

7. Have you ever stolen any money from the bank or its customers?

12. Have you ever stolen any money from the customers of the bank other than your wife or mother?

14. Have you in fact stolen any money from the customers of the bank?

SECOND TEST

a-6. With the exception of what you just told me, do you know anyone who has been stealing money from the _____ branch or its customers?

7. Have you ever stolen any money from the bank or its customers?

11. Have you ever stolen any money from the customers of the bank?

14. Have you in fact stolen any money from the customers of the bank?

10. Have you ever stolen any money from the bank? (A delayed reaction to this question shows some reflective thought that should be investigated through interrogation.)

MAXINE BELL RIEGER,
Polygraph-Examiner.

FIRST TEST

1. Is your first name _____?

Blood pressure, pulse: negative.

Breathing pattern: negative.

Sweat gland activity: negative.

Conclusion:

() Specific reaction indicative of deception without verification through interrogation.

(X) No specific reaction indicative of deception.

2. Do you live in the State of _____?

Blood pressure, pulse: negative.

Breathing pattern: positive.

Sweat gland activity: negative.

Conclusion:

() Specific reaction indicative of deception without verification through interrogation.

(X) No specific reaction indicative of deception.

6. Do you know anyone who has been stealing money from the _____ branch of its customers?

Blood pressure, pulse: positive; (strong).

Breathing pattern: positive.

Sweat gland activity: positive.

Conclusion:

(X) Specific reaction indicative of deception without verification through interrogation.

() No specific reaction indicative of deception.

40. Are you 27 years old?

Blood pressure, pulse: negative.

Breathing pattern: positive.

Sweat gland activity: positive.

Conclusion:

(X) Specific reaction indicative of deception without verification through interrogation.

() No specific reaction indicative of deception.

7. Have you ever stolen any money from the bank or its customers?

Blood pressure, pulse: Positive.

Breathing pattern: Positive.

Sweat gland activity: Negative.

Conclusion:

(X) Specific reaction indicative of deception without verification through interrogation.

() No specific reaction indicative of deception.

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8. Have you ever kept any cash overages?
 Blood pressure, pulse: Negative.
 Breathing pattern: Negative.
 Sweat gland activity: Negative.
 Conclusion:
 Specific reaction indicative of deception without verification through interrogation.
 No specific reaction indicative of deception.
41. Do you have a B.A. degree in English?
 Blood pressure, pulse: Negative.
 Breathing pattern: Negative.
 Sweat gland activity: Negative.
 Conclusion:
 Specific reaction indicative of deception without verification through interrogation.
 No specific reaction indicative of deception.
10. Have you ever stolen any money from the bank?
 Blood pressure, pulse: negative.
 Breathing pattern: negative.
 Sweat gland activity: negative.
 Conclusion:
 Specific reaction indicative of deception without verification through interrogation.
 No specific reaction indicative of deception.
11. Have you ever stolen any money from the customers of the bank?
 Blood pressure, pulse: negative.
 Breathing pattern: negative.
 Sweat gland activity: negative.
 Conclusion:
 Specific reaction indicative of deception without verification through interrogation.
 No specific reaction indicative of deception.
42. Were you born in 1934?
 Blood pressure, pulse: negative.
 Breathing pattern: negative.
 Sweat gland activity: negative.
 Conclusion:
 Specific reaction indicative of deception without verification through interrogation.
 No specific reaction indicative of deception.
12. Have you ever stolen any money from the customers of the bank other than your wife or mother?
 Blood pressure, pulse: Positive (strong).
 Breathing pattern: Positive.
 Sweat gland activity: Positive.
 Conclusion:
 Specific reaction indicative of deception without verification through interrogation.
 No specific reaction indicative of deception.
13. Have you in fact stolen any money from your wife or mother?
 Blood pressure, pulse: Negative.
 Breathing pattern: Negative.
 Sweat gland activity: Negative.
 Conclusion:
 Specific reaction indicative of deception without verification through interrogation.
 No specific reaction indicative of deception.
43. Is your birthday March 11?
 Blood pressure, pulse: Negative.
 Breathing pattern: Positive.
 Sweat gland activity: Negative.
 Conclusion:
 Specific reaction indicative of deception without verification through interrogation.
 No specific reaction indicative of deception.
14. Have you in fact stolen any money from the customers of the bank?
 Blood pressure, pulse: Positive (strong).
 Breathing pattern: Positive.
 Sweat gland activity: Positive.
 Conclusion:
 Specific reaction indicative of deception without verification through interrogation.
 No specific reaction indicative of deception.
3. Do you drink coffee?
 Blood pressure, pulse: Positive.
 Breathing pattern: Positive.
 Sweat gland activity: Negative.
 Conclusion:
 Specific reaction indicative of deception without verification through interrogation.
 No specific reaction indicative of deception.
9. Are you withholding any information necessary to the prevention of theft

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from the bank?

Blood pressure, pulse: Negative.
Breathing pattern: Negative.
Sweat gland activity: Negative.
Conclusion:

Specific reaction indicative of deception without verification through interrogation.

No specific reaction indicative of deception.

4. Do you smoke cigarettes?

Blood pressure, pulse: Negative.
Breathing pattern: Positive.
Sweat gland activity: Negative.
Conclusion:

Specific reaction indicative of deception without verification through interrogation.

No specific reaction indicative of deception.

45. Is today Wednesday?

Blood pressure, pulse: Negative.
Breathing pattern: Negative.
Sweat gland activity: Negative.
Conclusion:

Specific reaction indicative of deception without verification through interrogation.

No specific reaction indicative of deception.

SECOND TEST

1. Is your first name _____?

Blood pressure, pulse: Positive.
Breathing pattern: Negative.
Sweat gland activity: Negative.
Conclusion:

Specific reaction indicative of deception without verification through interrogation.

No specific reaction indicative of deception.

2. Do you live in the State of _____?

Blood pressure, pulse: Negative.
Breathing pattern: Positive.
Sweat gland activity: Negative.
Conclusion:

Specific reaction indicative of deception without verification through interrogation.

No specific reaction indicative of deception.

16. Do you have any intentions of trying to lie to me during this test?

Blood pressure, pulse: Positive.
Breathing pattern: Positive.
Sweat gland activity: Negative.
Conclusion:

Specific reaction indicative of deception without verification through interrogation.

No specific reaction indicative of deception.

4. Do you smoke cigarettes?

Blood pressure, pulse: Negative.
Breathing pattern: Positive.
Sweat gland activity: Positive.
Conclusion:

Specific reaction indicative of deception without verification through interrogation.

No specific reaction indicative of deception.

a-6. With the exception of what you just told me, do you know anyone who has been stealing money from the _____ branch or its customers?

Blood pressure, pulse: Positive (strong).
Breathing pattern: Positive.
Sweat gland activity: Positive.
Conclusion:

Specific reaction indicative of deception without verification through interrogation.

No specific reaction indicative of deception.

7. Did you ever steal any money from the bank or its customers?

Blood pressure, pulse: Positive (strong).
Breathing pattern: Positive.
Sweat gland activity: Positive.
Conclusion:

Specific reaction indicative of deception without verification through interrogation.

No specific reaction indicative of deception.

40. Is your birthday March 11?

Blood pressure, pulse: Positive.
Breathing pattern: Negative.
Sweat gland activity: Negative.
Conclusion:

Specific reaction indicative of deception without verification through interrogation.

No specific reaction indicative of deception.

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8. Have you ever kept any cash overages?
 Blood pressure, pulse: Negative.
 Breathing pattern: Positive.
 Sweat gland activity: Negative.
 Conclusion:
 Specific reaction indicative of deception without verification through interrogation.
 No specific reaction indicative of deception.
10. Have you ever stolen any money from the bank?
 Blood pressure, pulse: Delayed, positive.
 Breathing pattern: Positive.
 Sweat gland activity: Negative.
 Conclusion:
 Specific reaction indicative of deception without verification through interrogation.
 No specific reaction indicative of deception.
5. Do you know how to drive an automobile?
 Blood pressure, pulse: Negative.
 Breathing pattern: Negative.
 Sweat gland activity: Negative.
 Conclusion:
 Specific reaction indicative of deception without verification through interrogation.
 No specific reaction indicative of deception.
11. Have you ever stolen any money from the customers of the bank?
 Blood pressure, pulse: Positive (strong).
 Breathing pattern: Positive.
 Sweat gland activity: Negative.
 Conclusion:
 Specific reaction indicative of deception without verification through interrogation.
 No specific reaction indicative of deception.
45. Do you have a B.A. degree in English?
 Blood pressure, pulse: Positive.
 Breathing pattern: Negative.
 Sweat gland activity: Negative.
 Conclusion:
 Specific reaction indicative of deception without verification through interrogation.
 No specific reaction indicative of deception.
- a-12. With the exception of what you just told me, have you ever stolen any money from the customers of the bank other than your wife or mother?
 Blood pressure, pulse: Negative.
 Breathing pattern: Positive.
 Sweat gland activity: Negative.
 Conclusion:
 Specific reaction indicative of deception without verification through interrogation.
 No specific reaction indicative of deception.
13. Have you in fact stolen any money from your wife or mother?
 Blood pressure, pulse: Negative.
 Breathing pattern: Positive.
 Sweat gland activity: Negative.
 Conclusion:
 Specific reaction indicative of deception without verification through interrogation.
 No specific reaction indicative of deception.
48. Are you 27 years old?
 Blood pressure, pulse: Positive.
 Breathing pattern: Negative.
 Sweat gland activity: Negative.
 Conclusion:
 Specific reaction indicative of deception without verification through interrogation.
 No specific reaction indicative of deception.
14. Have you in fact stolen any money from the customers of the bank?
 Blood pressure, pulse: Positive (strong).
 Breathing pattern: Positive.
 Sweat gland activity: Negative.
 Conclusion:
 Specific reaction indicative of deception without verification through interrogation.
 No specific reaction indicative of deception.
49. Were you born in _____?
 Blood pressure, pulse: Negative.
 Breathing pattern: Positive.
 Sweat gland activity: Negative.
 Conclusion:
 Specific reaction indicative of deception without verification through interrogation.
 No specific reaction indicative of deception.
50. Have you deliberately lied to any of these questions?
 Blood pressure, pulse: Positive (strong).
 Breathing pattern: Positive.
 Sweat gland activity: Negative.
 Conclusion:
 Specific reaction indicative of deception without verification through interrogation.
 No specific reaction indicative of deception.

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9. Are you withholding any information necessary to the prevention of theft from the bank?

Blood pressure, pulse: Positive.

Breathing pattern: Positive.

Sweat gland activity: Negative.

Conclusion:

(X) Specific reaction indicative of deception without verification through interrogation.

() No specific reaction indicative of deception.

EXHIBIT 21A—MEMORANDUM FOR THE RECORD—PLANNING CONFERENCE ON TRUTH DEMONSTRATION TECHNIQUES MINUTES OF MEETING HELD ON JUNE 9, 1961, BY HERBERT POLLACK AND JESSE ORLANSKY, JULY 3, 1961

PLANNING CONFERENCE ON TRUTH DEMONSTRATION TECHNIQUES

Minutes of meeting, June 9, 1961

The meeting was called to order at 9:30 a.m. by the chairman, Dr. Ralph Gerard, with the following participants in attendance:

Stephen Aldrich	Joseph Kubis	Kent K. Parrott
Albert F. Ax	John I. Lacey	Herbert Pollack
Lewis C. Bohn	David T. Lykken	Orr Reynolds
Charles W. Bray	Donald Michael	David Rhodes
Leonard J. Duhl	J. Mooney	John A. Talbot
John Ford	Lihwood Murray	Marion A. Wenger
Ralph Hardin	Jay Orear	
Marshall Heyman	Jesse Orlansky	

The chairman said that the purpose of the meeting was to discuss the possible application of lie detection techniques as one means of inspection to enforce arms control agreements and also as a means of demonstrating the truthful intent of participants in negotiations. The meeting would be unclassified and only publicly available information would be discussed.

The following agenda was presented to the group:

1. Technical aspects:
 - Instrumentation.
 - Procedures.
 - Interpretation.
2. Political aspects:
 - Feasibility.
 - Appropriate channels.
 - Procedures.
3. Further steps.

The first topic to be discussed was instrumentation, of which the main purpose is the "objective" measurement of emotions. Up to some point, the interpretation of emotions improves as more variables are recorded and measured. The most useful variables are those which can be measured most accurately, such as the galvanic skin response, heart rate, pulse and blood pressure, etc., and which, of course, correlate highly with the emotional state of the subject. The interpretation of recordings with many variables requires sophisticated statistical procedures and the use of a computer. Attempts have been made to identify the most discriminating variables. There was some disagreement about the conclusion that one could identify specific emotions, such as anger or fear, by the pattern of automatic responses. It was felt that this type of identification is still a preliminary phase.

A distinction was made between "lie detection" and the "detection of guilty knowledge." The first assumes that lying involves a specific emotional arousal and that it can be detected by measuring autonomic responses. The second assumes that knowledge of guilty information is available only to the participants of a crime and therefore that a unique pattern of autonomic responses can exist only for those who possess guilty information. The use of the galvanic skin response alone has been sufficient to detect 100 percent of those who had guilty knowledge in an experiment involving students.

Much discussion was concerned with the relation between autonomic response and specific emotional states. The autonomic responses upon which lie detection depends would be influenced markedly by the context of particular words and the word habits of the individual. In one study, words with low response uncertainties gave low GSR responses, whereas words with high response uncertainties gave high GSR responses. An individual with multiple responses available to a given word tended to give GSR reactions of a highly emotional type.

The discussion continued on the techniques of how different liars lied, and on the patterning of the autonomic variables. Although there may not be a typical pattern of autonomic responses indicative of lying in general, nevertheless each individual may exhibit a consistent pattern of responses whenever he lies. From this came the concept that it might be possible to establish a man's normal responses as a basis for judging whenever he lies; this was called "titrating the man."

An individual's social role, such as chief of state, may create a situation in which it is his duty to lie and, as such, lead him not to exhibit any emotional response connected with lying. In dealing with a chief of state, the general conclusion was that subjective inference of intent would probably override any "objective" evidence collected by polygraph methods. The evaluation of false negative and false positive responses would have to be taken into account.

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Countermeasures to the use of lie detection techniques were also discussed. The existence of many false positive reactions would undermine the lie detection technique. Several possible countermeasures were considered:

(a) The "Hindu" system of going into a trance may make the person oblivious to stimuli.

(b) The deliberate use of muscular tension can introduce irrelevant responses into the recording techniques.

(c) The development of an exciting image within the subject's own imagination could confuse the recording to a very large extent.

Thus, there are many ways of contaminating the responses and of increasing the difficulty of interpretation. However, the use of such countermeasures could be detected and thus the operator would be alerted to take corrective measures. The validity of the polygraph recordings depends upon the operator's ability to identify such sources of error and on the suspect's ability to induce spurious reactions which would not be noticed. The role of drugs in stripping an individual of his resistance and of altering his responsiveness was discussed very briefly. It was concluded that the use of drugs is merely an adjunct to the interrogation and measurement process. Though it may have some value, great care must be used in interpreting the results.

The discussion then moved over to political aspects in the use of lie detection techniques. Final proof of an attempt to circumvent an arms control agreement would require physical evidence. Hence, even lie detection techniques of low reliability may be acceptable if they are used to indicate a reason to search. There was a short discussion on the influence of anxiety on the individual's selected at random to represent a typical sample of scientists or political figures by methods similar to those used in questionnaire or public opinion surveys. It was considered possible that the Communists might limit the knowledge of nuclear tests to platoons or cells, as the Communist countries call them, as a means of evading nonphysical detection techniques. Clearly, an individual would not react to a lie detection technique if he did not have any guilty knowledge.

Three questions were asked but not answered in the discussion: Is the technique scientifically valid? Is it socially acceptable? Is it politically acceptable? There was a short discussion on the influence of anxiety on the individual's autonomic responsiveness, on the stabilization of the cardiovascular and vasomotor response with different age groups, and of their effects on this type of recording.

The guilty knowledge technique rests on the assumption that a guilty person will show some involuntary physiological responses to stimuli related to remembered details of his crime. If the crime is such that the investigator can discover a number of factual details with which only the guilty person should be familiar, then the guilty knowledge method can be used. The guilty knowledge items are interspersed with other similar but irrelevant items in a stimulus list. In a test ban agreement, the examiner could use a preliminary interview method to establish the details for which he would be looking in a guilty knowledge test and thereby help him search for knowledge of new weapons, with unknown characteristics, not included in a test ban agreement.

The final part of the session was concerned with future planning. The group developed the following research concepts, listed without regard to order of importance.

1. Lie detection instrumentation and techniques should be reevaluated under real field conditions.
2. Multiple variables must be chosen very carefully and only the most critical ones should be used. These were considered to be changes in respiration, muscle tension, skin resistance, cardiovascular and vasomotor reactions, and eye motion.
3. Research should be undertaken to examine the influence of a person's social and political role upon his autonomic responses.
4. Attention should be paid to the use of corneal reflections to measure the direction in which the eye is looking, as pointed out by R. C. Davis in 1958.
5. Electroencephalograms may possibly be used if sufficient research is done to understand the meaning of the phase changes.
6. Improved techniques for automatic data recording and processing are important in the evaluation of multiple recordings.
7. Equipment should be miniaturized in order to make it more portable and reliable.
8. Work should be conducted on "bugs" in a lie detection system, such as false positives and false negatives.
9. The cost-effectiveness of nonphysical and physical inspection concepts should be compared with the knowledge that they may be complementary rather than redundant.
10. Evaluation of the social acceptability of lie detection techniques is most desirable, both in our own, as well as in foreign cultures. When dealing with people from other cultures, other variables are introduced beside the subject and interrogator. These are the interpreter, the semantic differential associated with words used in the interview and the unknown social sensitivity of the individual to the test procedure. All of this must be studied if we wish to use lie detection in other cultures.
11. While it would be desirable to develop a technique which automatically gives evidence of a lie, it is conceivable that pattern reading would also be acceptable.
12. It was considered desirable to study collective or group lying.
13. Reliability checks are desirable for comparing the performance of several interrogators on the same subject or test material.

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14. Further work must be done to determine the actual existence of pathological liars, and to evaluate the extent to which test records can be contaminated by such people.

15. What means, such as drugs, hypnosis, special equipment or special psychological procedures can be used deliberately to introduce spurious effects into test records.

16. A study should be made, perhaps using public opinion techniques to examine how people in the street would react to questions concerning their possible knowledge of secret work on arms development or on weapons testing. This is in recognition of the fact that the technical questions involved are only one phase of a major sociological and political problems.

17. Further work is required to study by physiological or other means whether it is possible to detect an intention to act in the future.

There was some discussion about the possibility of creating an international research group, including the United States, U.S.R.R., and other countries to explore and improve these techniques for mutual interest.

The meeting ended with the affirmation that lie detection techniques had sufficient merit to warrant their consideration as part of an inspection scheme for an arms control agreement and, possibly, for application as a truth demonstration device in political negotiations.

EXHIBIT 21B—MEMORANDUM TO THE FILE ON LIE DETECTION—MINUTES OF A MEETING, AUGUST 9, 1961

Topic:

Research to improve the objective measurement of autonomic responses for use in lie detection, July 20 and 21, 1961.

Institute for Defense Analyses, Research and Engineering Support Division, Washington, D.C.

Attendees:

Albert F. Ax.
Lewis Bohn (July 20).
Chester Darrow.
Ralph Gerard, Chairman (July 20).
John I. Lacey.
David C. Lykken.
Martin T. Orne.
Jesse Orlandsky (Chairman on July 21).
Herbert Pollack.

MINUTES

Since the last meeting it was planned to have four small meetings dealing respectively with the problem of inspection, the instrumentation of lie detection, the interview aspects of lie detection, and the diplomatic and political uses of lie detection. Further, the use of this technique in various agencies will be examined. The meeting on inspection took place on July 19, 1961, and led to the conviction that behavioral inspection (nonphysical inspection) offers a number of major advantages and does not have the serious deficiencies of the physical testing methods and that therefore it is definitely worthwhile to explore further on the state and improbability of the art.

Various autonomic responses may be used as measures of emotional state for the purpose of lie detection. There is some basis for dividing autonomic responses into those associated with attention which would be primarily cortical and might involve such responses as the GSR, and into those associated with guilty knowledge, which are primarily subcortical and might involve such responses as blood pressure. This dichotomy is by no means sharp and there is evidence that a fallen heart rate might be the most sensitive indicator of attention changes. Further, defense in the sense of social guilt is not entirely the same as defense at the physiological level of injury. Another dichotomy is suggested in terms of the instrumental situation: those which are analog or voltage measurements, and those which are time measurements. Since time measurements are easy and precise, and since it is possible to convert voltage measurements into time ones, this may be an important methodological consideration. In general, responses which are close to the basic physiological changes, which are relatively rapid, and which do not adapt out rapidly in repeated testing, would be relatively preferred; blood flow is a good indicator for these reasons.

A final dichotomy is in terms of responses which could be used on large scale field testing with great numbers of subjects, and those which would be practicable only under more limited use with very special subjects and better working conditions.

The following autonomic responses were considered especially useful:

Blood pressure: This may be feasible only under limited conditions.
Breathing rate and pattern.
GSR, especially palmar sweating.
Pulse volume, pulse rate, or pressure, depending upon the instrumental choice (photoelectric, impedance, and pressure transducers).
Velocity of pulse wave.
Systolic and diastolic blood pressure (may be available only under limited conditions).
Frontalis muscle tension and muscle potential peaks (probably only under limited conditions, unless converted from voltage into time measures).
Finger tremor (limited conditions).
Gastrointestinal reactions, using a telemeter capsule (this would need investigation).

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Ocular movements (especially for observing whether attention is directed to one position or another on a map, but also in many other general situations).
 EEG (especially phase differences, using a minimal five lead cap).
 Reaction time (especially latency of verbal and autonomic responses to a given verbal stimulus).
 Ballistocardiograph (or the ankle accelerometer).
 Blood oxygen concentration (ear oximeter).

In all these there is, besides the immediate response value, the possibility of long-range shifts in baselines associated with a progressive shift in emotional state, such as the anxiety level. Some of the measures might be especially useful in this latter case.

Research should be undertaken in two directions. The first would involve laboratory testing of multisensor, multichannel systems to discover what valuable information could be obtained from patterns and combinations of autonomic responses. This involves data digitalization and the use of computers for data processing. The second involves field trials with a limited, well-established group of measurements, such as GSR, pulse, respiration pattern and rate, and relative blood pressure. This should also be done to test automatic data processing as far as possible. The field tests might involve actual work with police groups and an established criminal population, with student populations under the stress of examinations, with any group willing to accept severe punishment for being caught and a considerable monetary reward for participating, a "genuine" test such as hiding an ICBM and interrogating the groups that might have done it, and the like.

The kinds of tests should include straight lie detection, guilty knowledge detection, and zeroing in on a location or some other attribute beyond the knowledge of the interrogator. There is disagreement as to whether these methods involve different psychological processes or whether different physiological responses occur, or whether the difference is a matter of degree of attention and emotional involvement; but there is no disagreement that there would be a methodological difference both in the measurements and the interrogation procedure, depending on what one was after.

Telemetering with sensors on the body is now quite practicable. Some measurements could be made without any body attachments, such as skin temperature, respiration patterns and rate, eye movements, and possibly pulse rate by measuring the ballistic action of the body.

An additional measure suggested after the first list is the Luria technique, which involves squeezing a bulb with one hand while maintaining the other steady. This seems to measure general level of emotionality or anxiety. Further, for field work, the data should be recorded on magnetic or paper tape and the question arose as to whether the interrogator should or should not have the responses of the subject before him. For many purposes, a pretaped interrogation could be used, for others not.

The questions of kinds of situations to use in examining the polygraph technique was discussed at length, especially the transfer from the artificial lie situation of the laboratory to real life. While it was agreed that the differences which seemed to be of kind might actually be only of degree (involving response, curves of different slope) nonetheless various measures are better indicators in one case than in another. The questions of experimental design, of field testing and of laboratory testing, therefore, need special scrutiny.

On the question of titrating or calibrating the individual, despite considerable detailed disagreement, there was a general consensus that certain initial test examinations would be valuable. For one thing, one could measure general reactivity and perhaps exclude certain individuals as unsatisfactory for the detailed examination. For another, one can get an idea of the general reactivity of different indicators for a particular individual. This may help the judgment as to the validity of the subsequent examination without necessarily indicating what the results of the examination would be. There was also some disagreement on the use of different stressors, different modes of stressing, the use of different methods of interrogation for lying, the validity of transferring from artificial to real life responses and the like. Some of the specific stressors that have been considered are various drugs, cold, pain, sensory isolation, and different sorts of interview situations. Drugs, pain, or sensory deprivation might also be used as sensitizers to potentiate or magnify autonomic responses to the test situations. Here is clearly one area of research.

The multiphasic personality inventory or other paper and pencil tests might also be used to calibrate the individual. Although these could easily be "faked," the mere relation of responses on these to the polygraph findings would give evidence of the use of countermeasures. The point was reemphasized that some of these preliminary tests might be highly important in indicating the degree of validity of the actual tests from individual to individual.

There was general agreement that test stimuli and judgments should be as objective as possible. Photographs or movies could be used as a stimulus situation while moving pictures of the subject could be used as an indicator of the response. It is a matter for research as to whether the polygraph response to the possession of guilty knowledge will be alike or different to that of lying, depending upon the mood and other conditions under which the subject is tested. For example, will a man who is telling a lie to benefit himself react the same way when he is telling a lie as a patriotic duty to his country?

The use of corneal reflections, retinal potential measurements, or the Macworth camera was discussed to tell what a person is looking at and how important it is to him.

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There seems to be less concern with false negatives than with false positives. False negatives are relatively unimportant when a considerable number of persons who might be presumed to have guilty knowledge are examined. False positives are regarded as more dangerous and reprehensible in the courts. There seems a reasonable chance that false positives could be rendered very rare by such techniques as: the use of multiple measurements, modifying the responsiveness of the subject with drugs (excitatory or depressed), repetition of tests, further exploration in detail of dubious responses, and the like. False negatives involve physiological lowering of activity (this might be overcome by drugs or prestressing); cultural unreactivity (this could be tested by investigating enough individuals of different cultures); or habitual lying (which could be tested by deliberate training studies, by working with trained individuals, and perhaps by selecting extreme personality types). Hypnotic and posthypnotic examination might be helpful in getting at this.

There was a discussion of amnesia, pathological lying, hypnotic amnesia, and the like. Possibly one could detect knowledge of which a person was unaware (or as to the source of which he was unaware) by the guilty knowledge procedures, even if not by straight lie detection. Research in this area is certainly possible, not only on "diplomats" but on "con-men" and "Madison Avenue" types.

On countermeasures and evasion, it is possible to recognize induced unreactivity (auto suggestion) as well as overactivity. Either of these may be detected because of abnormality in the overall record. Another type of evasion in which, as a result of specific training or conditioning, the individual is able to suppress knowledge of particular guilt areas might be a much more difficult problem. This is a matter for strength. One should distinguish between the possibility of knowing one is lying and still not giving an autonomic response from the possibility of actual suppression of lying associated with no autonomic response.

In connection with cultural and role effects, it is recognized that not only attitudes toward lying must be examined and allowed for, but also the meanings of words, the cultural usages, gestures, and the whole communication matrix. This may involve the need of linguistic experts.

Discussion of the detection of intentions went in two directions. On the one hand, it should be possible to ask questions in such a way that past events which would necessarily precede preparation for future acts are examined. On the other hand, the question arose as to whether intents are in a sense more pallid and, therefore, less likely to exhibit polygraphic responses than actually executed acts. This may be the case but it may even be the reverse, because the responses may be a measure not directly of intensity of emotion but of the range of available responses to a given individual and situation. For example, one can be more excited about a discussion of who one will vote for than who one did vote for.

Lie detection techniques may be applied to the following situations, each of which may possess some unique characteristics:

Guilt screening by police.

Arms control:

- On a population sample.
- On elite figures, e.g., politicians, scientists, industrialists,
- On top leaders.

Security screening and rescreening.

Diplomacy.

Business credit and pilfering investigations.

Legal applications.

Psychophysiological research.

Research on the following topics was considered desirable:

1. Replicate R. C. Davis' study on repeated trials with the GSR; he found greater success on second trials whereas the opposite is found in police work.
2. Develop a taxonomy and theory of lying; significant parameters probably include degree of perceived threat to the individual, the degree of guilt (or shame) and the relation of the lying response to group identity.
3. Experiments on lying, trying to generalize from one situation to another; e.g., try deliberately to "beat" the lie detection machine; try (by lying) to convince another person in the experiment that one is telling the truth.
4. Experiment on the guilty knowledge technique; e.g., manipulate the extent to which the experimenter has complete knowledge of the guilty information; and the extent to which the "guilty" group has complete or partial guilty data.
5. Group experiments on lying; e.g., poker and bridge, an individual lying alone or in the service of a group; perhaps the autokinetic effect experiment can be adapted to such use.
6. Experiments on "training" the autonomic response; either to respond or to inhibit at will, in role-playing situations, with and without a feedback of polygraph data to the subject.
7. Experiments on the effect of repetition on autonomic response.
8. Experiments on the possible value of hypnosis and drugs to reduce the anxiety of subjects.

The following brief summary was made at the end of the meeting:

1. Increase the number of autonomic responses measured in studies of guilty knowledge and lie detection, coupled with computer data processing, as appropriate.
2. Study the effect of situational variables and of information feedback on autonomic responses.
3. Extend multiple recordings in police work to include skin temperature, plethysmograph and reliable GSR and blood pressure measures.
4. Examine the effect of drugs and hypnosis on autonomic responses.
5. Examine the extent to which differences exist between subjects, with persistent stereotyping of responses for individuals.
6. Field trials are most desirable, including measures of the lie detection ability of professional practitioners.

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LIST OF ATTENDEES

Dr. Albert F. Ax, director, Psychophysiology Laboratory, Lafayette Clinic, 951 East Lafayette, Detroit, Mich.
 Dr. Lewis C. Bohm, Lockheed Electric Co., Systems Research Center, 78 Ocean Way, Santa Monica, Calif.
 Dr. Chester Darrow, Institute for Juvenile Research, University of Illinois, Chicago, Ill.
 Dr. Ralph Gerard, Mental Health Research Institute, University of Michigan, Ann Arbor, Mich.
 Dr. John I. Lacey, Department of Psychophysiology-Neurophysiology, Fels Research Institute, Yellow Springs, Ohio.
 Dr. David C. Lykken, Department of Psychiatry and Neurology, the Medical School, University of Minnesota, Minneapolis, Minn.
 Dr. Martin T. Orne, Massachusetts Mental Health Center, 74 Fenwood Road, Boston, Mass.
 Dr. Jesse Orlansky, Institute for Defense Analyses, 1825 Connecticut Avenue NW., Washington, D.C.
 Dr. Herbert Pollack, Institute for Defense Analyses, 1825 Connecticut Avenue NW., Washington, D.C.

Exhibit 22A—Material supplied by Dr. H. B. Dearman in response to a request by Congressman John E. Moss

MARCH 9, 1962.

To Dr. H. B. DEARMAN.

Arrangements: At the request of Dr. H. B. Dearman of the University of Virginia Hospital, _____ was examined on the polygraph, a detection of deception technique. He was examined for the purpose of determining his physiological reactions on the polygraph to certain questions prepared in advance by Dr. Dearman and unknown to the polygraph examiner prior to the test.

Procedure: On February 28, 1962, _____ was examined in a private room in the University of Virginia Hospital with only the examiner, Maxine Bell Rieger, and _____ present. Dr. H. B. Dearman observed the examination in an adjoining room through a two-way mirror. The polygraph examination itself consisted of the following:

A blood pressure bladder and cuff was wrapped around the upper part of his left arm with the bladder centered over his brachial artery. The bladder was inflated to a point approximating the arithmetic mean blood pressure, or midway between his systolic and diastolic blood pressure for the purpose of recording a continuous indication of his pulse rate, pulse wave amplitude, relative blood pressures and variations therein.

A corrugated rubber tube was fastened around _____ chest for the purpose of recording a continuous indication of his respiratory pattern and variations therein.

An insulated seating for two protruding electrodes was fitted on his right hand for the purpose of recording a continuous indication of his sweat gland activities and variations therein.

He was instructed to sit still, keep both feet flat on the floor, avoid unnecessary movements during the running of the tests and to answer each of the questions with the single word, "yes," or "no."

A Keeler polygraph, serial number 6303, to which the above accessories were attached was then activated in accordance with standard procedure, thus initiating the continuous and simultaneous recordings described above.

The following questions were submitted to the polygraph examiner by Dr. H. B. Dearman:

1. Is your first name _____?
 2. Do you live in the State of _____?
 3. Do you drink coffee?
 4. Do you smoke cigarettes?
 5. Do you know how to drive an automobile?
 6. Do you know anyone who has been stealing money from the _____ branch or its customers?
 7. Have you ever stolen any money from the bank or its customers?
 8. Have you ever kept any cash overages?
 9. Are you withholding any information necessary to the prevention of theft from the bank?
 10. Have you ever stolen any money from the bank?
 11. Have you ever stolen any money from the customers of the bank?
 12. Have you ever stolen any money from the customers of the bank other than your wife or mother?
 13. Have you in fact stolen any money from your wife or mother?
 14. Have you in fact stolen any money from the customers of the bank?
- After surveying the list of questions the polygraph examiner requested permission of Dr. Dearman to obtain some additional irrelevant questions directly from _____ so as to follow routine polygraph procedure in the questioning technique. Permission was granted and the following irrelevant information was obtained:

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Age: 27 years.
Date of birth: March 11, 1934.
Place of birth: _____
Education: B.A. degree in English.
Present address: _____

In the beginning of each of the tests irrelevant questions were first asked for the purpose of indicating the subject's normal tracing plus excitement with verbal stimulus, and then through the balance of each of the tests relevant questions submitted by Dr. Dearman were interspersed with the irrelevant questions for the purpose of indicating any significant changes from _____ normal tracing plus excitement level with stimulus when asked questions concerning the object of the examination compared with his normal tracing plus excitement level with verbal stimulus not pertaining directly to the object of the examination. At the beginning of each test there was an "announcement of test beginning" indicated on the polygrams with two X's, and at the conclusion of each test there was an "announcement of test ending" indicated on the polygrams with two X's.

FIRST TEST

The following questions were asked on the first polygram in the following sequence:

- Sit perfectly still, keep your feet flat on the floor, look straight ahead, answer all my questions with "yes" or "no"; the test is about to commence.
1. Is your first name _____?
 2. Do you live in the State of _____?
 6. Do you know anyone who has been stealing money from the _____ branch or its customers?
 49. Are you 27 years old?
 7. Have you ever stolen any money from the bank or its customers?
 8. Have you ever kept any cash overages?
 41. Do you have a B.A. degree in English?
 10. Have you ever stolen any money from the bank?
 11. Have you ever stolen any money from the customers of the bank?
 42. Were you born in 1934?
 12. Have you ever stolen any money from the bank?
 13. Have you in fact stolen any money from your wife or mother?
 43. Is your birthday March 11?
 14. Have you in fact stolen any money from the customers of the bank?
 3. Do you drink coffee?
 9. Are you withholding any information necessary to the prevention of theft from the bank?
 4. Do you smoke cigarettes?
 45. Is today Wednesday?

XX. The test is now over and I will soon be releasing the blood pressure cuff.

Mechanical settings on the polygraph at the beginning and ending of test I:
Arithmetic mean blood pressure registered 74.

Galvanograph section of polygraph was on self-center with the reactivity control knob set on No. 1, and the subject's resistance control knob registering 70,000 ohms.

At the conclusion of the test which consisted of 7 minutes, the arithmetic mean blood pressure registered 68.

The galvanograph section's reactivity control was still on No. 1 with the subject's resistance control registering 50,000 ohms.

The pulse rate of _____ during the test was 138 beats per minute.

Chart interpretation of test I:

Question 6. Do you know anyone who has been stealing money from the branch or its customers?

In the cardiophymnograph section of the polygraph pattern there was a rise in the diastolic pressure and a decrease in the systolic pressure with a double bounce occurring 5 and 10 seconds after the initial question stimulus.

In the pneumograph section of the polygraph pattern there was a change in the inhalation-exhalation ratio along with a drop in the apex line of the pneumograph pattern.

In the galvanograph section of the polygraph pattern there was a rise in the pattern.

Question 7. Have you ever stolen any money from the bank or its customers?

In the cardiophymnograph section of the polygraph pattern there was a rise in the diastolic pressure with a partial return and another rise resulting in a double bounce.

In the pneumograph section of the polygraph pattern there was a change in the I-E ratio.

In the galvanograph section of the polygraph pattern there was a slight decrease.

Question 12. Have you ever stolen any money from the customers of the bank other than your wife or mother?

In the cardiophymnograph section of the polygraph pattern there was a sharp rise in the diastolic pressure along with an increase in the systolic pressure. Followed by a partial return to the base line and another slight rise in the diastolic pressure resulting in a double bounce.

In the pneumograph section there was a decided change in the I-E ratio, accompanying a drop in the apex line of the pattern.

In the galvanograph section there was a rise which was sustained throughout the remainder.

Note.—At this point in the test the self-center control in the galvanograph section of the polygraph was changed to normal control, which allowed for a wider range of reaction by the subject.

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Question 14. Have you in fact stolen any money from the customers of the bank?

In the cardiophysgmograph section there was immediately upon asking the question a decided rise in the diastolic pressure with a decided decrease in the systolic pressure. Followed by a partial return to base line and another slight rise in diastolic pressure 13 seconds later, with an accompanying sharp rise in diastolic pressure and decrease in systolic pressure 20 seconds after question stimulus.

In the pneumograph section there was a change in the I-E ratio, and a gradual decline in the apex line of the pattern.

After the first test

The polygraph examiner consulted briefly with Dr. Dearman outside the polygraph room and asked permission to add two control questions:

16. Do you have any intentions of trying to lie to me during this test?

50. Have you deliberately lied to any of these questions?

Permission was also requested to discuss a couple of the questions briefly with ———. Dr. Dearman granted both requests.

Discussion that followed after first test

Question 6. Do you know anyone who has been stealing money from the ——— branch or its customers?

——— was asked by the polygraph examiner what came to his mind upon being asked this question. He replied he was thinking of ——— worked in the ——— branch of the bank, who had taken 25 cents left by a customer on the table, placed it in an envelope with the customer's name on it and when the customer returned later the money was missing from the envelope.

Question 12: Have you ever stolen any money from the customers of the bank other than your wife or mother?

——— remarked that the thought occurred to him that he might have stolen something from his mother as a child and couldn't remember it.

——— remarked at this time that every time a question had been asked by the examiner during the test he had felt as though he couldn't breathe. The examiner rechecked his pneumograph chest tube and he said it had not felt uncomfortable during the test.

The examiner informed ——— that in the second test she would rephrase questions 6 and 12 with the expression—"With the exception of what you just told me" so as to be sure they had made allowances for the information already obtained in the discussion following the first test.

SECOND TEST

The following questions were asked during the second polygraph test in this same series:

Sit perfectly still, keep your feet flat on the floor, look straight ahead, answer all my questions with "yes" or "no" the test is about to commence.

1. Is your first name ———?

2. Do you live in the State of ———?

16. Do you have any intentions of trying to lie to me during this test?

4. Do you smoke cigarettes?

a-6. With the exception of what you just told me, anyone who has been stealing money from the ——— branch or its customers?

7. Did you ever steal any money from the bank or its customers?

40. Is your birthday March 11?

8. Have you ever kept any cash overages?

10. Have you ever stolen any money from the bank?

5. Do you know how to drive an automobile?

11. Have you ever stolen any money from the customers of the bank?

45. Do you have a B.A. degree in English?

a-12. With the exception of what you just told me, have you ever stolen any money from the customers of the bank other than your wife or mother?

13. Have you in fact stolen any money from your wife or mother?

48. Are you 27 years old?

14. Have you in fact stolen any money from the customers of the bank?

49. Were you born in ———?

9. Are you withholding any information necessary to the prevention of theft from the bank?

50. Have you deliberately lied to any of these questions?

The test is now over and I will soon be releasing the blood-pressure cuff.

Mechanical setting on the polygraph at the beginning and ending of test II:

Arithmetic mean blood pressure registered 84 on the sphygmomanometer dial.

The galvanograph section of the polygraph was on normal control with the reactivity control knob set on 80, and the subject's resistance control knob registering 50,000 ohms.

At the conclusion of the test which consisted of 8½ minutes the arithmetic mean blood pressure registered 78 on the sphygmomanometer dial.

The reading of the galvanograph section remained the same.

The pulse rate of ——— during the test was 132 beats per minute.

Chart interpretation of polygram on test II:

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Question 6-6: With the exception of what you just told me, do you know anyone who has been stealing money from the bank or its customers?

In the cardiostereogram section of the polygraph pattern there was a decided rise in the diastolic pressure and a decrease in the systolic pressure for 7 seconds with a rise in the systolic pressure at that time and a continued rise in diastolic pressure which was maintained for 10 seconds.

In the pneumograph section of the pattern there was a decided decrease in the apex line and a change in the I-E ratio.

In the galvanograph section there was a rise immediately upon announcement of test beginning which was sustained throughout the test.

Question 7. Did you ever steal any money from the bank or its customers?
In the cardiostereogram section of the pattern there was a sharp rise in the diastolic pressure immediately upon insertion of question stimulus followed by increase in systolic pressure raising the apex line of the pattern. A partial return to base line with fall in diastolic pressure and followed by rise in diastolic pressure resulting in a triple bounce.

In the pneumograph section of the pattern there was a change in both apex and base line of the pattern, accompanying a change in I-E ratio.

Question 11. Have you ever stolen any money from the customers of the bank?

In the cardiostereogram section there was a drop in the entire pattern to the pen stop at the bottom of the paper.

In the pneumograph pattern there was a drop in the apex line of the pattern, and a change in the I-E ratio.

Question 9-12. With the exception of what you just told me, have you ever stolen any money from the customers of the bank other than your wife or mother?

In the cardiostereogram pattern there was a rise in the diastolic pressure 6 seconds after question stimulus was inserted.

In the pneumograph pattern there was a change in apex and base lines as well as a change in I-E ratio.

Question 14. Have you in fact stolen any money from the customers of the bank?

In the cardiostereogram pattern there was a decided sharp rise in diastolic pressure with a partial return to base line followed by a second rise in diastolic pressure, partial return, third rise, return to base line, and fourth rise in diastolic pressure. There was also an increase in apex line of the pattern.

In the pneumograph pattern there was a drop in the apex line, two apneas, and a change in the I-E ratio.

CONCLUSIONS

_____ was dismissed from the polygraph examination room following the polygraph testing. The polygraph examiner did not interrogate as it was not in the original arrangements with Dr. Dearman to do so.

It is the opinion of the examiner, Maxine Bell Rieger, that had interrogation been permitted it would have been conducted on the following questions which showed such marked physiological reactions on the polygrams of the first and second tests:

6. Do you know anyone who has been stealing money from the _____ branch or its customers?

7. Have you ever stolen any money from the bank or its customers?

11. Have you ever stolen any money from the customers of the bank?

12. Have you ever stolen any money from the customers of the bank other than your wife or mother?

14. Have you in fact stolen any money from the customers of the bank?

MAXINE BELL RIEGER,
Polygraph Examiner.

EXHIBIT 22B—LETTER FROM BURKE SMITH, PH. D., CHAIRMAN, PSYCHOLOGY DEPARTMENT, UNIVERSITY OF VIRGINIA MEDICAL CENTER, TO DR. H. B. DEARMAN, APRIL 23, 1964

UNIVERSITY OF VIRGINIA HOSPITAL,
DEPARTMENT OF NEUROLOGY AND PSYCHIATRY,
Charlottesville, Va., April 23, 1964.

Dr. H. B. DEARMAN,
Johnson City, Tenn.

DEAR H. B.: With regard to your question of whether specific emotions can be identified from polygraph records, I have the following to report. I first consulted one of the physiologists in the medical school who indicated that he knew of no relevant research and that very probably such research would more likely have been done by psychologists rather than by physiologists. This was my opinion, and we had searched the literature in preparation for our paper and found nothing to indicate that emotions could be identified from the polygraph record. I then raised the question with the department's research committee and the consensus of opinion there was essentially the same as indicated above. A couple of people maintained that it might be theoretically possible to identify an emotional response by differential analysis of polygraph records under controlled laboratory conditions, but we were all in agreement that for practical purposes and clinical purposes the techniques were not sufficiently refined. One point that I think should be made is that in life situations it is very rare to experience a pure emotion of fear or rage or love; rather, most of our emotional experiences are mixed. Furthermore it was agreed that individual variations were very probably so great that baselines would have to be established for each subject in a polygraph experiment before attempting to analyze the data.

I also consulted a recent book, "General Experimental Psychology," by Lawrence M. Baker, published by the Oxford University Press, New York, 1960. On page 225, in a chapter entitled "Bodily Changes and Psychological Phenomena," Dr. Baker has the following paragraphs:

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"We do not seem to be ready to attack some of the oldest problems regarding emotion with much hope of success at the present time. There is almost no recent scientific progress that can be pointed to in the matter of differentiating between emotions. Yet, the demands placed upon psychologists to discriminate between such emotions as fear, rage, jealousy, hate, and love continue. Simply asking the individual about his feelings is still a widely used procedure. Studies of bodily changes cannot be said to be very promising at present if we work toward a solution to these particular problems. On the other hand if we make a different approach and look upon emotion as a descriptive term used to denote level of energy mobilization, an aspect of motivation and organization of behavior, we may be able to ask a different set of meaningful questions. Skill in describing and predicting what can be expected of the individual under varying circumstances may in time emerge.

"While it is readily conceded that studying emotions by cataloging bodily changes is not a highly effective one this approach is defended because it appears that we have nothing better at present. To take a defeatist position that we can never understand, predict, or control the phenomenon that has been referred to as emotional or affective behavior in man remains unjustified. Closely tied in with the patterns of emotional complexities are the goals toward which we work in all scientific endeavor. It may well be that part of the difficulty has grown out of the segmenting of emotions into a small part of psychology when the subject matter really permeates all psychological problems. Furthermore, the separation of some of these problems from the general objectives of science and the philosophy of living might be a doubtful procedure. To abandon attempts to comprehend the problems of emotion and motivation is dangerously close to accepting the idea that we can do no better than to proceed blindly toward many of the basic goals which man, for better or worse, is forever setting up for himself.

"However frustrating or futile our attempts to study emotion may seem to be, a decision to abandon all effort in this vital area is unthinkable. Only animals without imagination can live without participating in the events of the past and the future: man can be expected to press toward desired goals, endeavoring to control or to avoid those situations, whether physical or psychological in nature, that threaten his survival or well-being. Intermingled with these strivings are the sensations, feelings, and behavior that have been referred to as emotional, and man will keep trying to understand them."

Sincerely,

BURKE SMITH, Ph. D.,

Chairman of the Psychology Department, University of Virginia Medical Center.

[Journal of Applied Psychology, 1963, vol. 47, No. 6, 408-411]

EXHIBIT 23—EFFECTS OF HEIGHTENED MOTIVATION ON THE DETECTION OF DECEPTION¹

¹The research in this study was supported in part by the Institute for Experimental Psychiatry and by the Mental Health Research Training Program, Harvard Medical School. The authors wish to express their appreciation to Emily Carota Orne for her critical comments in the preparation of this manuscript.

(By Lawrence A. Gustafson and Martin T. Orne, Massachusetts Mental Health Center and Harvard Medical School, Boston)

One of five cards was selected by each S and 2 minutes association to this card was required. GSR response to the selected card was compared to the responses for nonselected cards in 2 groups of Ss. 1 group was motivated to "deceive the operator and withhold responses." The other group was given no special instruction. The hypothesis that Ss who are motivated to deceive will more frequently produce disproportionately large skin resistance responses to critical items as opposed to noncritical items than will Ss who have not been so motivated was upheld. Ss who were motivated to deceive were more successfully detected. In addition detection took place at a much greater than chance level in the motivated group, while in the other group it occurred only at chance levels. The degree of autonomic response to significant stimuli appears to be a function of the motivational state of the S.

The apparent causal relationship between certain classes of verbal stimuli and physiological responses is the basis for the detection of deception by means of a polygraph. While variables which may increase or decrease the number of successful detections are often mentioned, these variables have not been manipulated experimentally.

It has been postulated repeatedly that the factor which produces the physiological response is not lying or guilt per se but rather something relating to the consequences of being detected (Burt, 1921; Chambell, 1929; Marston, 1917). This has been formulated as the punishment, or threat of punishment, theory (Davis, 1961). According to this theory, the greater the consequences of being detected the greater the physiological response will be to the critical items, and

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therefore the greater the chance of detection. However, the consequences of detection have not been treated as an independent variable. This would be one of the critical tests for the theory: if no differences were found when the consequences were varied, the theory would not be valid.

On the basis of the previous observations, it is hypothesized: Subjects who are motivated to deceive will more frequently produce disproportionately large skin resistance responses to critical items as opposed to noncritical items than will subjects who have not been so motivated. The frequency of detection among the motivated group is therefore likely to be greater.

METHOD

Subjects

Thirty-six male subjects between 18 and 25 years of age were recruited for a "paid psychological experiment" from the employment offices of four colleges in the Boston area. None of the subjects had previously participated in a study in deception. All subjects were randomly assigned to one of two experimental groups—18 to each group.

Procedure

Subjects were run individually. Upon reporting, all subjects were given a very ambiguous idea of the nature of the experiment. They were told that the purpose of the study was to find out how normal subjects reacted physiologically to a series of numbers and letters, that it would be necessary to attach a number of recording electrodes to them, but that none of the electrodes would carry current to them. Electrodes for recording skin resistance (Wenger, Engle & Clemens, 1957) and five other variables were then attached. (The remaining variables will be discussed in a later paper.) At this point a tape recording was played to half the subjects according to a random schedule, previously determined. This group was referred to as the tape group, while the remaining subjects were in the no-tape group. This recording contained the following information: (a) the experiment was designed to see how well the subject could keep information away from the experimenter; (b) that this was extremely difficult to do, and that only people of superior intelligence and great emotional control were able to do this; (c) they were to try as hard as they could to beat the experimenter and the equipment; and (d) if they were successful, they would be paid an extra dollar.

All subjects then picked a card from a deck of five cards. All the cards in a deck were either all number of all letter cards, with a single character on each. Half the time the letter deck was used, and half the time the number deck. The numbers were between two and nine and the letters between B and I.

The cards were arranged so the subject could not see the face of the card until he had drawn. The experimenter could not see the face at any time. After the subject had memorized the card, he placed it face down on a stand beside him. In order to make the selected card more significant to the subject, he was instructed to write down on a piece of paper, in the case of a letter card, all the words he could think of beginning with that letter, or, in the case of a number card, all the expressions and titles he could think of containing that number. He was given 2 minutes for the task. The subject was then told to lie down and relax as much as possible, and that after about 5 minutes he would hear a series of numbers (or letters), including the number (or letter) he had removed from the deck. He was not to respond verbally to any of these. The experimenter left the room and began recording the physiological measures on an Offner Type R dynograph located in an adjacent room. At the end of 5 minutes he turned on a tape recording and one item of information was presented every 15 seconds. The first item presented was a dummy foil, while the next five were the same as the characters on the five cards. After all six had been presented, they were presented in a different order. This was repeated until each character had been presented five times.

As each character was reproduced by the tape recorder, the signal pen on the polygraph was activated and the letter or number was written on the record. At the conclusion of the tape, the experimenter returned to the subjects' room and did one of three things, according to a previously arranged, randomized order. To one-third of the subjects in each group he told which card they had picked; to one-third he deliberately misinformed them as to which card they had picked, and to the remaining third he said nothing concerning the card they had picked. (The reasons for this design will be discussed in a separate paper.)

The subject then picked a card from a second deck. If the first deck had been numbers, the second was letters and vice versa. The remainder of the trial was exactly the same as the first trial.

The difference in skin resistance between the level immediately prior to the stimulus and the lowest level reached within 4 seconds was used as the response measure for each stimulus. Readings were made to the nearest 500 ohms. The readings were all made by a person who did not know in which group the record belonged and did not know which was the chosen letter or number.

The largest mean response was used as the predictor of the card that the subject had chosen. The mean responses for each character were determined and these means were then ranked, the largest response receiving a rank of 1. The rank of the character chosen by the subject was then determined. If this rank was 1, it was considered a correct detection, while if it was more than 1, it was considered as not successful.

RESULTS

The ranks of the selected card for Trials I and II for all subjects are shown in Table 1 for the tape and no-tape groups, along with the number of correct predictions.

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TABLE 1.—Mean ranks for the selected characters for different conditions

Trial	No-tape condition		Tape condition		Mann-Whitney U
	Mean rank	Number of correct predictions	Mean rank	Number of correct predictions	
I.....	2.36	6	1.44	12	190.0
II.....	2.86	4	1.81	11	188.5

¹ $p < 0.05$, $n_1 = n_2 = 18$, two-tailed.

NOTE.—Fisher exact probability tests of detection rates for no-tape and tape conditions for Trials I and II yield: $p < 0.05$.

A comparison was made between the ranks of the selected character for the tape and no-tape condition on Trials I and II. The Mann-Whitney U for Trial I was 90.0 and for Trial II was 88.5. Both of these are significant at the 0.05 level (two-tailed).

While primary concern of this study as put forth in the introduction was to determine whether difference in subject motivation would affect the magnitude of the response to a chosen card in relationship to the magnitude of the response to other cards, it is also of interest to see how successful detection itself was in the two conditions.

Fisher exact probability tests for Trials I and II for the two conditions indicated that there was a significant difference in the number of correct detections between the tape and no-tape conditions (see Table 1). It was decided to see if detection was occurring at a greater than chance frequency in both groups. A binomial test indicated that for both Trials I and II the tape group was detected at a significantly greater than chance frequency ($p < 0.001$ on both trials) while for the no-tape condition this was not the case ($p > 0.10$ on both trials).

The records of those subjects who were in the tape group appeared to show both larger and more frequent responses, not only to the correct character but to all the characters. These differences were significant at the 0.05 level (Mann-Whitney U ; two-tailed).

DISCUSSION

The significant difference between the ranks of the selected character in the tape and no-tape conditions (for the first trial 1.44 and 2.36, and for the second trial 1.81 and 2.83, respectively) with corresponding differences in the relative response size to critical and noncritical items for both trials is supportive of the hypothesis put forward in the introduction of this paper and the punishment theory of detection of deception. According to this theory the "person will give a large physiological response during lying because he anticipates serious consequences if he fails to deceive [Davis, 1961, p. 163]." In the present experiment, while the subject is paid an extra dollar if not detected, probably the greatest consequence of being detected would be a loss of self-esteem. In the tape it is mentioned that the only persons who are able to deceive are those with superior intelligence and great emotional control, two qualities which most undergraduate students cherish. (The experimenter was careful to assure the subjects who had been detected that it had been difficult and that they had put up a good struggle.) Marston (1917) suggested that the factors which make detection possible are not directly due to the response of lying, but rather are due to an emotional reaction, probably of fear, surrounding the verbal response of lying. Burt (1921) found that having other people present during the detection procedure increased the likelihood of successful detection. In a study by Chappell (1929), it was found that simply having the subject lie without any possibility of detection or punishment did not produce any marked responses. Further, Larson (1922) had noted that after a confession, the critical items no longer produced responses. Here again the stimulus no longer produces a response after the consequences of deception have been eliminated.

Our findings by no means eliminate alternate explanations of the events underlying the detection of deception. In this experiment the consequences of being detected are quite different for the motivated group not only during the actual recording session, but also during the period when they are memorizing the card and associating to it. In terms of a conditioned response theory, it would be assumed that during the period of making associations to the card, a greater response is probably produced for the tape group than for the no-tape group because of their increased involvement and this becomes conditioned to the selected character and produces a larger response during the test situation. A future experiment which would resolve this issue would be to change the consequences of deceiving during different parts of the experiment. Certain trials could be highly rewarded for deception while other unmotivated trials could be run for an innocuous reason, such as to "check the equipment." Any differences in the relative sizes of the responses would clearly be due to differences in the consequences of being detected and not due to differences in the responses conditioned to the selected card.

The significant differences between the number of successful detections (that is the number of times a critical item was assigned a rank of 1) for the tape and no-tape conditions uphold our hypothesis that the number of successful detections is increased as motivation is increased. It also lends support to the consequences theory mentioned earlier.

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It is of interest to see what ranks were assigned to the critical items in cases where the subject was not successfully detected. In the tape condition on Trial I, of the 6 individuals who were not detected, 4 were assigned a rank of 2 on the critical number. Even in cases where detection did not occur, the critical item produced an abnormally large response and the assignment of ranks was not random. However, in the no-tape group, of the 12 who were not assigned a rank of 1 on the critical item, only 3 were assigned a rank of 2 on the critical item.

Individuals in the tape group were not able to suppress the response to the critical item, though they were able to enhance their response to one or more non-critical items.

The fact that motivated subjects were detected far more readily than chance, supports the claims made for lie detection in actual life contexts where motivation would be maximal. On the other hand, the finding that without special motivation detection in the laboratory is difficult explains some of the skepticism toward laboratory studies of deception (Berrien, 1939). Clearly the situational variables play a crucial role in the responses of the autonomic nervous system.

As mentioned in the preceding section, the tape and no-tape groups appeared to be different, not only in the number of responses made to the selected card, but to all cards. While autonomic responses are usually considered to be more or less out of the area of experimental control, except by the manipulation of certain characteristics of the stimulus, such as the intensity or duration, here we find that by manipulating the role of the subject we have greatly altered his responsiveness to a stimulus which objectively remains unchanged. This relationship of the demands of the experiment to autonomic nervous system (ANS) activity is a factor that has not been considered in the discussions of response specificity and stimulus specificity. One can only speculate concerning the effect that different expectations of experimenters have on the nature of their subjects' responses. This relationship between the subject's role and ANS activity could be important for a theory of the etiology and treatment of psychosomatic disorders.

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A

TESTIMONY ON THE VALIDITY OF THE POLYGRAPH

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Dr. ORNE. That is a good question. I don't know how to define a lie. As a lawyer you could define the term better than I. It is not a term which has been carefully defined by scientists. What a lie is is a matter of point of view which varies with individuals; however, it may not be necessary to define this concept because the so-called lie detector does not actually detect "lies."

Mr. KASS. Then what does the lie detector or the lie detector operator have to do?

Dr. ORNE. I think this is perhaps a more meaningful question.

What the polygraph is used for in so-called lie detection, is to find out, whether there is an undue physiological response at some point which is usually associated with an attempt to conceal the truth.

Now, there are two different models which you can look at. I think that the one used most commonly in commercial lie detection is that you are trying to find out what information specifically this individual has which will elicit this kind of response. You might call it the guilty information problem. You might ask the person, "Are you lying?" And you are then asking in his terms, not in scientific terms, whether or not he feels this is a lie, and hoping to elicit a response. This is the most general kind of question.

You might ask him, "Did you take something?" or "Did you murder so and so?" and so on, attempting to see whether or not a specific item of information, which he is assumed to have evokes a response.

There is an entirely different way of looking at it which is much easier, I think, from a scientific viewpoint. This is whether he in fact has certain information where you are trying to identify, not whether he is telling the truth or not, but rather trying to determine whether a given set of data is meaningful to him.

Now, this is quite a different kind of problem. It is one which is perhaps much more amenable to investigation and one where I think most of us would agree that it is possible to do this.

I don't know whether I am being clear in this distinction. If you, for example, had a set of facts which were important to you, your physiologic responses to these stimuli should be different from your responses to a set of verbal stimuli which were not significant. What you would be determining is not whether the individual lies but whether the data which you are presenting to him is relevant or not relevant to him: you are determining not whether he is telling the truth but whether a given set of information has importance to him.

Mr. KASS. How would you, if you were a polygraph examiner, or if you were in an experimental situation trying to determine whether this person has this fact, how would you determine this by using the polygraph? Or could you determine this by using the polygraph?

Dr. ORNE. I think you have to qualify the term. I think you could assign a probability value to whether an individual does or does not have a given item of information. The more items of information you are dealing with, the better the odds are of a very high probability. For example, if I ask you a question which has only two alternatives: "Last night did you go to sleep soon or did you stay awake a long time?" Let us assume that you responded that you stayed awake a long time. First of all, there would only be a 50-50 probability involved here, and the chance of error would be quite high. If I asked you a question with, let us say, five alternatives, this would cut down the possible chance fluctuation. If I asked you 10 questions with 5 possibilities each, we could begin to be a lot more precise and you could increase the probability of knowing what you are doing.

Does that answer your question?

Mr. KASS. What if you were interested in just one fact: "Did you go to sleep last night?" without the alternative? Would you be able to get any sort of reaction response in determination, correlation—whatever word you want to use—from the polygraph charts?

Dr. ORNE. The less data you are looking for, the more difficult it is to assign a very high probability to the data that you are getting, because you have only a very restricted range of things that you have to make a decision between.

Now, if you say "Can you determine it?"—the answer is only in terms of probabilities. You can assign a probability value and that is all you can do.

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A — Mr. KASS. In your studies you have assigned probability values to your experiments. Could you comment on the value that you placed on them?

Dr. ORNE. Well, I think perhaps one of the problems, if I can explain it a little bit more theoretically it might be easier to see—you are asking, and the statements of lie detector people are usually phrased in terms of "this person is guilty," or "this person is innocent," with a very small group of individuals about which no determination can be made. The lie detection people attempt to come to a decision, i.e., guilt or innocence. As such, you have difficulties. A perfect categorization with imperfect data is impossible. Therefore you do run into the problem of obtaining possibly false positives or false negatives.

Mr. KASS. Could you explain for myself and for the record what you mean by a false positive and what you mean by a false negative?

Dr. ORNE. There are two types of errors. A false positive is when you say a person is guilty and he is in fact innocent. A false negative is if you decide a person is innocent and he is in fact guilty. It would be a false negative because you classified him in the negative category and he is in fact in the positive one, and visa versa.

You can switch the terms around if you like.

Dr. LACEY. Perhaps it should be made clear at this point that these are not symmetrical errors. You can have a test which has a high incidence of false negatives and few false positives and have a test that has a high incidence of false positives and few false negatives. Obviously, one's decision to utilize the two in a practical situation depends very much upon how well one can specify the proportion of these two different kinds of errors in a specific situation. The proportions of false decisions are probably situation bound.

Dr. ORNE. Precisely, this is true in many instances with the same test not only with different tests. For example, let's assume we have a given set of 100 tests for the detection of deception where, for experimental reasons, it was arranged to have 50 people who were, in fact, guilty and 50 people who were, in fact, innocent so that you have 50 people who should be classified as guilty and 50 who should be classified as innocent and you are trying to clarify which are which. In other words, trying to separate the sheep from the goats. You have a test which is, let us say, 80 percent accurate; you can set your criteria to maximize the number of correct determinations of both guilt and innocence. As a result, with this theoretical case, you would end up with 40 people classified correctly in each group with 20 percent false positives and 20 percent false negatives. In other words, 10 guilty people who are classified erroneously as innocent and 10 innocent people who are classified erroneously as guilty.

However, you can choose a cutoff point in such a fashion that you can be reasonably certain no one will be called guilty who is in fact innocent. This would mean, however, that you would then classify the people in such a way that you might call 80 people innocent and this would then include all the 50 who are, in fact, innocent but also 30 who, in fact, guilty. By eliminating all the false positives with an imperfect technique you have to accept a great many more false negatives. In this case, by deciding to be correct in all cases where you call someone guilty, you will be wrong 60 percent of the time when you call someone innocent. But you could pretty well guarantee that the 20 that you called guilty were in fact guilty. In other words, it is entirely possible to choose a cutoff point which eliminates false positives at the expense of increasing your error rate with false negatives. Obviously you can do it the other way around also by reversing the position of the cutoff point. This choice is an administrative rather than a scientific decision. You are working with the same data but you can choose your cutoff point in such a way as to pretty well guarantee that you will lose none of the guilty ones or that you will lose none of the innocent, but you can't do both.

For some purposes, such as a sensitive security position, you might be willing to accept a large number of false positives in order to make certain that you will pretty well eliminate the possibility of false negatives. Conversely, for criminal investigation purposes, you might wish to set the criterion in such a way that you would rather be certain of eliminating false positives and be willing to accept a high error rate with false negatives.

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committee to deal with the two points that you mentioned?

Dr. KUBIS. Yes, I certainly would.

One is a legal question, the rights of an individual; the other is a training and educational problem. The lawyers obviously have their job in the rights section; the other is in the training area.

Now, I don't know too much about the training procedures that have been in existence.

Mr. REID. On the first point we have had a witness who has indicated perhaps 80 percent, and I underscore perhaps 80 percent, do not measure up to what he considered professional standards.

Mr. REID. But you would favor the prompt establishment of a we have had one piece of testimony that indicated that confession was secured on the basis of a polygraph examination, solely on the basis of that, and with no other supporting evidence.

The question that immediately arises—was the confession induced by the polygraph and were the rights of the individual infringed in that regard?

From what I heard, I was not wholly reassured that they were not.

Thank you, Mr. Chairman.

Mr. HARDY. Mr. Chairman.

Mr. MOSS. Mr. Hardy.

Mr. HARDY. You have lost me completely now. I was pretty well lost in the beginning.

A while ago, in the discussion with Mr. Reuss on the question of the validity of the polygraph tests and the results which were achieved I thought I understood you gentlemen to be in pretty good agreement, I know Dr. Lacey came in with his own question, which he answered—but I was left with the feeling that there was pretty good agreement that validity was such that it ought not ever to be used in trivial cases, and I believe Dr. Orne so stated it in expressly those words.

Then we got into another area of security cases that purely for possible past suspicions which might provide an avenue for additional investigation—at least that is the way I interpreted it—if I am wrong, clear me up—but the answer you gave Mr. Reid sounds to me like you are all endorsing the thing.

Dr. DEARMAN. I am not.

Mr. HARDY. Fine. I am glad to get that one. If I misinterpreted the rest of you, I would like to get it clear, because I think we have a direct conflict.

Dr. ORNE. I think the question of validity—

Mr. HARDY. If the thing is not valid, then it ought not to be used, if we can't rely on it.

Dr. ORNE. That is exactly it.

Mr. HARDY. Then you distinguish between validity and reliability. You were talking about probability. Probability relates to reliability and validity.

Dr. ORNE. Right.

Mr. HARDY. So you have to have a mathematician to go along with your psycho—whoever he is.

Dr. ORNE. That is part of the training. Let us put it this way. I think that probably, judging from laboratory studies, there is no question that the detection of deception works better than chance. I don't think you will get any disagreement on that.

There is a question, depending on the conditions, how accurate it is and this is why I wanted to use the term "accuracy." Probably a guess which would be meaningful would be somewhere between 75 and 80 percent. Now, if this is the case, then this is all you are going to get from it with present day available techniques and it becomes an ethical, moral, administrative decision when you will take advantage of this 80 percent or so which the gadget gives you.

Mr. HARDY. Could I assume, then, Doctor, I don't want to interrupt your train of thought, but could I assume that if you got an 80 percent probability of its reliability, given an operator who is not too bright, who might have an 80 percent factor for fallibility—

Dr. ORNE. I don't think it should go the other way assuming—I don't know. I have no way of judging what would happen with somebody incompetent. However, I would say that the analysis of the data is not complicated. I mean the objective of measuring of the wiggles of a line is something which any one can do.

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Mr. HARDY. What is your basis for the 80 percent figure that you used of reliability? Is that an assumption or is that an experimentally determined figure?

Dr. ORNE. No; this figure is based on laboratory studies.

Mr. HARDY. Laboratory studies by a psychologist?

Dr. ORNE. You can have them from a psychologist, from a psychophysiological, you can have them from psychiatrists.

Mr. HARDY. How about the ordinary policeman?

Dr. ORNE. I have no data.

Mr. HARDY. That is what we are having to use. We are using all sorts of people in this thing. A private in the Army. A sergeant.

Dr. ORNE. There is no data available.

Mr. HARDY. So then we are monkeying around with something we don't have any data on and the degree of reliability is such that, according to the unanimous testimony of the group, as I understood it, it ought not to be used in trivial cases and now you are only going to use it as a guide to determine what has happened in the past, you can't use it as a guide for the future. At least, I understood Dr. Kubis to emphasize that. So you can only use it as an indicator of what has happened in the past and then, after you get that, you don't know whether you are right or wrong or whether you are 80 percent right or 90 percent wrong.

Dr. KUBIS. May I state that the people who have been working in the field, the Chicago group and other groups, do publish numbers.

Mr. HARDY. I know, I have seen some of them. We had some testimony about them.

Dr. KUBIS. There are such numbers in existence. I think some of the police laboratories also publish numbers. These are of the order, as Dr. Orne said, from 75 up.

Mr. HARDY. You do not know how factual they are.

Dr. KUBIS. That is another matter.

Mr. HARDY. If they are not factual, what good are they to us?

Dr. KUBIS. I think you have just raised a question that you don't know.

Mr. HARDY. That is right. I am just as ignorant as I can be. You all are not helping me very much, either.

Dr. KUBIS. I may say that I don't know whether there is life on the moon or not. I don't know because I haven't investigated and I haven't checked on the data. Until we check on that data, we cannot be sure, but all indications seem to show that they are about 80 percent, 75 to 80 percent accurate.

Mr. HARDY. But you could use a computer to arrive at some conclusions with regard to that on the basis of the information that has thus far been gathered. By your own testimony, you can't take a computer and evaluate the information which a polygraph gives you? Did I not understand you to say that earlier?

Dr. KUBIS. That was the basic conclusion because each individual is different from every other and I need a single criterion for all individuals.

Mr. HARDY. But you can do a better job in evaluating the data you have about the probability of life on the moon than you can evaluate what is in the individual's reaction which may not conform to the general pattern of humanity. The norm of the individual was discussed by Dr. Orne a while back.

Dr. ORNE. Could I try to answer that one this way: If I give you a record—now, you have no training at all—

Mr. HARDY. That is right.

Dr. ORNE. In polygraphy. You obviously have had a lot of training in asking questions.

Dr. LACEY. We don't know how valid they are.

Mr. MEADER. Is this training or did he just come naturally by it?

Dr. ORNE. I don't know. But it is effective. If I give you a record and I say, "Now, here are 5 points, you tell me which one of these is the biggest wiggle, that is all you have to do, and I ask you to make this judgment 20 times and we can take somebody totally untrained to make these judgments. Out of these sets of judgments by untrained people, on wiggles of a pen, you can end up in a laboratory study with an accuracy rate depending on the condition on which

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Mr. REUSS. You are familiar with Mr. Gustafson's studies?

Dr. ORNE. Yes.

Mr. REUSS. And are you familiar with the portion of that article which deflates the Chicago school claim of 95 percent accuracy?

Dr. ORNE. Very much so.

Mr. REUSS. I will read you from that article by Mr. Gustafson and his colleagues, and I quote:

"These figures"—and here he is referring to the 95 percent claim of accuracy of the Chicago school—

leave us with no information at all as to the correctness of "reported guilty" in about 40 percent of the cases, and with no such information at all in almost 90 percent of the reported innocent cases. This is a far cry from the claim of 95 percent accuracy. Most of the claims by others for the effectiveness of this method are not even documented with the number of cases.

What it all adds up to is that aside from the misleading figures of Inbauer and Reid and a few others, there exists no public body of knowledge to support the enthusiastic claims of operators. There are no publications in reputable journals, no facts, no figures, tables, or graphs. In short, there is nothing to document the claims to accuracy or effectiveness except bald assertions.

Would you agree with that statement by Mr. Gustafson?

Dr. ORNE. I would say that this was done before we embarked on some laboratory research. I think that Dr. Gustafson as well as I have the view now that there is laboratory data, reliable laboratory data, available, which shows that this works certainly significantly better than chance.

Mr. REUSS. However, that laboratory data has nothing whatever to do with the actual performance outside the laboratory of the lie detector, does it?

Dr. ORNE. Not quite. It does.

Dr. Kugelmass has done a study in Israel, using Israeli police cadets, in some staged real life situations. This is still a laboratory type study, except it was done in life. The cadets did not know it was a study.

And it is the type of thing which I do not think we would have done, that he was able to get the corporation to do, because apparently this was of real concern to the Israelis for practical reasons.

Mr. REUSS. Outside of this one study by Kugelmass of Israel, spelled—

Dr. ORNE. K-u-g-e-l-m-a-s-s.

Mr. REUSS. Aside from this one Kugelmass study, is there any evidence whatever of the effectiveness of lie detector tests outside of the laboratory?

Dr. ORNE. We can only extrapolate from the laboratory.

Mr. REUSS. I wish you would answer my question. Your answer is "No," I take it.

Dr. ORNE. "No," yes. Yes, the answer is "No."

Mr. REUSS. Will you furnish for the record the Kugelmass study? Did he write up a paper on this?

Dr. ORNE. I do not have it with me, unfortunately.

Mr. REUSS. Is it in a monograph form?

Dr. ORNE. I do not believe it is yet published. It was a report that I saw. The reason why it was relevant was that he used some of our procedures, which were lab procedures, in a much more real life-like situation, and came out with data much like ours in terms of percentages.

And it is on the basis of this type of thing that I have somewhat more confidence in a laboratory study if it holds up in this kind of quasi field thing.

Mr. REUSS. You fortunately soften things with a "quasi," because this is still a laboratory test.

Dr. ORNE. Yes.

Mr. REUSS. The Israeli police officers were presumably good guys rather than bad guys, were they not, and hence this was not in any sense a field experiment?

Dr. ORNE. No. It was a staged situation, of course.

Mr. REUSS. In connection with this, Dr. Kubis, I have looked at—not as thoroughly as I would have liked to and shall when I have more time—your report, "Studies in Lie Detection," dated June 1962, and prepared for the U.S. Air Force.

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Retrospectively, some of these were not accidents in the sense they could not have been predicted. Many of these individuals were accident prone. So we violated human rights and we endangered human life in the course of it.

Looking back on it, I think it was justifiable.

Now I will completely agree with Dr. Kubis in what he characterized as trivial instances, like preemployment screening. I am horrified at the thought of a department store clerk being subjected to a polygraph examination. I am not horrified at the thought of men being selected for some highly sensitive mission in our Government, let us say, and the polygraph being used as one—and not even a major one—information-gathering device. I would like to see that expanded. I would like to see a great deal of research done on it.

Now, then, however, those using it, I think, have to be very, very much aware of the fact that in this case that they are going to have a lot of false positive records. They are going to label people, for example, as actual or potential homosexuals. They are going to label people as having engaged in shady practices, and so on.

They must be aware of the fact that they may be wrong. They may be wrong perhaps in a large percentage of those cases. They should say something to this effect: "Gentlemen, we have to select 10 people for such-and-such a job. We have 1,250 people from whom to select these 10 people. We are going to subject you all to these procedures, one of which is the polygraph, and on the basis of them we are going to select 10, knowing full well that the adverse decision against you is made only because we are playing the probabilities; we are playing an actuarial game; we are playing an insurance game.

"Under no circumstances will the fact that an adverse decision has been rendered, under no circumstances will this be made part of your dossier."

I wish we could do some brainwashing and all the people who did the examining and made the decision will never remember that good old Joe, the one we thought was good old Joe, was turned down in a job examination. That is the idealistic part of it.

Somehow everybody utilizing these techniques must be made aware, it seems to me, that they are placing the reputation of people in very serious jeopardy with a tool of imperfect validity.

So, ways have to be found to protect legal rights. First of all, the polygraph operator should never make the legal or administrative decision. That is true whether he is a private with 2 years of high school or whether he is a Ph. D. and an M.D. I, myself, would never make such a decision. But I would be very glad to provide evidence saying there is some area of disturbance here to a trained, qualified person who has the responsibility for making that kind of legal or administrative judgment.

Dr. DEARMAN. May I ask you something?

Dr. LACEY. Surely.

Mr. REID. Would you continue relatively unrestricted use of the polygraphs in certain areas or would you, in effect, call a halt until an interdepartmental committee can check the validity of the procedure?

Dr. ORNE. I think I would want to know what the consequences of calling a halt are. As Dr. Kubis, for example, points out, for very sensitive security purposes, a polygraph gives some information. I would not want to be responsible for depriving us of necessary information. However, at the same time, I would like to see somebody get together and find out what is available, what the needs are, and to set up some decent standards after these facts are known.

I don't think I have any information to base any judgment on. Maybe Dr. Kubis has had more acquaintance with people who do this kind of work.

Dr. KUBIS. There are two questions there, Mr. Reid, as you have mentioned, the training of the person and a violation of the rights of the man being examined. If there are violations of the rights of the person being examined that procedure should be halted immediately. If this has any relationship to his training, then that sort of training, that negative aspect of the training should be eliminated.

As for the individuals that I have seen working in the field in responsible positions, I have a lot of admiration and respect for them and for their acumen in being able to get many answers which I would have to go through in a plodding way. I don't know how many are ill trained. If there are people who are not well trained, perhaps these facts can be obtained from a study of the accuracy with which they have been able to determine what they were after. There is always some feedback later on as to whether the man actually did or did not commit the "crime" and maybe we could examine such records before any blanket rule is promulgated to eliminate all interrogation.

Mr. REID. But you would favor the prompt establishment of a

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TESTIMONY ON THE USE OF COMPUTERS IN
ANALYZING POLYGRAPH RECORDS

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Dr. Martin T. Orne, senior research psychiatrist, Massachusetts Mental Health Center, and associate in psychiatry, Harvard Medical School.

Gentlemen, I wonder if you would stand and be sworn.

Do each of you solemnly swear the testimony you are about to give this subcommittee will be the truth, the whole truth, and nothing but the truth, so help you God?

Dr. LACEY. I do.

Dr. DEARMAN. I do.

Dr. KUBIS. I do.

Dr. ORNE. I do.

Mr. MOSS. Will you identify yourselves for the record?

Dr. LACEY. I am John I. Lacey.

Dr. KUBIS. I am Dr. Joseph Kubis.

Dr. ORNE. Martin Orne.

Dr. DEARMAN. Dr. H. B. Dearman.

TESTIMONY OF DR. JOHN I. LACEY, CHAIRMAN, DEPARTMENT OF PSYCHOPHYSIOLOGY-NEUROPHYSIOLOGY, FELS RESEARCH INSTITUTE, AND PROFESSOR OF PSYCHOPHYSIOLOGY, ANTIOCH COLLEGE, YELLOW SPRINGS, OHIO; ACCOMPANIED BY DR. H. B. DEARMAN, PSYCHIATRIST, JOHNSON CITY, TENN.; DR. JOSEPH F. KUBIS, PROFESSOR, DEPARTMENT OF PSYCHOLOGY, FORDHAM UNIVERSITY; DR. MARTIN T. ORNE, SENIOR RESEARCH PSYCHIATRIST, MASSACHUSETTS MENTAL HEALTH CENTER, AND ASSOCIATE IN PSYCHIATRY, HARVARD MEDICAL SCHOOL

Mr. MOSS. Do any of you gentlemen have a statement you would like to make at this time? If not, the Chair recognizes Mr. Kass, counsel for the subcommittee.

Mr. KASS. Dr. Lacey, could we start with you? Could you discuss the various measurements which are recorded by the polygraph? What is the polygraph and particularly what are the physical responses measured when the instrument is used as a lie detector?

Dr. LACEY. The word "polygraph" simply refers to any assemblage of instrumentation which enables the simultaneous and continuous measurement of more than one physiological variable. The word does not apply primarily to the so-called lie detector apparatus. They have simply preempted the word. If one measures 12 channels of brain waves and one blood pressure channel by means of an indwelling catheter, one is using a polygraph.

The variety of physiological measures which can be measured is very large. Some of the procedures are innocuous and relatively painless. Some are less innocuous and more painful. Also, one can choose various methods of display. The action of the heart, for example, can be exhibited either as the familiar electrocardiogram or the electrical signals deriving from the action of the heart can be processed by a piece of electronic machinery. One can display the envelope, cycle by cycle, of heart rates or heart period, and so on.

The so-called lie detector polygraph is, as I understand it, a very simple and for the most part a fairly crude piece of instrumentation.

Here I do want to make a statement.

I am not a lie detector expert. My experience in the field of lie detection is very minimal indeed. I have read some of the literature, including Dr. Kubis' latest very scholarly contribution to the field. I have used the lie detector technique as a simple introduction, to elementary students in psychophysiology, to the problem of what is known as autonomic activation.

I have, however, done polygraphy in the sense that I have been engaged for many years in the measurement of physiological responses in an attempt to understand their significance for behavior.

So, anything that I say about the lie detector machine or lie detectors will have to be checked with people more expert in the field than I. But, as I understand from descriptions I have seen, and on the basis of my early graduate school days when I used the Keeler poly-

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graph, these are relatively simple crude instruments. There seems to have been no change, Dr. Kubis, in instrumentation. There has been no attempt to take advantage of the many, many things we have learned in the past two decades, let us say, about the recording of physiological responses, the artifacts, biophysical and electronic, as well as those engendered by the nature of the examiner-examinee interaction.

There has been no attempt to take advantage of new methods of display, new methods of computation.

As I understand it, lie detector operators still diagnose the record by visual scanning of the record.

I may say I am convinced this is an impossible task. But Dr. Kubis has recently shown, with well-trained individuals using rating scales in a very careful way that it can be done.

Does that answer your question, Mr. Kass?

Mr. KASS. Dr. Kubis, what does the polygraph used in the commercial practice as a lie detector measure?

Dr. KUBIS. Usually lie detectors in commercial practice measure three responses. They attempt to monitor some aspects of the cardiovascular response; namely, blood pressure or pulse, or a combination of both. They attempt to monitor respiration and now, in the last 15 years or so, the psychogalvanic response.

These are the three indices that are used fairly widely in the commercial lie detector.

I may add that, though three indexes are obtained, my experience in talking to men who have used lie detectors is that these men have a preference for one or the other in their actual interpretation. Even though they may have three signals some may feel more comfortable in using blood pressure. Others may feel more comfortable in using respiration responses. And still others may prefer to use the galvanic responses.

As Dr. Lacey mentions, it seems to be almost an impossible task to scan all three visually and get objective criteria in that one glance at the record.

Mr. KASS. Dr. Kubis, is there a correlation or intercorrelation, for example, when an individual lies, between his blood pressure, his pulse, his respiration, and his galvanic skin response?

Dr. KUBIS. Perhaps you mean whether there is always a positive correlation. There will always be some type of relationship. Even though we may not observe any, looking at these things visually, there undoubtedly are relationships within the recording responses. But those may not be constant from individual to individual. Some of these men have acquired a great facility in using these instruments and presumably, from the percentages that they quote, they seem to have been able to identify people who have told something that was contrary to what they believed.

I may mention here that lie detectors don't prove fact. Lie detectors are merely belief verifiers if they are used properly; namely, they indicate, if it is accurately done, whether the man believes what he is saying. This does not indicate that what he says is a fact.

We have examined people in mental hospitals. If the patient said he was Napoleon, and if he believed this, the lie detector response indicated that he was telling the truth. All that the lie detector showed is that he believed what he was saying.

Dr. LACEY. The point is well taken. There is, however, another point: that is, the meaning of the physiological disturbance. We have to be very careful in choosing our words. Physiological disturbance can be recorded when a symbolic stimulus is administered to an individual; say, a word, scene, image, description. To the best of our knowledge and ability, many times we cannot elicit from the subject or patient a verbal description of what underlies the disturbance.

Let us use a word, a phrase, which will carry meaning but which, itself, needs a lot of talking about—"unconscious anxiety" can be recorded in the cardiovascular system or in an electrodermal response. So not only does the polygraph record what the subject believes but it records what he unconsciously feels.

Mr. KASS. Dr. Orne, what is a lie? I think you are qualified in this panel both as a psychiatrist and as a psychologist. Can you, from your experience, define what is a lie?

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This is the type of approach which should be made.

C L Mr. KASS. Dr. Kubis, to your knowledge, and you have done some work with the Federal Government, has the Federal Government ever conducted any such studies to determine the scientific aspect of polygraph as a lie detector?

Dr. KUBIS. The study that I had been working on was precisely along these lines. It was attempting to find out something about operators, how relatively good and relatively poor operators can interpret records. It was attempting to find how accurate the various indices are in discriminating the person who "is lying" in an experimental situation. Finally it was an attempt to see whether some integration of numerical results could be obtained to determine certain invariant factors that might remain constant from person to person. Only then would you have an objective index that could be used uniformly for the entire population of possible candidates; otherwise, you are faced with the situation of setting up norms for each individual. In the ordinary lie detection situation, the men in the field may not have enough time to develop a normative base for evaluating the performance of suspects.

Dr. Lacey has been working with this problem for a number of years and he knows how difficult it is to set up an individual norm for each person. The men in the field have to do this by intuition, by some feeling that they have of working with these machines for a number of years.

Somehow or other, if we can accept the figures they give, they are coming up with accuracies that are greater than chance. How trustworthy these numbers are is another problem. I have to stick with the numbers they publish.

Mr. KASS. This study you are talking about, is that entitled "Studies in Lie Detection, Computer Feasibility Considerations, Fordham University, New York, N.Y., Air Force Project No. 5534"?

Dr. KUBIS. That is right.

Mr. KASS. What were your conclusions from this study?

Dr. KUBIS. That in the absence of any invariant relations the application of a computer to get real time decisions was not a feasible procedure at the present time because there were no uniform criteria of what we may call guilt or innocence, nonbelief verification or belief verification.

C Mr. KASS. You say there is no uniform criteria at this time and, therefore, we could not do computer feasibility studies?

Dr. KUBIS. Computer feasibility studies can be done. Computer feasibility studies are studies to see whether computers can be feasible. Feasible for what? There are two types of objectives: Whether they are feasible for really doing the work of the lie detector operator or whether they are feasible for measuring physiologic responses. It is fairly clear they are feasible for measuring physiologic responses.

Mr. KASS. Haven't the studies that were performed avoided the basic question of how scientific the polygraph is as a lie detector but related more to expanding the polygraph itself?

Dr. KUBIS. No; once you ask the question of how feasible it is to apply a computer, then you are getting to the heart of a very important scientific point. We all know that the human individual in judging visually complex patterns is not such a good judge of these patterns—not such a good evaluator.

We also know that if a computer is properly applied that it can measure responses to a much finer degree of precision than the human eye can do under these circumstances, especially in a short period of time. This is very basic.

Technically, this raises another important point. If the human individual is subjectively oriented, he may be biased by his emotional condition, and he may make judgments of error which are due to his condition and not to the tracings. It would be much better to use an objective instrument to eliminate the individual variability among examiners. Not that I am for it at this time, but if there is a better method of measuring we should use that method.

Mr. HARDY. Could I ask a question on that?

Mr. MOSS. Certainly.

Mr. HARDY. Do I understand, Doctor, what you are saying is that a computer can be relied on to make an accurate interpretation of that measurement?

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Dr. KUBIS. That is right.

Mr. KASS. Dr. Kubis, are you also saying that the computer could possibly replace the examiner in some situations?

Dr. KUBIS. I should not like to put the lie detection "profession" out of business. That is not my objective. It is purely a scientific problem of measurement that I was interested in. In point of fact, if the criteria are put into the machine; that is, the numbers are put into the machine so that the machine will discriminate what numbers it accepts and what numbers it rejects, even in a crude way the machine can do as good a job as the man who has a record in front of him and has to evaluate it visually.

Mr. KASS. We have been talking about the polygraph and I think it was Dr. LACEY who mentioned that it measures autonomic responses.

Dr. LACEY. Also skeletal responses.

Mr. KASS. What do you mean?

Dr. LACEY. Skeletal muscles are the muscles under voluntary control. Polygraph simply means many writeouts.

Mr. KASS. How many possible writeouts, charts, pens, whatever you call it, do you use in your laboratories?

Dr. LACEY. I have the capability in the largest of our 5 experimental suites of measuring 19 channels of information.

Mr. KASS. Does that mean that you can measure 19 different autonomic and skeletal responses?

Dr. LACEY. And brain responses.

Mr. KASS. And brain responses?

Dr. LACEY. That is correct.

Mr. KASS. Dr. Dearman, I think you were talking to me earlier about the autonomic nervous system. Could you define it for us?

Dr. DEARMAN. That is what we call the vegetative nervous system, the automatic nervous system controls glands of internal secretion, heart, blood pressure, intestines, urinary bladder. It controls all those things which automatically take place without our knowledge, so to speak. We cannot make our heart beat faster or slower. If the situation arises, the automatic nervous system will make it beat fast or slow.

Mr. KASS. What type of responses come out of the automatic nervous system?

Dr. DEARMAN. It is divided in two parts, the sympathetic part and parasympathetic part.

The sympathetic part of the nervous system is the excitatory part. The parasympathetic is the inhibitor. In other words, it is a balanced system.

On the polygraph, you record the automatic response to blood pressure, pulse, skin resistance.

Mr. KASS. Do blood pressure, pulse, respiration, galvanic skin response fall under the autonomic nervous system?

Dr. DEARMAN. Yes.

Dr. LACEY. Respiration partially. One can control it in various aspects.

Dr. DEARMAN. You can control it for a length of time.

Dr. ORNE. There is one thing which I think should be clarified. As you described the autonomic nervous system one gets a feeling it is an automatic nervous system. I think it should be clear that many of these parameters which we are discussing when we are talking about their measurement are not necessarily involuntary. For example, the psychogalvanic skin response, which is in essence a sweating response, is an autonomic response, and many people believe it is therefore not subject to any volitional control. This is not the case.

If you tell the individual, "Please give me a big GSR response. Please sweat when I say 'now,'" he usually will be able to produce a beautiful GSR response at will.

If you tell a subject, "I would like you now to increase your heartbeat, just think of yourself being afraid when I say 'now,'" and then say "All right, start now," his heartbeat may go from 80 to 110 within a beat. When you say "stop," it will drop within a beat back to 80.

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In there, you looked into whether you could substitute a computer for the live operator—a study in which, to my relief, you came to the conclusion that however worthless a liveoperator might be, a computer would not improve matters very much. You also reported on a laboratory-type study you had made at Fordham.

Dr. KUBIS. That is correct.

Mr. REUSS. Here again I want you to correct me if I either misread or misdescribe it, but am I right in thinking that you set up an experiment in which you got various Fordham students, and you asked one of them to play as if he were a murderer—

Dr. KUBIS. A thief.

Mr. REUSS. A thief. Perhaps I should let you tell me just how you set up this experiment. Were there three people involved?

Dr. KUBIS. There were three people involved.

Mr. REUSS. And who were they supposed to be?

Dr. KUBIS. One was to take the role of a thief, the other of a lookout, and a third of an innocent suspect. And the third person did not know the identity of the other two. He was brought in later. He could not identify them. They never knew him, he never knew them. Consequently, he was innocent even of what was going on and the identity of the two people who were engaged in the experience.

In this case, the thief was supposed to take money, and he actually had to take money, from a receptacle which contained religious material. And if the group knew the feelings about Catholics as to invading religious types of material and opening up and taking money from an object that has religious connotation, the group would realize that this sets up a number of tensions within such an individual. He does not like to do this.

Some of them did not want to cooperate. Another, when he came back, fainted right before he took the examination. Enough emotion or tension was generated by this experiment. Several of the subjects came running back and said there must have been some people following them, because they did not want to be caught in this.

So the experiment provided enough tension and enough feelings of uneasiness, when they were taking this money while the lookout had to be sure that no one was around. So in a sense it was a well staged experiment, realistic, but still staged.

Mr. REUSS. Without in any way deprecating the experiment as a laboratory experiment, it did suffer from at least this defect, did it not, as presumably all laboratory experiments with live bodies would: All three of the bodies involved knew that they were lying like hell, did they not?

Dr. KUBIS. When they denied taking the money, or acting as a lookout.

There are a number of questions that were asked. Some were concerned with the taking of the money, opening the object, forcing it open. Other questions asked whether the subject was an accomplice.

In this way we were able to set up a number of questions that would discriminate the thief from the lookout, the thief from the innocent individual, and the lookout from the innocent individual.

Mr. REUSS. I do not want to bring religion into this discussion. That is the special province nowadays of the Judiciary Committee. But in this connection, and having in mind the fact that Fordham is a Jesuit university, and that many of its students are Catholic, and apparently those in this study were, was any thought given to whether tension might be caused about participating in a study whose purpose was to see whether the ultimate subject, truth, might in fact be obtained by clamping things to people's arms, chest, and fingers, and then taping the results into a computer? Did that bother anybody in their bull sessions?

Dr. KUBIS. Yes; it did bother some, and some did not continue with the experiment. Later on, we found out that those were the ones who were suspected by their fellow members of pilfering books from the bookstore. Those did not continue.

One person was sent to an infirmary, because he felt ill, and the other fainted, right before the examinations.

Dr. DEARMAN. So you would have to say, then, that something in their past life was reactivated, would you not?

Dr. KUBIS. I do not know whether it was something in their—I would say in any person's behavior, there is something of his past in

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I would just like to read to you from "Principles of Legal Medicine," edited by Geoffrey Mann, Department of Legal Medicine, Medical College of Virginia, Richmond, Va., entitled: "Detection of Deception." It is written by Robert B. King, captain of Virginia State Police. In this he says:

A great deal of emphasis must be placed upon the ability of the examiner who must be tactful, persuasive, and mentally alert at all times. The examiner should talk with the suspect in the examining room for some time before the examination is made. He must convince the suspect that the lie detector is going to work and it is impossible to beat it. The suspect must realize that if he lies during the examination it will be recorded on the machine.

Mr. KASS. Dr. Kubis, did you agree substantially with the conclusions that Dr. Lacey made in his interpretation of question No. 6 on that second chart?

Could I ask you this, Dr. Lacey, while Dr. Kubis is looking at the chart for a minute. Dr. Lacey, could you continue for our record your point about the heart beat increasing from 60 to 70 beats per minute?

Dr. LACEY. I was simply pointing out that that change within 1 cardiac cycle of 10 beats per minute might be a rather significant change one would like to be able to detect. With this method of display, it would be very difficult to detect that change. With a little electronic processing of the data on the line, to translate each of these cardiac cycle times into a rate or a period, one could then plot this along the up-and-down axis of the paper and get a display which would be visually recognizable, independent of paper speed. It is one of the points I make about the relative degree of primitiveness of this kind of instrumentation.

Mr. KASS. Would the heartbeat, which is increased the same 10 beats per minute from 120 to 130, show the same point you are talking about?

Dr. LACEY. You have been reading, Mr. Kass.

Mr. KASS. No; listening to you earlier.

Dr. LACEY. No, sir; this is one of the reasons why we must substitute measurement techniques for visual analysis techniques.

The magnitude of the evoked response in a variety of physiological systems depends unfortunately to a variable extent, depending on the experimental condition, upon the level of physiologic function at the time the stimulus was administered. Let me take a very simple example, and let me use an explanation of the phenomenon with which I do not agree. To give you an explanation with which I do agree would involve us in a long discussion, and it is beside the point. The phenomenon still exists, whatever its explanation: If, for example, at the moment a question is administered, the subject's heart rate or blood pressure happened to be rather high at that moment, high for him now—and you see we don't know what high or low is for him, we just bring him into an exciting situation, and start administering an examination—if the individual's blood pressure or heart rate or what-not, blood flow, were high at that moment, the administration of an exciting stimulus would result in an absolute or percentage change that would be less than that elicited by that same stimulus at a lower level of functioning. There are ceilings above which our body regulatory mechanism will not permit our heart rate or blood pressure to go—there are brakes built in, homeostatic mechanisms—maintaining a regular state of function. So that if the individual's heart rate is high at the moment of a stimulus administration, the compensatory regulatory mechanisms within the body will prohibit a large response. It will in effect say: I will not permit your heart rate to go above 120 beats per minute and I will do everything I can to push it back down. I will not permit your blood pressure to go over 192 millimeters of mercury systolic. A variety of bodily mechanisms will be brought into play to bring the blood pressure down.

As a matter of fact, some of the diseases with which we are concerned today, hypertension, various forms of cardiovascular diseases, can be termed a failure of these homeostatic mechanisms. That is how serious they are. They are constantly at work.

Now, unless techniques are found, they don't exist today, except in highly specialized laboratory experiments, unless techniques are found to evaluate to what degree this individual obeys this so-called law of initial value in which the magnitude of response is less the higher the

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C [prestimulus level—and this is an individual characteristic—and unless we learn how to take this into account in the measurement of the response—the measurement, not the visual analysis—unless ways are found to take this into account, the error is going to be proportionately greater.

Let me say again, however, what I said before. Either intuitively or empirically or rationally, the people operating this machine have arrived at partial protection against this sort of error: juxtaposition of critical and noncritical questions, all this sort of thing.

However, it is only partial protection. Appropriate displays would help. For example, let us take the case of heart rate. One could display the changes in cardiac cycle time as a change in cardiac period; that is to say, as a change in the time interval between successive contractions of the heart; or one could display this by converting—electronically on-the-line—converting these time differences in cardiac cycle time to a rate by making the displacement of the pen linear with respect to rate.

Now, then, it turns out as a consequence of some simple mathematics that it makes a difference whether you display in terms of period or rate.

Displaying in terms of rate takes this law of initial value into account, so to speak.

Let me give you a simple example. I was warned this would come up sometime, so I jotted down a little arithmetic last night. Let us suppose we have a cardiometer, an instrument which translates cardiac cycle time into a display. Let us suppose we have a cardiometer which is linear with respect to rate. By "linear with respect to rate," I mean the following: If between one heart contraction and another heart contraction one and a half seconds were to elapse—you might find this in a young athlete at rest, for example—this would correspond to make 40 beats per minute. We can cause our machine to trace a line down at the bottom of the graph, 80 beats per minute at the middle of the graph, and 120 beats per minute at the top of the graph. Each cycle time, each cardiac cycle time appears as a line somewhere in the up-down extent of the graph. So, if at one point his heart is beating 40 beats a minute, we would have a line down here. If the next cardiac cycle time is the equivalent of 60 beats per minute, the graph will rise and we will have a line there. If it is next 80 beats, the graph will rise and we will have a line here.

Let us simultaneously have another tracing linear with respect to period, that is cardiac cycle time, itself. At 40 beats per minute, the heart is beating once every one and a half seconds. At 80 beats per minute, the heart is beating every three-quarters of a second: I will have to use the number 750 milliseconds, 750 thousandths of a second. At 120 beats per minute, the heart is beating twice a second or a cycle time of 500 milliseconds. Now, we will have a trace linear with respect to period. In other words, instead of displaying rates from 40 to 120 beats per minute, we will display times from $1\frac{1}{2}$ second to 500 milliseconds. Now, let us consider an individual whose heart rate changes from 90 to 100 beats per minute and, of course, in an interrogation let us say. On the tracing with respect to rate this would represent a variation of $12\frac{1}{2}$ percent of full scale simply because we are linear with respect to rate.

On the tracing linear with respect to period, we would have a change of only 6.7 percent full scale. This is a direct mathematical consequence of the imposition of the reciprocal relationship: heart rate and heart period are reciprocally related.

Similarly, if an individual increased in beats per minute from 80 to 100, this would represent a 25-percent variation of full scale on the trace. That full change from 80 to 100 beats per minute is a change of cardiac cycle time from 750 to 600 milliseconds. That is a change of 150 milliseconds in a trace with a spread of a thousand milliseconds. So that same response display period only occupies 15 percent of the tracing.

See pg. 19 wave form traces of a computer

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Mr. REID. Mr. Chairman.

Mr. MOSS. Mr. Reid.

Mr. REID. Dr. Orne, I gathered while I was out of the room briefly for a phone call, you questioned the validity of the use of the polygraph. Did you touch on the question of training and standardization for polygraph operators?

Dr. ORNE. No; I did not.

Mr. REID. Will you comment on that?

Dr. ORNE. It would be a very difficult decision to decide what is proper training. I do not know who should set up the ground rules for it. I am sure we all agree that we should have a trained person. What is proper training, however, is difficult to determine. Should you require him to have a Ph. D. in psychology? If you do, you will have very few polygraphs in use because there are not enough psychologists and of those I can't think of any who would do it.

Mr. REID. Might I ask a specific question to pinpoint it a little more precisely? I think the testimony we have heard from several Government departments indicates that the training standards are minimal. Indeed, one department trained operators for a period of only 6 days. Would it be fair to say, in your judgment, that is totally inadequate?

Dr. ORNE. May I answer the question in this way: I would say that what is the proper training for an interrogator—if you ask me that question, I would have a very hard time answering it also. I don't know what proper training is for an interrogator. I have been very impressed with a couple of people who were police interrogators who seemed to be very good at it. How they became good at it, I don't know. Whether they came that way or whether they learned it, I don't know. I know it is this kind of person who is really good and I think Dr. Kubis' work shows that there are people who are good at it, and there are people who aren't good at it—if you could pick the good ones, you would be in fine shape.

Mr. REID. To put the question in another way, if I may interject here and separate the trained interrogator out from the individual who is professionally qualified to interpret the tracings. As I understand it, we are dealing with a number of variables: the question, the possible response to a given question as well as a number of physiological reactions both autonomic and otherwise, including the specific reactions of up to 19 different tracings. It would be my impression from what I have heard that this would require someone with a rather comprehensive background and maturity of judgment.

Dr. LACEY. And a computer.

Mr. REID. Some have even said that you should have a doctor and a psychiatrist and a few other things combined in one. But a high school or college graduate who has had no really professional training in some of the disciplines, whatever you may define as qualified, seems increasingly to me to be very questionable.

Dr. ORNE. I would very much agree with this. I would add one more point, however. As we get to know more about the technique, the more you know about a method the less training you need to have. For example, thanks to penicillin, during the war technicians in a submarine could save lives, they could give a shot of penicillin. You would not do this now. You prefer having a medical man. But it is potentially possible.

If we knew really enough, if enough adequate data were available, you would, and I think it is ultimately possible to have this be a marketing system for the producer and for the industry in general. Wool is in a you can make the decision, the less judgment is involved, the less training is needed. Ultimately, it may be possible for statements to be made in terms of probability of guilt or innocence based on objective procedures. If we had enough knowledge, I would not worry about a high school student, a high school graduate being trained if he were taught how to make the right measurement of the right wiggles in the right place, and plug in with the right formula he could come out with an answer.

I would be much more worried about the fellow who is going to use the data because then it will be objective data stated in objective scientific terms; namely, a probability which you can verify.

D *[Handwritten initials]*
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Mr. REID. To deal with the specific problem which I think is facing this committee and in a sense the Government as a whole, it is that there are over a thousand of these polygraphs in use, if we include CIA and NSA. The training standards appear to be relatively minimal. At this juncture would it not be well, in effect, to call a halt to the use of a lie detector until such time as some adequate procedures and standards and training are worked out both from the technical standpoint and from the implication of the individual, because the Government is using them and apparently the reports of the technicians reading these tracings have some relevance to the particular investigation.

The review procedures seem to be somewhat questionable, and the protection of the rights of the individual is not very clearly guaranteed. Even if the examiner was well trained, I am not clear that the administrative decisions which you allude to are being carefully reviewed or that the rights of the individual are protected. Therefore, my question, after a rather wordy preamble, is, What do you think the Federal Government would be well advised to consider doing in terms of procedures, methodology, and protection and review procedures in terms of the rights of the individual?

Dr. ORNE. The more training the better, obviously. I think this is a pragmatic question which is really administratively determined, depending on the need, depending on the availability of personnel. There is no point, for example, in my saying you should have only people who are psychiatrists with proper training in psychophysiology doing it because this would be totally unrealistic. They are not available.

There should be no point in saying you should have only Ph. D. psychologists doing it. They are not available.

The question is the cutoff point which is a commonsense decision and not really a scientific one in terms of what the needs are and what is the best kind of available personnel you can get. I certainly think it should be a college graduate, but this is no guarantee of anything.

We certainly know that there are psychopaths who get through college, too. Some of them, unfortunately, even finish professional school.

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people polygraph tests. I think we all agree that would not work, either.

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Now, at this moment, we have one statistic, 4,400 persons were given tests, or, to make it more precise, 4,400 tests were performed, because we do not know that the tests were performed in each instance on a different person. We did not seek the number of persons involved.

But what have we developed, or what can we develop, statistically, from the 4,400 tests given, and in making an analysis to produce something of significance, what criteria should we impose for that analysis?

Dr. KUBIS. It is a matter of damage to the person in case of a mistake. If it is a criminal case, say, that he is accused of a crime, the mistake there will be damage to his reputation.

I feel, in terms of military cases where there may be damage to one's reputation, there should be a very small percentage of error, if that report is going to have a lot to do with the final judgment on the case.

If it is purely advisory, and if we have no other ways of determining the guilt or innocence of this individual, then perhaps the lie detector can give some added information.

Mr. Moss. But it cannot determine the guilt or innocence.

Dr. KUBIS. It cannot determine the guilt or innocence. No lie detector does this. It can determine whether he will believe or whether he does not believe what he is saying, provided the examiner makes a correct judgment.

Mr. Moss. Does it even determine that? Can he honestly believe what he is saying and have an autonomic response indicating that he does not believe what he is saying?

Dr. KUBIS. There will be a number of errors of this sort. There will always be errors in using a manmade instrument. In general, though, with the use of lie detectors you will be identifying such individuals who are speaking contrary to their mind in a larger proportion of cases than if you had not used this instrument.

You may say: "I think he is guilty, from the way he is answering this question. I feel he is not telling the truth." Now, if we took an independent judgment on this, and we took a person who is skilled in the use of a lie detector, the lie detector examiner would, with greater degree of accuracy, be able to determine whether the man is telling the truth or is not telling the truth.

Mr. Moss. Well, we want to find out what percentage of these 4,400 cases were accurate.

Dr. KUBIS. That should be in their records of those that have been verified. There will be a large number that have not been verified.

Mr. Moss. Well, you say that the claimed accuracy rate of the instrument is about 70 percent, so there would be about 3,000 of these cases, where the operator and the machine arrived at a conclusion. It could be a conclusion of guilt or a conclusion of innocence.

Dr. KUBIS. Or whether he believes what he is saying, or does not believe what he is saying.

Mr. Moss. No. In the field, does the average operator report that he believes what he is saying, or does his report indicate that he, the operator, concludes that the person is not telling the truth?

Dr. KUBIS. Usually, I believe that most operators think in terms of guilty or not guilty. But a careful operator will say, "In my judgment his records are similar to those who, in the past, I have known to have lied."

Mr. Moss. Then one of the first things we would have to do is run a study on the operators.

Dr. KUBIS. Yes. You would have to know the accuracy of each operator.

Mr. Moss. And would we also have to know whether the operator is the person who normally believes what he says, or whether he is a person that might on occasion be confused. Should he have a test?

Dr. KUBIS. I would think that if he is an ordinary individual and has a record of honesty, is an upright gentleman and has always been so, we have to, on the basis of our ordinary dealings with people, assume that he is a reasonably honest person, and that he will not do something that is unusual. We will have to accept on face value that he is an honest individual.

Mr. Moss. In other words, we would grant to the operator something we would not grant to the examinee, an assumption that he is at that point a reasonably honest individual, and that he believes what he says.

Dr. DEARMAN. In other words, this thing is so highly sensitive, wa
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then the one giving the polygraph should be a highly trained individual,
should he not?

Dr. LACEY. That is a loaded question. Yes; I would agree. He
should be absolutely qualified to do the job but I can't answer your
next question: What are the qualifications?

Dr. DEARMAN. I should say the ones most capable of doing that
are men like you who have done your research, have degrees in psy-
chology and psychiatry, men who know something about human per-
sonality. In other words, to me the lie detector is nothing but a pro-
jective test which projects the physical components of an emotion,
much like the Rorschach is a projective test of the psychic component.

Dr. LACEY. I would think of it in another way. With the current
level of our instrumentation—let me interrupt myself to say that I am
not talking about the commercial polygraph now, I am talking about
the kind of instruments we use in the laboratory. Maybe the com-
mercial polygraph is fine—I say again I don't know these instruments.
I do know, however, they are not utilizing the newer techniques. I
would say that with the kind of instrumentation we have today, with
the kind of know-how we have today in terms of autonomic measure-
ment to secure, for example, a mathematical evaluation of the res-
ponses, and a portrayal of a profile of reactions, I would say that in a

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reasonably short period of time—don't press me to say how long—but in a reasonably short period of time, I could train a technician to produce a record, just as we have trained technicians to produce X-rays, to produce a glucose tolerance test, and so on. But they don't make the clinical decisions.

Dr. DEARMAN. That is right. You would make that.

Dr. LACEY. Yes. But I would not like to make the legal administrative decision. I would be able to make the clinical diagnosis that something is going on here.

Dr. DEARMAN. In your opinion, this is what you believe. Then you would say to the administrator: "What you want to do with this information is your business." That is what you would be telling the administrative officers.

Dr. LACEY. My own feeling is that this would have to be spelled out legally, administratively with some real protection.

Mr. KASS. Dr. Lacey, from your knowledge, not as a layman but a man experienced in the use of the component parts of the polygraph for the last 20 or 25 years, what would you recommend as the minimum training requirements? What are the minimum standards which should be in existence today, not projecting 2 or 3 or 5 years, but today.

Dr. LACEY. Not knowing in any real detail the problems that the polygraph operator on the line is facing, I really can't answer that question in that way, but I can answer it this way: I have to train in the course of my work a variety of technicians. I have technicians carrying on the experiments as well as professional people in the laboratory.

How long do I take to train a technician, let us say, in the operation of an experiment which requires some four channels of information, which is about as much as I can handle. I have the capability for 19, but I rarely take more than 6. I will take a nurse, an X-ray technician, a college graduate, and in some 6 months I will be comfortable in leaving that person alone to take the record. That is to say, I will be confident—perhaps mistakenly so—I will be confident that this technician now knows how to turn the right knobs in the right sequence, can identify an artifact such as a popping electrode, a GSR artifact on the skull, if we are taking brain wave, too tight a cuff, too much venous occlusion if we are measuring blood flow. In 6 months, I will be confident in leaving this person alone to take the record.

I would not be confident—well, the Ph. D's who have come to me for postdoctoral training—I am not comfortable leaving them alone for the complete design of an experiment and for the complete interpretation of a set of data and what they mean, in 3 years. So, I think technicians can be trained fairly quickly, and the more delimited their task and the more objective their instrumentation, as Dr. Orne has correctly pointed out, the easier it is to train.

Mr. KASS. It would be your recommendation that a minimum of 6 months, leaving aside for the moment the question of interrogation as it relates to the polygraph as a lie detector, it would be your conclusion that a 6-month training program would be the absolute minimum to learn how to use the various component parts, the knobs, et cetera?

Dr. LACEY. To learn enough about the underlying physiology, which is absolutely required—to learn enough to identify artifacts, let us say, I would be comfortable with the 6-month criterion. Some people will learn it in less than 6 months. I would be comfortable with a 6-month criterion to be followed by a long period of internship, of supervised experience.

Mr. KASS. At what point would you be satisfied that the person can devise the experiment or to put it in the polygraph detection term, to create the question formulation process? How long a period would that take?

Dr. LACEY. I went to ask my prospective father-in-law how long it would take before I could marry his daughter. He started out by saying, "John, I would be doing both you and my daughter a disservice."

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I think I will answer that question by saying, Mr. Kass, I will be doing both you and the polygraph operators a disservice by even attempting to answer that question. I don't know the operational characteristics on the line. I would just be giving you a guess. The longer the better.

Mr. KASS. Dr. Kubis, you do know the characteristics of the lie detector. Would you comment on the minimum qualifications and standards that are desirable?

Dr. KUBIS. This raises two problems that Dr. Lacey has mentioned: Technicians versus operators. We have to decide which ones.

Mr. KASS. We are talking about the present state of the art today not as projected in the future. Today, apparently, the individual examiner and operator in the Federal Government and in the commercial practice is both a technician—

Dr. KUBIS. That is right. Consequently, this is the more serious question. It is fairly clear that a technician can be trained as Dr. Lacey mentioned, fairly comfortably within a period of 6 months. Some earlier, depending on the capability of the individual.

Mr. MOSS. At that point, what background, minimum background should we have for this proposed trainee?

Dr. KUBIS. Dr. Lacey, and I agreed with him, has mentioned that there is no specific background that is necessary for a technician. It is like the man who can inject a syringe when necessary in a submarine. But he is only a technician. He is not going to evaluate the records, a procedure which is the critical issue in the lie detection test nor make the final diagnosis. Even with the technician, we have anywhere from at least 6 weeks to 6 months. This has nothing to do with the structuring of the questions, and with evaluating the situation and being able to pull out the essential details that will maximize this response which people call the lie response. This is a very difficult procedure. You may have a robbery but if you ask the wrong questions you are never going to get anywhere. You have to know the individual, his capability for understanding your language. You have to be able to formulate your own ideas into the language that is the other person's language so that communication can take place in a two-way fashion. This is an extremely difficult job. So much so that in some sex cases—I have heard these stories and I believe them—very naive operators trying to indicate how learned they were used words with children like "penis," which the child didn't understand at all, then of course he didn't insert a penis into the vagina of a little girl if she didn't know what a penis or a vagina was.

This requires an ability of the individual to do a critical amount of translation to the level of the man he is examining. Therefore, he has to know the person very well.

This means that at the operator level, we have to have a man who understands people, who knows a lot about motivation, who has a facility for translating his own, say, abstract notions into concrete terms so that this two-way communication can come about.

Now, this is just the first stage. Then comes the application of the test.

As Dr. Orne mentioned, we can by changing the inflection of the voice incriminate the individual by asking the question. This is a common procedure in law when the lawyers object to the way a question has been asked of a witness; namely, the question may be asked so that the witness feels he is being accused rather than being asked.

We should require a great deal of training in this type of procedure. Some people have suggested that possibly you might record the voice as a monotone and have that same voice ask questions of all the individuals who are being examined in a particular case.

This brings up another difficulty, because, it seems that a live person asking the question is probably more efficacious in arousing what may be called the "lie response" than a canned voice which is recognized as being canned. So these bring about a number of problems where the operator has to be trained to be as objective as he can. This is a very difficult procedure, especially when he is given the facts of the case. Those facts are colored by the persons who are giving the facts. He may prejudice the case before he begins for he may select questions in accord with his prejudices.

Now, how do we train a man to be objective in this? This is a second difficulty.

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The third is interpreting the responses.

So we have at least three sets of difficulties that come about. In this particular case, the ability, the capability of a man to become a good operator, and that does not mean an interrogator. An interrogator is one who has an ax to grind sometimes. That is an interpretation that may be given to the word "interrogator." But let us say we have an examiner, an understanding examiner. His competency is in part a function of the individual and in part of training. How much training we should give to an individual in order to be an understanding examiner, is a difficult point to establish, but obviously it is going to be more than the 6 months to train a technician.

We all know that some people can never be good therapists. Others can be trained to a certain degree.

Now, we have a similar situation in detection training. It is extremely demanding because the person has to be very objective. He cannot be prejudging the issues before the answers come. Yet, it is almost an inherent tendency in a human individual when he is given a set of facts about a case and the people who are involved—it is almost humanly impossible not to form some tentative estimate of who the most guilty person is, if you know all these facts in the case.

Suppose we withheld these facts from the examiner. Shall we then have a second man who will just construct the questions for the case? This brings up another matter about the nature of the examining process in lie detection. At any rate, we can see at least a year's training period or more.

To become a good operator, one would need a good deal of training initially in sheer operating technique, a good deal of training in personality dynamics. One needs to eliminate the sharp edges that one has which may irritate other individuals and cause reactions in the person being examined.

I have a feeling this should be a long-drawn-out procedure; but there are other people, equally competent, who probably feel it can be done in a much shorter period of time. To me it is an extremely serious problem when the reputation of an individual is at stake—even his life. You can kill an individual and he is done with. But once you attach an incriminating label to him that goes along with him for the rest of his life. This is killing him in extremely slow stages psychologically.

Dr. DEARMAN. Might I add here also that the examiner must know a lot about his own blind spots. You might say, if his personality, for instance, was such that he felt guilty about masturbation and one of the men he was examining said he had been masturbating this might arouse anger in the examiner and therefore cause him to bear down on this fellow more.

Dr. ORNE I don't know; I have a real problem in answering this. You might say obviously the polygraph operator, given his present task, should be someone who has at least psychiatric training—has been analyzed. In addition, he should be a psychophysiologicalist.

Furthermore, he should have at least 5 years' experience as an interrogator. I don't know of anyone who matches these criteria. This may sound facetious. In a sense, it is, but in a real sense it is also serious, because we can set a certain ideal. We need to approximate this idea. The closest one can get, and here again are pragmatic and administrative questions; namely, I would not like to say, for example, the person should be, let us say, a psychiatrist, because I don't know where you are going to find the psychiatrists who are going to give polygraph examinations. I don't think you would choose to do this as your life's work. I know I wouldn't. I don't know of any psychiatrist who would.

The same holds for psychologists.

Mr. Moss. Doctor, are we then saying that this device is so important that the end does justify the means and we will take the best available?

Dr. ORNE. No, sir; this is not what I would like to say. What I would like to say is that we should have an idea of how close we come to this.

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For example, take the issue of therapists. We know what we would like to find in a therapist. We also know in a State hospital situation, volunteer college students have done a tremendous amount of good in getting people out of hospitals.

Since we can't get enough therapists to work in State hospitals, we encourage the college students to come in. It does get patients out.

We psychiatrists often have a red face—well, they get people out.

Mr. Moss. The good outweighs the damage that might be done.

Dr. ORNE. Under those circumstances.

Mr. Moss. Under those circumstances.

Dr. ORNE. Now, I think here we would have to say, we would have to begin with individuals with reasonable maturity, reasonable intelligence, and select people who are willing to do the job because there is no point in setting standards where you aren't going to find anyone. Then given that, I would then go along with the kind of training which both Dr. Lacey and Dr. Kubis outlined.

I think it is an empirical question of how much you need. I think you could find out, once you did studies to find out who is good, the problem is we don't know yet to what extent training makes a difference. They think it makes a big difference. As a guess, I would say it probably does.

I would like to have an empirical comparison of people who were trained for 3 months versus those trained for a year versus those with 5 years experience.

Only when you see that data would I be in a position to make any kind of judgment. We may be surprised. I think it should be looked at as a question which should be explored.

Mr. Moss. Dr. Kubis, I came in the middle of your discussion. You were indicating a 6-month training period for the technician.

As I review the responses to the questionnaire prepared by this subcommittee and sent to the Federal agencies, we find that their examiners or operators or technicians—and this seems to be a term that is not precisely defined—I had a very interesting discussion with Mr. Baxter over the correct terminology and we went around the barn and got nowhere. But whatever we call them, the Government uses one person to give this examination. Now, is he the technician trained in your 6-month period or is he doing a job far advanced of this 6-month trainee?

Dr. KUBIS. Do we have any information what school they came from or how much training they have had? I don't know.

Mr. Moss. Let us take, over in the Army military police, they have a training program down at Fort Gordon, Ga., and it is 7 weeks. They required that the operator be a U.S. citizen, that he have 2 years of college, that he be 25 years of age, that he hold the rank of warrant officer, that he have no court convictions, be an accredited investigator, with 1-year experience, and have passed a criminal investigation course. Now, I haven't inquired as to whether that course is as extensive as this 7-week course for the polygraph operator, but I would hope it would be more extensive.

Now, that is the requirement for the military police.

We get down here to Naval intelligence in the Department of the Navy. We find that he must be a GS-9 or its equivalent. He must have a college degree, be 25 years of age. He must complete an internal course of 5 to 8 days, and have a history of meaningful interrogation experience, however that might be judged. The criteria are not set forth here.

Then we have the Post Office Department where they gave 338 tests. They have 17 polygraphs and they have a requirement that the person be 30 years of age, a high school graduate, postal field service grade 13 or above, and have 5 to 8 years of investigative experience and he is given a special course. It is the 7-week course at Fort Gordon.

These are some of the typical qualifications of the polygraph operators now doing the job for the Government.

Dr. KUBIS. I am a bit extreme on this issue because I believe that examinations of this sort should be done only in serious matters. If it is a serious matter, this involves consequences that may be very grave to the individual and I would expect much higher standards. Now, if they examine an individual, as has been mentioned before by Mr. Reuss, for stealing, say, a package of cigarettes, I feel, unless there are other

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I have no difficulty about the men who are good investigators, have been doing good work and whom I have seen in operation. But as for the average examiner, I wouldn't know how many of them had adequate training. We discussed that question yesterday with regard to the agencies which have been using polygraphs. Some records indicate 5- to 8-day training periods. This seems woefully inadequate as a training procedure for an investigator who is going to make delicate judgments. Unless that man has had a strong internship of at least 6 months to a year with a very competent person, working continuously, under strict supervision, one would question whether 5- to 8-day training period would make a polygraph operator.

If there is a large number of these short-course individuals, on the average they should not be as good as those who have been well-trained. Our own experience with graduate students, involves a training period of about 1 year super-imposed upon 2 years of graduate work, and laboratory work. The average operator in our laboratory attains an accuracy of about 80 percent.

Now I do not know how this accuracy will project out into the general field. At present any man can become a lie detector expert, whatever that may mean for the moment, by merely having the money to buy a machine.

Mr. KASS. Dr. Kubis, does a 6- to 7-week training course seem any less woeful?

Dr. KUBIS. It would depend on the man. If he had quite a bit of experience in interrogation, working with people, questioning them, understanding them, getting an appreciation of how to phrase questions; and if he had a strong technical training of anywhere from 3 weeks to about a maximum of 6 months, as Dr. Lacey pointed out yesterday, and then had this 6-month training period, I would say a man of intelligence and intuitiveness should be an average type of operator.

Mr. KASS. Dr. Kubis, 6 months? The question was 6 weeks.

Dr. KUBIS. There are two types of training to consider: Technical capability of operating; and the capability of examining a case, phrasing the essential questions, examining the individual, and then interpreting the results.

Now yesterday we distinguished between those two phases. The technical phases Dr. Lacey had mentioned could vary anywhere from 3 weeks to about 6 months.

Would that be right?

Dr. LACEY. I think I would just say in my own laboratories, I wouldn't trust the technician to take good records under 6 months. But that is for different purposes.

Dr. KUBIS. That is many more channels than three?

Dr. LACEY. No. When I was asked a question how many channels I have, I said 19. That is the total capability of the lab. Under no circumstances have I ever utilized all 19 in a single investigation. Just to get decent brain wave records and blood pressure records, and good skin resistance records, and so on, the normal sort of routine measurement we do in the laboratory, I would feel uncomfortable with a technician under 6 months, because there are many artifacts and they have to learn to distinguish them. And it is simply incredible how often I have found that people don't see an artifact; think it is a real response.

Mr. KASS. What is an artifact, and what are the artifacts that can come out? Let us stick to one component right now.

Dr. LACEY. Which one?

Mr. KASS. The cardiovascular component.

Dr. LACEY. Well, there are many. They are quite simple in the case of the cardiovascular component. I can't see how anybody would miss them, once he is alerted to them. Since this method of measurement is, as I have said before, a rather complicated resultant of blood pressure changes, and changes in arterial elasticity, and changes in the volume of the arm. Perhaps I should emphasize that this, too, changes: we don't have constant arm volume, the changes depending on the state of constriction and dilation of the underlying arteries in the arm. One could possibly mistake an arm movement which changes the volume of the arm under the occluding cuff, one could mistake this for a response. One could—I don't know one actually does, I was

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cause someone has declined. One of the reasons this committee is operating is because a Member of Congress, Representative Gallagher, became indignant over the urgings by high officials of the Pentagon that high officials in the civilian branch of the Government take such a test. I think it is to their credit they did not.

However, again that is one of the things that somebody must believe these are relatively infallible.

Dr. KUBIS. I wonder whether it might also be used as an instrument of intimidation, which would place the individual taking the test in jeopardy and also would incriminate him of some type of action of which he was completely innocent. A technique such as this would tend to smear his reputation thereafter, because there will always be individuals who are ready to believe that he could have done it.

It may be for the purpose of creating a doubt in the mind of others about the honesty of this man. This could be very effective, because if the procedure created a doubt in the mind of individuals, he may have gained his point.

Mr. MOSS. I think motivation here is difficult to establish.

Dr. LACEY. It would be an inference.

Mr. MOSS. Mr. Reid.

Mr. REID. Thank you, Mr. Chairman.

I just have three brief questions: First, Dr. Kubis, I believe in your earlier testimony you started to talk about training and the need for training in three areas: technical operation of the polygraph; the procedures involved in interrogation; and finally the interpreting. Could you, as precisely as possible, give a reasonable estimate as to the length of time that should be allocated in any course for some kind of professional standards to be developed in those three areas?

Dr. KUBIS. Yes, Mr. Reid.

I am an extremist on this issue.

Mr. REID. I wish you would be extreme in this sense, that you err on the side of full protection to the individual and full training professionally on behalf of the operator, interrogator, and/or interpreter.

Dr. KUBIS. Yes. Many people disagree with me; probably violently, too. I should like an operator or examiner in this field which involves the manipulation and control of the delicate, interpersonal relationships and an evaluation of an individual's on-going mental condition, to be a student of psychology; to have taken specialized courses in psychology. And I should like him to have at least a master's degree in psychology, with specialization in instrumentation, in interrogation, interviewing, and personal dynamics.

As for the people who are doing extremely important work, I should like them to have the training of a doctorate student, although not necessarily the degree.

Mr. REID. Could I ask this supplementary question: If you had an individual with a college education or with a master's degree but who, perhaps, had not had any specialized training in the area we are talking about, how much additional training—and this, I think, we are faced with in the use of polygraph in the Federal Government—specifically, would you allocate to learning the operation of the machine; to interrogation; and to interpreting? I assume you have some reasonable level of maturity in college education, perhaps graduate study, but no familiarity at that point with the machine, with interpreting, or with interrogating.

Dr. KUBIS. He has not taken any special course work?

Mr. REID. No.

Dr. KUBIS. He is already an operator?

Mr. REID. No.

Dr. KUBIS. He is not an operator?

Mr. REID. You have a college graduate with a master's degree. You are setting up appropriate standards for consideration in the Federal Government in the three disciplines you have just mentioned. You originally said, as I understand it, that on technical operating procedures you perhaps needed up to 6 months.

Dr. KUBIS. Yes.

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Mr. REID. Could you give me some such scale that is roughly relevant for each of the three you are talking about? I assume it is ideal to have an overall background and a master's degree, preferably, psychological training, perhaps knowledge of psychiatry; but the services take a certain number of men, and they put them through a course. Could you give just a rough rule-of-thumb that would err on the side of high standards?

Dr. KUBIS. The man who is in serious interrogative work?

Mr. REID. You just decided as a secretary of one of the departments that you are going to have 10 people involved in the use of the polygraph. You have gotten a relatively high educational background. You are going to set up a course on knowledge of the polygraph operation, interrogation, and on interpreting.

Dr. KUBIS. I would say, and again I am extreme—an additional 2 years of training. This may mean internship with a man who has already attained good standards. This could be done by internship where he could get experience by actually working.

Mr. REID. But before he would be solely responsible for giving a test, interrogating and interpreting, it would be at least 2 years?

Dr. KUBIS. I would say 2 years. Again, I am an extremist.

Mr. REID. Thank you.

Dr. LACEY, I believe in your testimony you talked about the need for some legal controls to protect the rights of the individual. Would you be good enough to spell out a little more precisely what you have in mind?

Dr. LACEY. If you promise me not to attack me for practicing law.

Mr. REID. No; I think we are all individual citizens of the country concerned with the broad question of the rights of individuals.

Dr. LACEY. In all seriousness, Mr. Reid, I don't know. That is because I simply have not been involved in the practical matters involved. So, I can answer your question only in the most general of terms. If that is satisfactory, I will be glad to do so.

Mr. REID. Certainly.

Dr. LACEY. When you were out of the room, I think I said that the adjudication—no, let me start all over again. The view I expressed yesterday was that the only use of the lie detector which I would feel comfortable about, was one where one was trying to select or classify or arrive at some administrative-legal decision about one subject sample of individuals from a very large subject sample of individuals. I can show mathematically that there would be no argument, no value judgment involved. One can show mathematically that with stated degrees of validity one will get stated degrees of precision of selecting this subject from a sample of individuals.

Under these circumstances, I would feel that there should be really a board. Certainly the law must be represented on the board. Certainly a psychologist or a psychiatrist must be represented on the board, perhaps both. They really have different skills. The examiner should have full power to challenge an inquiry and ask nasty questions, "How in the devil do you know that?" Perhaps, although I rather doubt it, somebody who knows something about psychophysiology. I will agree with what Dr. Orne said yesterday, if you provide good instrumentation that is about it; you diminish the demand on the technical side. Somehow the adjudication of the attribute that you are going to assign to this man should be just that, an adjudication process.

Mr. REID. To take one or two specifics: One, you would hold that the individual would have the right not to take this test, and further, that the fact that he did not take it would be considered without prejudice? That would be one legal protection?

Dr. LACEY. Yes.

Mr. REID. Second, I would assume that you would agree that an individual who did take the test should have the right of appeal without question.

Dr. LACEY. Without question.

Mr. REID. In some concept of due process that would reflect perhaps the kind of board you are talking about.

Dr. LACEY. Without question.

Mr. REID. Thank you. I have one other question, Dr. Lacey. I believe that you have done some work as a part of a group with the

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that behavior. This is universal. I think we could say that about any of our actions. We are the living history of our past as we exist right now.

Now, what we have to distinguish is whether that past has been significantly connected with the present incident.

Dr. DEARMAN. Yes. And the boys who could not carry through with the experience were suspected of stealing books, were they not?

Dr. KUBIS. One of them. The other two were not. But they could have been scrupulous individuals. Having once entered the experiment, they may have felt that they were lying, and this may not have been good, so they evaded the situation by fainting and getting sick.

Mr. REUSS. Let me ask you, Dr. Kubis, and the members of the panel, this question, which reflects my own bewilderment at the whole investigation we are conducting—of the occult art of polygraphing: I am amazed that here in this advanced democracy, for the last 40 years, the polygraph has been going great guns throughout the country, so that today—the security agencies aside—the U.S. Government itself applies some 20,000 polygraph tests a year, and Lord knows how many tests are applied in industry. Yet, so far as I know, nobody has ever made a study of the actual lie detector cases to see whether, not in the laboratory or in the quasi-laboratory, but in the field of activity, they are in fact worth anything or not.

I recognize difficulty in such field tests, but why could not honest and competent social and physical scientists like you four gentlemen, for example, take the material of let us say last year's 25,000 Government tests and see in how many of those incidents the crime was in fact solved—we know who stole the stuff from the warehouse, whatever it was—and then see how that matches with those that the polygraph found innocent and those that the polygraph found guilty?

This has never been done, has it?

Dr. ORNE. And it needs to be done.

Mr. REUSS. And until it is done, this whole occult art is entirely unproved, is it not?

Would anyone disagree with what I have said? I am just trying to reason it out with you.

Dr. KUBIS. I think it should have been done. I think there should be a self-checking procedure in any such agency so that they have a continual reevaluation, not only of their procedure, but of their results. The results will indicate possibly what went wrong with the procedure.

But unless this is done, they may be perpetuating a number of errors that they have not corrected, because they have not examined themselves in this manner.

Mr. REUSS. I am glad that you gentlemen share my amazement that here we keep on applying this practice without having done what it seems to me science requires us to do, which is to see whether it works or not. And there are ways, not infallible, but better than doing nothing about it, to see whether it works.

Dr. LACEY, did you have anything to add?

Dr. LACEY. I was just about to say: The field of "lie detection" has not been one which has attracted the attention of a large number of scientists.

In my own field of psychophysiology and neurophysiology, for example, I doubt that there is a handful of people who have given it more than casual attention. Dr. Kubis is one of the exceptions. He got interested in it early and has been working on it. Dr. Orne got interested in it recently.

The field of lie detection has been in the hands of people who have trained themselves, gotten whatever help they could get, I am sure, and have developed outside of the confines of any of the recognized scientific disciplines, or professions.

This I think accounts for the lack of the kind of scrutiny that you are calling for.

LINO MAS 39

I think more interest is being engendered these days, simply because it has come to be such a widespread practice, and because there are now some theoretical interests which now interest scientists. Scientists do not work unless there are some theoretical interests.

The study that you are suggesting is not an easy one, and it would involve some very careful planning.

* I would like to say that the serenity of past records is not as likely to be effective as what we call a prospective study, where, from the very beginning, a group of knowledgeable people get together, plan a study, set forth criteria, a population to be studied, the circumstances under which data will be collected, and so on.

Going back over statistical data can be very misleading.

Mr. REUSS. If I may interrupt you, though, would it not be a good idea to do both? Would it not be a good idea to send a team of competent and honest practitioners, some of them medical doctors and psychiatrists, some of them psychologists, some of them simply intelligent generalists, and in addition to the prospective study that you talk about, sending them to look at the results of last year's 20,000 tests in the Government?

Go back 2 years. Leave out the cases where no resolution has been had of the mystery, but take the cases where we now know by extrinsic evidence pretty well what happened, though this takes some evaluation, and then go back over the files.

What did the polygraph operator say was indicated about suspects A, B, C, and D, and rejects C, D, E, and F? I do not see why that would not be a useful part of a study.

Dr. LACEY. I guess I was just prejudging the case, having similar experiences, that one would not be able to come up with much decisive information.

Mr. REUSS. But coupled with the prospective study that you are talking about, would not the two of them enable us to proceed with much more wisdom and certainty than we now have?

Dr. LACEY. I think the retrospective study might serve the purpose of familiarizing the investigators with the difficulties involved in setting up a prospective study. It would be sort of a field study, a pilot study, to see what would have to be controlled and thought of.

I do not think any decisive information would come out of it. I mean this has been the history all the time, of retrospective studies of this kind.

Mr. REUSS. Dr. Orne?

Dr. ORNE. There are a number of reasons for what Dr. Lacey says. We would like to find out, in some study of this kind, what the real accuracy rate is, due to the instrument. Unfortunately, in the life situation, the operators are given a great many hints by the people around them, and you would have to set up a study, for example, to separate the data which you get from doing this test from other data which may be helping or hindering.

Odds are you would, for example, get a higher accuracy rate than the real one in a retrospective study, because I am sure that the operators are getting all kinds of leads.

There is one other point—

Mr. REUSS. I guess I should stay with you on this retrospective study a bit, because I am not sure I understood you.

Let's just invent a case. Let's suppose this involves the U.S. Army, and at Camp Gordon, Ga., of all places, a case of beer was missing from the officers' club, and they got all the boys in barracks 60 out and did whatever polygraphing they do. And either because someone confronted with the polygraph broke down and told all, or because by more normal police methods they later caught and court-martialed the stealer of the goods, the case has now been determined. And let us assume that an independent judgment confirms that it was probably decided rightly, that the person who was found guilty really was, that the circumstantial and other evidence was conclusive.

Then I should think it would be useful to go back over the investigatory file and look at the polygraph papers with the squiggles on them and the notes of the operator, and see what he had to say—which ones of the 40 people given the polygraph test did he think were guilty, and which were innocent. And I should think it would be very helpful to go back and look at that.

LINO MAS 40

Now, is there anything wrong with this approach—coupled, of course, with the prospective study which has been mentioned by Dr. Lacey?

Dr. ORNE. Certainly it would give you data which would be interesting, and I think you have to separate what you are trying to find out.

I think everybody would agree that this should be done, that you should have a look at it.

I think most of us, however, would feel very cautious about interpreting this data, because if you were there, probably you found out that the man who did the polygraph examination did it after having lunch with a fellow who picked up the man whom he was polygraphing, and who told him: "You know, I think I got the one."

Now, if you had a tape recording of it, you would find that this polygraph examination may have been a very different kind of an examination than another polygraph examination.

And even if you look at the wiggles of a pen, as I tried to point out, in the way you ask the question you can make the pen wiggle.

Mr. REUSS. Well, what you are saying, Dr. Orne, comes close to saying that the polygraph is of absolutely no value. What you are saying is that even where it purported to establish that it was efficacious in a particular case, it may well not have been, because the polygraph operator relied upon extrinsic evidence. Thus he pronounced a given set of squiggles as guilt indicative, when, in fact, the same squiggles might have led him to pronounce the man innocent if his extrinsic padding around had shown that probably the fellow had a pretty good alibi.

Is that not about what you are saying?

Dr. ORNE. No, sir. First of all, if this were the only problem, we would be in fine shape. I am worried about the fact that even the squiggles of the pen, which after all we might still be able to look at, might be affected by this extrinsic knowledge.

However, and this is where the laboratory comes in, there are reasons why we do laboratory research, namely, we can control these variables, we stay up nights working out how to control them. And then our colleagues come along and tell us we have not done it completely, so we re-do it.

But you do have control of the situation, so that you can then ultimately get at the mechanism involved.

Now, what we would really like to know—and it is my suspicion that in a life situation, if you control the variables, we could separate out, without too much trouble, by doing the proper research, to what extent you can really get the data from the polygraph record, as opposed to prior knowledge.

It demands certain conditions, surrounding the polygraph situation. It demands that the polygraph examiner has no data about the person, but certain data about the situation. And it would have to be very carefully worked out as to just what data he has.

And only if you did that—and this is what Dr. Lacey is trying to say, I think—in a prospective study, could you then trust where the decision came from.

Mr. REUSS. Well, now, let me pursue this a bit more with you.

Suppose, in our retrospective study for the year 1960, let us say, of this hypothetical case at Camp Gordon, the records, that is, the sheets with the squiggles on them and the notations of the polygraph operator, said that suspects A, B, C, D, and E, whom I have examined, are innocent, because there was no pronounced wiggling of their—

Dr. LACEY. Squiggles?

Mr. REUSS. Of their line; and attached and appended hereto are the questions I asked him, which I carefully preserved for all posterity, being an honest, scientific polygraph operator.

And then suspect F—the polygraph operator's notations indicated—looked awfully guilty. His squiggles were something terrible when the important questions were asked.

And let us further suppose that the court-martial records show that suspect F was later picked up a couple of weeks after this with the identical case of beer, serial numbers intact, in his possession, and was tried and put in the brig.

LINO MAS 41

If this happened, I would say, "Well, gentlemen, we have started on an interesting ex post facto inquiry."

And as far as we have gone, on just this No. 1 case, from Camp Gordon, Ga., it looks as if the polygraph was on target.

In the case I put, could we not tentatively say that as we went on to case No. 2?

Dr. ORNE. Not scientifically, sir.

Dr. LACEY. Could I help?

Mr. REUSS. Well, before you help—

Are you saying it would not be useful to undertake exactly what I am saying?

Dr. ORNE. Very useful.

Mr. REUSS. And it has not been done.

Dr. ORNE. Absolutely. I am agreeing with this completely.

I am cautioning, however, that this really would not prove to me that the polygraph is good, bad, or indifferent, and if I may take an example from medicine, there is the problem of evaluating a drug. We know when a new drug comes out, if you give it to the GP, it is going to work for a certain period of time, and somebody has proposed that you should be sure and use a drug when it is still new enough to work, because after it has been used around a while, it sinks in potency to its actual level. In other words, its placebo effect is less.

And you would not consider today evaluating a drug without giving placebos to other people. But if it turned out that if the doctor knew which drug was active, and which was the placebo, it makes a big difference, because he was giving the active drug with conviction and the placebo without conviction.

And so you not only had to give a placebo, in other words, not only did the doctor have to try it that way, but you had to have somebody else code the pills, so that the doctor who was giving it would not know whether it had an active ingredient in it.

And then you find sometimes very dramatic results with the placebo. Occasionally you see side effects and even serious complications with the sugar pills—these are, of course, either suggestions or coincidences, but the drug is blamed and discontinued because the doctor does not know its placebo until later. A control group is needed to judge complications as well as therapeutic effects.

There is a tremendous amount of data to show this.

Mr. REUSS. Now, how does this apply to the hypothetical lie detector ex post facto visit that I was talking about?

Dr. ORNE. Because we have to separate the extent to which the polygraph operator produced a different polygraph record, by testing the subject in a different way, because he was convinced that the suspect was guilty.

So that it makes a big difference if I ask somebody: Was it No. 1, was it No. 2, was it [with emphasis] No. 3?

Mr. REUSS. You are saying in very clear and illustrative form what I commented on a while ago; namely, even if this test No. 1 that I have posited seemed to say that the polygraph did a masterly job in this case, maybe it did not, because maybe the polygraph operator had extrinsic evidence and was in the shoes of the doctor who gives the placebo.

However, if the Camp Gordon test disclosed that the polygraph operator said, after reading his charts, "Suspects A, B, C, D, and E are innocent, suspect F is guilty," and if the court-martial records later showed that a fellow named X, who was just walking down the road and had no relationship to A, B, C, D, E, and F, had actually stolen the beer and was convicted on indisputable evidence—if this were the result of that polygraph test, then you would certainly say that here the polygraph was not only of no value, but was misleading, would you not?

Dr. ORNE. No, sir. I would again want to know what the polygraph data was, as opposed to its contamination, because it can work for you, it can work against you.

But this is the whole problem: that under ordinary circumstances, the same argument, which I have said might well work for the polygraph, might actually be confusing the thing, whereas if you had it done blind, in other words, properly, properly controlled, and you had a neutral test across the board, you might well find subjects A, B, C, D, E, and F were innocent, by reasonably objective criteria.

LINO MAS 42

Mr. REUSS. But the results of this would have established that the findings of the polygraph operator in this particular case had been erroneous and misleading, from the standpoint of the object of the exercise, which is the detection of crime. In the case I put they pointed to a man as guilty who was in fact, in my hypothesis, innocent.

Dr. ORNE. Sir, I think I understand the difficulty. You are trying to establish what is, with present-day technology.

Mr. REUSS. Exactly. The question I asked this morning: Is it now, in the current state of the art as practiced, a valid procedure?

And it seems to me that one of the best single ways of telling whether it is valid or not is a way that, so far as I know, nobody ever does—to look back over the records and see whether you cannot get some enlightenment there.

Dr. ORNE. I think what both Dr. Lacey and I were trying to answer is a somewhat more basic question; namely, not only is it a valid procedure today but what does the procedure intrinsically have in it in terms of how good is it really potentially?

Mr. REUSS. But I think it is important to distinguish this. It is one thing to have gentlemen like yourselves in your scientific experiments determine whether at some future time the world can evolve something which you might want to call a lie detector which would be of use in employment screening or in criminal detection or something else. It is quite another thing to blithely sit by while our Government undertakes 20,000 polygraph tests a year plus what the security agencies do, and private industry takes hundreds of thousands of such tests a year, without anybody knowing whether they are worth the paper they are written on.

Dr. LACEY, the subject matter on which you wanted to comment has not been covered. I invite you to comment now.

Dr. LACEY. The phrase is constantly being used, "Is the lie detector valid?" I think our whole discussion today and tomorrow will be clarified if we change that question.

This is not a question that the scientist would ask. I think we would ask the question, what is the degree of validity, and under what circumstances was his degree of validity obtained? This perhaps brings out my main quarrel, if we are still talking about retrospective studies, I don't believe there will turn out to be such a thing as a single degree of validity of the polygraph test. The validity, I would suspect, will change as a function of, for example, the subpopulation with which we are dealing.

I think it is very likely that we will get different results with the socioeconomically deprived resident of a large city slum or the embezzler. I believe embezzlers tend to have somewhat higher IQ's than petty thieves.

I think the validity will change as a function of the nature of the interrogation procedure which I am certain is not objectively in the files in the way we would like to evaluate it.

We would need tape recordings of every nuance, of every change of tone.

Mr. REUSS. If I may interrupt you at that point, we were informed by the armed services that tape recordings are frequently made, often-times unbeknownst to the person being examined. This gap in the body of evidence could therefore be supplied.

Dr. LACEY. And I am sure that going around the country to some of the agencies that are using it, this one would fill one gap more or less and that one another gap more or less.

I am also quite convinced, and I mentioned before this is a prejudice—I am prejudging the event on the basis of past experience—I am convinced in no place would we find the kind of data we need. We would do it much more reliably and we could answer your question, too, that is to say, we could set it up—we don't intend to but it could be set up so that lie detection as it is practiced today would go on. There would be either no interference or minimal interference with it.

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TESTIMONY ON THE USE OF THE POLYGRAPH IN
GOVERNMENT AND/OR NON-TRIVIAL SITUATIONS

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LINO MAS 18

No one has really bothered to take all the verified decisions and studied what the probability of being right and wrong are of only those where we in fact know what happened, subsequently. There is no data available.

Dr. LACEY. Indeed, the problem of verification is a very difficult one. Dr. Dearman's case is an instance of a false confession, confession is a common criterion. The case shows that we have to know the reliability of our criteria.

E Dr. KUBIS. I think, as you phrased the question, it was in terms of a dichotomy; where wrongdoing has happened and where personnel screening is to be done. These are two very different issues.

My main objection is to personnel screening that gives a pseudo-guarantee that the individual will act so-and-so in the future on the basis of these results. This is sometimes done on the basis of what he has done in the past.

Although in some instances the past may indicate that he may be do the same thing in the future, this is not inevitable. Once a person has stolen some pencils 5 years ago, this may or may not be a good indicator whether he will steal in industry or in business. There is a different viewpoint in personnel selection from that in police work. In personnel work there is a regard toward the future. In terms of the criminal situation, there is a strong regard and emotion toward the past. The objective is to see whether he actually had done something in the past and to determine whether this is an objective incident.

These two issues, I think, cannot be lumped together. I know there are quite a number of good individuals who obtain results that are greater than chance. Furthermore, if there is no other information obtainable in a criminal case, and it is only in such cases that I believe the lie detector should be used, and if a lie detector in the hands of this individual can add some information; say, can change the balance from 50-50 to maybe 60-40, this is at least added information. Not that it should be accepted legally but this should be used to obtain further information. The information you gain in that interrogation may lead you into new alleys where you, by investigative work rather than by lie detection work, can get added evidence.

Mr. REUSS. Thank you.

Mr. MONAGAN. Mr. Chairman.

Mr. MOSS. Mr. Monagan.

E Mr. MONAGAN. I think Dr. Kubis partly answered the question I was going to ask. In responding to Mr. Reuss, when he asked about the validity of the use of this procedure, you stated you would not use it—and you used the term in “trivial situations.”

Dr. Lacey said something about the determination of the use being a matter of degree.

You have since differentiated between preemployment use and criminal use. Is that the sort of thing you had in mind when you used the term “trivial situations”?

Dr. KUBIS. Yes.

Mr. MONAGAN. In other words, the social considerations and criminal investigations might be more important and might sanction the use where you would not use it either in private industry or in Government in preemployment cases?

Dr. KUBIS. And I think preemployment, too, again can be divided into two parts. There may be certain types of positions where you may have to know the background of the individual, involving very important security considerations, where that type of background may be used by somebody else to the detriment of the organization. Such information may concern the vital security of the Nation, and it could be detrimental to that organization or to the country, if others may make use of that individual. I am considering as trivial, non-sensitive jobs; say, clerical jobs.

Mr. MONAGAN. The importance of the interest to be protected might justify the use to a greater degree?

Dr. KUBIS. That is right.

Mr. MOSS. Any further questions?

LINO MAS 23

you are using it, somewhere between 75 and 80 percent, depending on the study. This is untrained people in the sense that all you are making is a judgment, which one of these five wiggles is bigger than the other wiggles.

So I would say there is a basis, a scientific basis on which you can say there is phenomenon that works.

Dr. LACEY. It is not judgment; it is a matter of measurement.

Mr. HARDY. But do you know what it means?

Dr. LACEY. I said before, sir, everything from that point on is an inference.

Mr. HARDY. That being the case, if it is an inference, who are we or who are you to pass judgment on what the thing really infers?

Mr. REID. If the gentleman will yield?

Mr. HARDY. I am through. I am just as lost as I was when I came in.

Mr. REID. In pursuance of your erudite and your most expert questioning, could I ask just one other?

We have had information before the subcommittee that indicated that only about 30 percent of certain polygraph tests have been ever verified. I believe, Dr. Orne, you said there has been no real study of verified cases. You have also said that there is some probability of false innocence and false guilt. Therefore, we do not have any verifiable data, do we, that actually proved out, that the cases in the polygraph and the tracings all checked out. Therefore, are we not trying to use a procedure that has no real backup statistically through verified cases?

Dr. ORNE. I think this is the problem of the base you use. I would be personally interested, I don't happen to know the data but it would seem to make sense to me to look at the cases which have been subsequently verified, because there is no reason that these cases are particularly different from the other ones and judge from these cases what the total accuracy rate ought to be. That would be the best approximation we could get at the moment. There is no question that this is a feasible procedure.

When we talk about 80 percent accuracy rate, and I would like to go back to this point for a moment, if I may, we can set it up so that we can maximize the probability of accurate determination of innocence and accurate determination of guilt. If you do that, you use the best cutoff point, you end up with roughly 80 percent accuracy. You can also set it up so that you get essentially 100 percent accuracy in terms of innocence, but that means you are going to drop your accuracy of picking up guilt to maybe 50 or 40 percent. You can also for another purpose decide you are going to get 100 percent accuracy of picking up guilt but then you inevitably pick up a lot of false innocents.

Mr. REID. Does that not really say this: that there must be very substantial thought given to the administrative decision which is what you are talking about, as to precisely what you are doing, what relevance the results might have and whether, in fact, they lend themselves to verification or not.

Dr. ORNE. If I may just carry out this example for a minute. If this were, let us say, used for fairly trivial purposes, then I would for one want to be certain that there is just about as close to zero probability of picking up somebody innocent and calling him guilty. If we lose a lot of guilty people, that is just too bad.

If, on the other hand, this were, let us say, a very vital security issue, I think it would perhaps be legitimate to say we just can't afford to have the wrong fellow here and we will have to exclude people who would be perfectly fine but we just can't take a chance. It is then an entirely different issue.

Now, this is more of an administrative decision. All the scientist can tell you is how good your data is. Then somebody else has to make the decision what he should do with it. This business of 80 percent accuracy really is not meaningful unless you begin to ask at what point are you accurate and you can't have it both ways. If you want to eliminate all people who could conceivably be guilty, you are going to be including people who are innocent. If you want to get all people who are innocent to be sure they are innocent, you are going to be missing some people who are guilty.

LINO MAS 31

Dr. DEARMAN. How do you know he has more information about this particular situation you are questioning on? Why could it not be a similar situation in the past?

Dr. LACEY. Really, Dr. Orne, let us take Dr. Dearman's case. The polygraph was correct. The diagnosis of guilt was an incorrect inference.

Dr. DEARMAN. Yes; it recorded properly what it was set to record.

Dr. LACEY. The bank examiner said that is nonsense, such a theft was not made. Only then with that kind of background information you go back and say, "Look, you did not steal from the bank. What is going on?" That is what we meant before when we said the physiologic disturbance is just that.

Mr. MOSS. Gentlemen, I would suggest that in order that we avoid anxiety over a possibility of a lunch break that we now recess until 2 p.m.

(Whereupon, at 12:30 p.m., the subcommittee recessed, to reconvene at 2 p.m.)

AFTERNOON SESSION

(The subcommittee reconvened at 2 p.m., Hon. John E. Moss (chairman of the subcommittee) presiding.)

Mr. MOSS. The subcommittee will be in order.

E I believe when we recessed, we had a very interesting discussion going on, but we cannot resume with it immediately, because Dr. Lacey is necessarily delayed in returning to the committee.

Dr. ORNE, you indicated that under certain conditions, for security considerations, where information is needed, or additional information is needed, you felt there was some justification for using the polygraph technique as a preemployment screening procedure.

Is that correct?

Dr. ORNE. Yes, sir.

Mr. MOSS. Generally, do you feel that the polygraph should be utilized as a preemployment screening device?

* Dr. ORNE. As a personal view—both of these are obviously personal views—no.

Mr. MOSS. On the basis of your knowledge of techniques currently employed in the field, not in the laboratory, in general screening for preemployment, has it validity?

Dr. ORNE. I again would like to separate the two aspects of validity.

If you ask the question: Is it accurate?—it is certainly better than chance. I am convinced of that.

Mr. MOSS. Better than what chance?

Dr. ORNE. Better than just flipping a coin. In other words, if you were flipping a coin and on the basis of that were making decisions, where you would be right half the time if it were a two-way choice—it is appreciably better than that.

Now, how you are going to use it should be an administrative kind of a decision, depending upon the stakes involved.

If I could, I would like to just try to spell this out perhaps a little more, because I think it is a basic point, which tends to be overlooked.

The use of the polygraph allows you to come to a kind of statement about the probability that a given individual believes what he is talking about. Now, that is all you get, really, a probability that this is so.

You can then choose to accept for different purposes different kinds of probabilities. Provided you think of it in this way, there are undoubtedly some positions in the Government where it is vital for the security, let's say, that we do not pick somebody who is a wrong person, for whatever reasons.

Let's say that there are a thousand people applying for 10 jobs, so that we have got a very high rate of selection that we need to do. Given an instrument of a relatively low degree of accuracy, let's say one that is accurate 70 percent of the time, instead of 50 percent of the time, that would be chance—

Mr. MOSS. The instrument is accurate each time, is it not?

Dr. ORNE. The instrument always gives you data, but the determination, in terms of "if you knew all the facts," whether a person really believes what he is saying, will be accurate 70 percent of the time, compared with what it really is.

Now, this is not a very highly accurate tool. It means that you are batting 70 percent, instead of 50 percent, which would be a chance thing.

LINO MAS 32

E However, if you have to pick only 10 people out of a thousand, let's say, you can, even with such a poor instrument, with a very high degree of accuracy, pick 10 people, where it is highly improbable, very improbable, that any will belong to the wrong category.

Mr. Moss. Doctor, how do we know if I flipped the coin I would get 50 percent, rather than 70 percent? Would that not depend on the kind and the manner of flipping it?

Dr. ORNE. Oh, yes; I am assuming an unbiased coin flipped in an unbiased way 70 percent of the time.

Mr. Moss. But I could get that with a coin.

Dr. ORNE. Yes.

Mr. Moss. And I might get less than that 70 with operator A rather than operator B?

Dr. ORNE. Yes, certainly.

Mr. Moss. To your knowledge, has anyone in the commercial use, the Government use, the nonresearch or professional use, of the polygraph, undertaken any studies which would be valid as statistical indexes of results?

Dr. ORNE. The studies of commercial lie detection? Is that the question, sir? None that I know of well enough so that I would be comfortable about saying that I would trust the statistics, no.

Mr. Moss. Dr. Kubis, do you have any view with regard to such studies?

Dr. KUBIS. No. The only data that are available, which is a large body of data in terms of numbers, is from the Keeler group, which I think now are the Reid and Inbau group. They have been publishing these statistics since they have been editing their book on lie detection. There is a fairly large group of data there on non-Government statistics with regard to lie detection.

I do not know, but I think there should have been, if the Government is using it in certain of its operations, a periodic check on the accuracy of this work. There must be some sort of data, some sort of feedback, or these people would not feel confident in using such an instrument.

E Mr. Moss. What criteria should be utilized as a minimum in making such a recheck in order to develop meaningful and reliable statistical information?

Dr. KUBIS. There are various numbers that are used to develop statistical significance. For example, there are numbers like 10 percent error, 5-percent error, 2-percent error, 1-percent error, that may be tolerated.

The selection of the error that you wish to tolerate in the procedure depends upon the seriousness of the material that you are working with.

I should like to have an error of much less than 0.00001 percent of the times that this object, which may have an atomic component in it, will not explode by itself. I would want terrifically high significance, which means very low probability that this should explode.

Therefore, if we are dealing with security cases, important cases, I think that the probability of error should be very small.

If people want to deal with some other types of cases, and they have to use such an instrument—assuming it is legal—then the error in such instances can be larger. In other words, the error that I would be willing to accept or anybody would be willing to accept could be larger.

It all depends upon the seriousness of the mistake that you would be willing to tolerate.

Mr. Moss. To see if we can tie this down, let us look at the staff report, the table on departments.

Let us take, for example, the Department of the Army, military intelligence, and military police. And during the year 1963, military intelligence conducted screening examinations on 8,094 persons, and military police conducted criminal interrogations on 4,400 persons. And let us confine ourselves to the 4,400 tests performed in the course of criminal investigation.

LINO MAS 34

Dr. KUBIS. Merely from this point of view, he would have to be examined, because there is sufficient evidence that has been gathered that he is likely to have been connected with the crime.

Mr. Moss. Should we know something about his personality traits when he is in that booth, along with the examinee?

Dr. KUBIS. Yes. We should. If the examination is well conducted, we should know quite a bit about the examinee.

Mr. Moss. After the operator is convinced of the infallibility of this device, this multigraph gadget—

Dr. KUBIS. He belongs someplace else. He is God, then unfortunately, this is the tendency in some beginners.

Mr. Moss. It would probably surprise you, or maybe it would not, to learn that as chairman of this committee I have had many communications in recent weeks from men who assure me that this is "a most reliable, scientific device." These are men who are engaged in commercial polygraph activities all around this country who, in their communications, indignantly charge that I am attempting to destroy them.

Dr. KUBIS. These men have an ax to grind.

Mr. Moss. Well, if that is their conviction, how objective will be the job of interrogation?

Dr. KUBIS. This is the matter of training that you brought out this morning; namely, that we should know something about the individual and how good he is both morally and in terms of capability and training—scientific training.

Mr. Moss. The operator is very important, then?

Dr. KUBIS. Exceedingly important, because the machine does not say a thing. It is the operator who does the work.

Mr. Moss. All right; can we then make an analysis of the results obtained from these 4,400 cases, without knowing considerably about the 205 polygraph examiners who gave the tests?

Dr. KUBIS. No; unless they have kept records.

Mr. Moss. Have they kept records?

Dr. KUBIS. Probably they have records on the verified cases. As for the others, I do not think we can make much of a judgment.

Mr. Moss. But can you make an analysis of this, pointing to the accuracy or reliability, without taking into account all of the cases?

Dr. KUBIS. All of the 4,400? No, you cannot; because some of them will not have been verified.

Mr. Moss. And normally, the ones that are felt to be truthful or innocent will not be followed up after examination, will they?

Dr. KUBIS. Normally, no.

Mr. Moss. If the person breaks down and confesses, is that a positive result even though it might be a false positive?

Dr. KUBIS. This is rare—that the man confesses to a crime and he had not committed the crime. This is rare, in general.

Mr. Moss. What statistics do we have on that?

Dr. KUBIS. Only the publicity reports that appear now and then. Roughly about once or twice a year you get a case where the man has confessed, and then he retracts his confession.

Mr. Moss. And then we get those that make the newspapers?

Dr. KUBIS. That is right. But usually a man who has not committed a crime will not deliberately admit that he has done it unless he wants to show up a procedure. He may do this as a test case.

Mr. Moss. I regret that I am not going to be able to pursue this, although I hope to either later in the afternoon or tomorrow morning. I have another meeting right now.

Mr. Reuss, would you take over?

Will you gentlemen pardon me?

Mr. REUSS (presiding). Mr. Monagan, do you have some questions at the moment?

Mr. MONAGAN. I have just one question.

Speaking about the advisability of the procedure in broad terms, you have cast some question upon its validity in various aspects; largely, as I take it, on the basis of its reliability as a technique.

Do you have any question, based on broader philosophical considerations, of the degree to which this procedure invades, or may invade, the privacy of the individual?

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Dr. KUBIS. With respect to myself or the group?

Mr. MONAGAN. Anybody that has any opinion about it. It could be raised in connection with criminal cases, but I think it is more applicable in the preemployment situation.

Dr. ORNE. As a private individual, for example?

Mr. MONAGAN. Yes.

Dr. ORNE. Certainly I do, and I think all of us have very real concern about many developments in technology, and the potential implications, and I think the ones here are very real, as real as, for example, wiretapping, which I brought up, which concerns me very seriously.

Mr. MONAGAN. This is not quite as bad as that, because that is usually totally involuntary, and at least for the outward manifestation of this, you do have consent.

But I think it has previously been suggested that there may be byproducts that are not foreseen in the course of investigation, and we are so sensitive, now, to the invasion of privacy in so many ways that I just wanted to ask that question.

You are dealing with this all the time in the laboratory in a very practical way, but I wondered if you had some feeling about the broad implications?

Dr. ORNE. I think there are real implications, and the problem of safeguarding the individual is a very concrete one and a very real one.

I think that equally so, probably if there were a situation involved where the real security of the country is at stake, provided the individual is still safeguarded—this is a big “provided,” because the end does not justify the means beyond a point.

But I think, then, under these circumstances, if it is a position which involves very sensitive security things, just the same way as you would exclude some people on the basis that maybe they had a friend that people are unhappy with.

Now, this is really unreasonable—that you should exclude somebody because he has the wrong friend—and it bothers me. But I still cannot argue with it as long as it protects an individual.

Mr. MONAGAN. You get back more or less to the same balancing of the interests that we were talking about before, except that, you do feel that, in addition to technical defects, this possible invasion of individual rights or prying or whatever you want to call it might be an important consideration, depending upon the importance of the interests involved.

Dr. ORNE. My only comment on it would be that I think none of us here—none of the four of us—would be any more expert on this particular issue than any other four individuals that you would happen to ask.

Mr. MONAGAN. I realize that, but I just wanted to ask you.

Thank you, Mr. Chairman.

Mr. REUSS. Gentlemen, I wanted to clear up what was a little confusing to me in the record this morning, a matter having to do with the claimed percentage of performance on these polygraph tests.

Both Dr. Orne and Dr. Kubis mentioned the figure of 75 or 80 percent. When you used that figure, you were talking about laboratory tests, and you were not talking about actual lie detector tests on real people, were you?

Dr. KUBIS. That is right. These were laboratory figures.

Mr. REUSS. And so far as any member of the panel—any of you four members of the panel—know, the actual verified percentage of success of lie detector tests actually undertaken for employment screening or wrongdoing detection purposes is negligible?

Dr. KUBIS. The amount of verified material—the only source I know is the Chicago group.

Mr. REUSS. The Chicago group includes Mr. John Reid?

Dr. KUBIS. That is right.

Mr. REUSS. Now let me ask Dr. Orne of Boston about that.

Mr. Lawrence A. Gustafson is a member of your staff; is he not?

Dr. ORNE. Yes.

Mr. REUSS. Are you familiar with the article that he and some colleagues wrote in the December 1962 Harvard Business Review, entitled “Don't Trust the Lie Detector”? (See pt. I, hearings, p. 147.)

Dr. ORNE. Yes.

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Dr. DEARMAN. No, sir. Would you like me to read the letter from her that she has written?

Mr. KASS. Please do, Dr. Dearman, but just the pertinent parts.

Mr. Chairman, could we insert the letter in the record?

Mr. REUSS. Without objection, it is so ordered. (See exhibit 20, p. —.)

Dr. DEARMAN. You have the entire letter in the report I gave you; in the 200 pages. This letter is dated April 1, 1962, as follows:

I would like an opportunity to come to Charlottesville and speak to the doctors in the Department of Psychiatry to enlighten them on what the polygraph does accomplish so they may know how it may be used in any future research regarding human personality. The best of luck to you on the publication of your article. I shall be looking forward to receiving a copy of it. Let me say again what a pleasure it was working with you on this. It marks one of the highlights of my polygraphic work this year.

Mr. KASS. This was signed by the polygraph examiner who examined the second case?

Dr. DEARMAN. Yes.

Mr. KASS. Thank you, Dr. Dearman.

Dr. LACEY, you stated earlier that in the critical areas of our Government—and I assume you meant agencies like the National Security Agency, Central Intelligence Agency—it is possible to use a lie detector under—and I think you used the words “with all sorts of precautions.” Could you define what type of precautions are necessary? In fact, I think the panel could answer this.

Dr. LACEY. Well, I have to be an idealist, again, in answering that question. Now, we change from the scientific aspects of the participation of physiological response in behavior to the protection of the rights of individuals and here I feel very strongly. I must admit that if a tenth of what I have been reading in the newspapers is true, I am horrified at the casualness with which this is handled.

Let me start out by saying this: Even a test with relatively low validity can be shown and, I think all of us who have worked in this area will agree, as a mathematical consequence can be shown to improve the probability of making a correct choice. For example, taking an entirely unrelated subject, in World War II, we had to produce a great many pilots, bombardiers, and navigators, and we had to produce them in a hurry. We were up against it. A massive program was mounted, the aviation psychology program, for the selection and classification of aviation cadets.

In the course of a few years, with a sort of a small-scale Manhattan project, a considerable variety of tests and procedures were devised which had validity against a given criterion; the first step in the process of producing pilots, bombardiers, navigators, namely graduation from preliminary training. These tests, taken singly, put together in proper multiple repression form, had a validity which I would be surprised to find exceeded by a polygraph examination. The validity was such, however, that there was a great deal of misclassification of the individual. There were many false positives and many false negatives. Nevertheless, given a very large population, a very large labor supply, if you will, and given a very high cutoff point, we could demonstrate retrospectively and prospectively that at one stage of the war when we had a very large supply and very small number we needed to select we could guarantee about 90 percent graduation from the class if my memory is correct. It was very, very satisfactory.

Now, then, the rights of many individuals were violated. That is to say, there were many false negatives, there were many people we denied the opportunity to engage in training for pilot, bombardier, and navigators. They might have made good pilots, bombardiers, and navigators; better than the ones we chose. We goofed many times with false positives.

Unfortunately, too many of the young lads we admitted to the program spun in and killed themselves and killed their comrades on training missions, and so on.

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reasons to the contrary that these are not serious enough matters for which lie detectors should be used. It is a tremendous waste of valuable time unless there is an important principle involved where you may want to deter more serious behavior and not have such things happen very frequently.

But to use lie detectors for very minor thefts just because, say, the bank has examiners on a yearly retainer fee and has them examining for small losses of about \$10 or \$15, I think this is a derogation of the possible scientific value that a lie detector may have.

It is these types of procedures that often attempt to predict what the man will do in the future. About 15 years ago somebody from an insurance company had asked me whether I could do this. They would be willing to pay high fees. I turned them down flatly. I told them very realistically that one can never predict what a man will do in the future, say, in terms of whether he will steal or not. This is an impossible matter as far as I am concerned. Anybody who attempts to do so puts himself in a very unfavorable position.

However, I am sure that that organization did get somebody to work with them on this type of procedure. The present-day excuse for such usage is that it will prevent people from stealing. This is a different issue. There may be better ways of preventing people from stealing. You may not need to have a lie detector around to use as a preventive measure.

It is uses such as these that I object to very strenuously. The instrument is not being used in a scientific manner but is used as a bugaboo. These types of procedures degrade any scientific application.

As a comment on the qualifications, they may have in terms of years of investigative experience some of the things I would like in an investigator, although there is no guarantee from the numbers that are given in here, 1 to 2 years, or 5 to 8 years, whether those are real training and sound investigative experiences.

Mr. Moss. You are undoubtedly aware of some of the types of articles which have been printed extolling the virtues of this machine for personnel screening, aren't you?

Dr. KUBIS. Yes.

Mr. Moss. One of them was submitted by one of the witnesses in the earlier hearings. I will ask you to look at that.

Mr. KUBIS. I am not in favor of such screening procedures where there are no basic issues involved, such as whether a man has done something which is serious and which is a violation of law. These procedures are often searches into the past of the individual which may damage the individual. They not only upset him but damage him because they elicit information from him that can be used against him. We have no way of guaranteeing that such information will not be put into the hands of unscrupulous individuals. We do not know whether the secretaries have access to such files and will spread information of this sort around. To get such information about the personal lives of individuals when nothing serious is at stake, I think is a danger that creates all of the unhealthy aura that surrounds lie detection procedures.

Mr. Moss. Dr. Lacey, this morning, as I recall, you were reluctant to stipulate that there would be justification but you stated that there might be justification in certain areas in our Nation's life where the polygraphs can be used. I think you inferred that these areas would be those bearing strongly upon the security of the Nation.

Now, if there are those areas, and I think it might be well here to briefly summarize the assignment this committee has been given. Congressional committees do not start out on fishing expeditions. For instance, this committee has spent more than a year in very careful preparation for the hearings previously held, the hearings today, and other series which we will hold before we finally conclude the work of this committee. Our assignment was to make an evaluation, an overall evaluation, of polygraphs as they are used in Government.

Now, explicit in that instruction to the subcommittee is the requirement that we make findings and conclusions and recommendations that we will file formally in a report to the Congress.

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Now, in carrying on this type of study, we expend a fair amount of tax dollars, so it is expected that we will come up with recommendations that are properly documented. Of concern to the subcommittee is the use of the polygraph by agencies deeply involved in the security of this Nation.

Now, if there are valid reasons why the polygraph be routinely used in personnel screening, in periodic reexamination of personnel before new assignments, and before promotions, then we would first agree that the Nation's security is involved and, therefore, it is a most important area.

Would you require in this field more carefully trained, more highly qualified personnel operating these devices?

Dr. LACEY. I think before you returned, Mr. Moss, a similar question was asked and I gave my feelings about it then. But I can state them again, if you wish.

I think the essence of my answer was yes, I think the polygraph should continue to be researched in these agencies but that they should be covered by the most intensive legal and administrative supervision that can be mustered.

Again before you returned, we were building up the concept that a technician can take a polygraph record, but it takes a great deal of training and caution to say anything more, to interpret it. I think I said that for my part the only thing I would ever be willing to interpret in a polygraph record is that there is some evidence that this set of stimuli has some special differential significance for this individual. It does not mean guilt or innocence, does not mean that he is a homosexual or has latent homosexual tendencies. It means there is some differential significance. What it is remains to be determined.

This may get to be a complicated medical, psychological, legal, and administrative decision.

I also stated that when it is deemed necessary to use this technique, which under favorable circumstances will have better than chance validity, when it is deemed necessary—and I am not prepared to spell out, you know, what the basis for “necessity” is—when it is deemed necessary to use it, one should go all out to protect the rights of the individual concerned.

I gave a hypothetical case of a thousand agents being available as a pool from which 10 agents have to be selected for some specific job which requires some specific something or other. I feel that it should be made very clear to everybody concerned, that everybody concerned from the technician up to the final person who makes the decision, everybody concerned understands there will be false positives, that many of the 990 who are not allowed to go to this job are not therefore necessarily guilty of anything or possessed of any bad attribute or attributes; that we were playing an actuarial game here for the good of our country; that, therefore, this record should never be part of the individual's dossier; it should be expunged from the record entirely; it should never follow the individual beyond that point.

The only reason it was used is because we want to increase the probability of selecting the proper 10 people for the job. It is only increasing the probability. That is the sort of thing I had in mind.

Mr. MOSS. Is there disagreement?

Dr. DEARMAN. No, sir.

Mr. MOSS. In other words, this is the consensus of the members of this group?

Dr. ORNE. Yes, sir.

Dr. KUBIS. Yes, sir.

Mr. MOSS. Mr. Kass?

Mr. KASS. Dr. Orne, you stated earlier that you have no question in your mind, and I think the panel is in agreement, that the polygraph works—in your words—better than chance in a laboratory. Now, what about in a field situation? Are there many variables that must be taken into consideration? What are these variables? I realize they are probably numerous.

Dr. ORNE. They are many. I think a great many of them have been brought out. The kind of person it is, the kind of interaction that is going on. The amount of data which the examiner has beforehand. His biases and beliefs and how he communicates these. The individual's physical and mental well-being, and so on.

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that I raised, and there may be others, one of the presumptions was ruled out, this man did not in fact steal the money. Therefore, we have other presumptions that this man is excessively sensitive to any questions implying threat or that there is some neurosis here.

To Dr. Dearman's credit as a psychiatrist, he detected the possibility of some neurotic interconnection, some displacement, some condensation of the symbolic stimuli involved, and proceeded to track it down. Within the limits of clinical judgment and within the tests you produced and which you predicted would change the polygraph record in certain ways by changing the nature of the questioning which was a very logical and scientific thing to do, Dr. Dearman was able to arrive at a conclusion which seemed to him, and to me, much more in accord with the facts, that we are here dealing with a neurotic individual.

I say again the case exemplifies two things; under proper conditions, the polygraph examination proved reliable, and that an intelligent investigation ruled out two of three possibilities—there may be more—and came to a correct conclusion.

Mr. REUSS. Now let me ask this question since I think you have stated your answer. Bearing in mind the whole case, however, that the bank had not had any thefts from it and that the bank then administered this test to an uncounted number of its employees. And in this case, although the man falsely accused by the polygraph operator did not, thank God, go to jail, he does seem to have required psychiatric treatment, and so on, and has spent an awful lot of time fussing around with this. Wasn't this whole procedure asinine? What do you have to say—as a citizen and expert—on the bank subjecting its people to this sort of treatment?

Dr. LACEY. I will repeat what I said before.

Mr. REUSS. Why should we have had a polygraph here at all?

Dr. LACEY. Oh, there are many answers to that. Dr. Orne's point yesterday, with which I heartily agree, was that we must acquire information if we can show that it is reliable and valid information.

Mr. REUSS. That a bank should—

Dr. LACEY. May I finish?

Mr. REUSS. But I would like you to be responsive to my question which is whether in this particular case it seemed good policy for the bank to put all its employees to this test without there having been any loss or defalcations.

Dr. LACEY. I have not changed my opinion since yesterday at which time I said that the so-called lie detector procedure may well turn out to be a useful channel of access of information.

In the present state of knowledge, the number of false positives and false negatives are likely to be so large, that the risk to an individual's life and reputation are so great, that the invasion of privacy is so great, that it should be used only with the greatest caution when other considerations, such as vital security of our Nation enters the picture.

Now, I am prepared to be responsive. If you ask me, should this man have been administered on a routine basis polygraph checks—am I correct, is that what they do?

Dr. DEARMAN. Yes.

Dr. LACEY. I say, no, sir; they should not have. But the reason you find me squirming and resisting the words you use, such as asinine and unscientific, is that I do not believe the procedure is asinine or unscientific. I think one has to arrive at a balanced judgment of what is going on, that it should be used only with the greatest of care.

I do not have an axe to grind for the polygraph operator. I am not one. I do have an axe to grind, frankly, for the utilization of an objective physiological measurement in the interpretation of what is going on in human behavior. This, I devote my life to. It is a very dangerous venture in our current knowledge. It is beset with many, many hazards. But it can be a useful tool in proper circumstances. I don't agree that routine preemployment screening in a department store is a proper circumstance. I am sorry if this puts some people out of business, but I simply don't agree with that.

If I were a polygraph operator and doing this, I would simply resist the temptation to say anything other than there looks to be excessive response to these stimuli.

Let us investigate further. I certainly would not permit any such record coming out of my laboratory to become part of anybody's dossier.

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Along these lines, to create an impression that a procedure is no good because there are mistakes and in this particular instance, on the basis of a single case, is like saying the whole thing is no good at all. Such cases of error will always exist as long as the human individual is alive and will be making judgments.

Mr. Moss. Don't you think we have another decision that we must make, whether it is necessary to tolerate this method of invading the privacy of the individual, whether the need for it is so great that our society must tolerate it? Yesterday, I think it was the consensus of the panel that there were areas of our national life where our security was involved, where we might have to tolerate this. But the pattern at the moment is one of a rapid growth and expansion of the use of these imperfect instruments in the hands of inadequately trained, imperfect individuals. This constitutes a major invasion of the privacy of individuals not even suspected of crime, where the price they must pay for seeking employment is the probing on a broad basis in not only their conscious but their subconscious mind, where dossiers are built up and transferred from one employer to another and permanent prejudice can be created.

Can we tolerate this in our society? Should we tolerate it?

Dr. KUBIS. We should not tolerate such invasions when the matter under investigation is not serious from the point of view of the social obligations that that individual has to maintain or live up to in that society.

There should be serious matters for a lie detection examination. I am very strong on that point, myself, Mr. Moss. I don't believe they should be used in trivial cases. I do not believe there should be continual checkups. I am strongly in disfavor of its use as preemployment screening for types of jobs that don't seem to have serious matters connected with them except for the loss of limited and sometimes trivial amounts of money or property.

As you have said very rightly, Mr. Moss, this is a matter of weighing money against the reputation of an individual, and you cannot equate these two variables.

The reputation of the individual, his dignity, have to be protected and maintained.

Mr. Moss. This can become very insidious, can it not, if you have an employer in a community who routinely screens applicants through a polygraph. Now, most applications for employment contain a question, "Have you ever been refused employment? If so, will you give the details?" Now, if this employer who refused to employ an applicant on the basis of a polygraph examination should be referred to later, does he say that "I refused to because he could not pass a polygraph test."?

Dr. KUBIS. This is a very unethical use of the polygraph. Even if it had been an occasion where in the individual failed to meet certain requirements, this still does not imply that that individual in any way has done anything wrong. Even if he has done something wrong but has paid his debt to society, it is also a matter of ethics whether such information should be used in ordinary types of employment.

This is a problem which an ordinary employment interviewer is faced with in working with people who have returned from prison. It places a great responsibility on the interviewer to decide whether he should give this information to an employer. In most cases the interviewer is correct if he does not give this information to an employer provided that individual meets all the requirements of the job and provided this does not involve any serious security matters to the detriment of the societal structure into which he is entering again. This type of information should be disseminated just for the sake of blackballing this individual from other types of jobs.

Mr. Moss. Well, I sense a broadening here of the possibilities of justified use. I thought that we had agreed that it would be in those areas where the security of the Nation might be involved.

Dr. KUBIS. That is right.

Mr. Moss. Yet, I dare say that its use today in preemployment screening, where there is a remote connection with the security of the Nation, is almost an immeasurable fraction of the total.

LINO MAS 71

Dr. LACEY. I would like to say two things. You may remember—I can't remember, sir, whether you were here or not—I agree for my money, as far as I can see, the only justifiable use of lie detector—the only one I would feel comfortable with perhaps is what I should say—would be where the need is great, as is the case where the vital security of our Nation is concerned. Here I would say that the use of the polygraph technique or kindred techniques is far from asinine. But, sir; whenever that statement is made, then the additional statement is also made that this has to be protected by tight, legal procedures, that this technique should be viewed as is a clinical technique in medicine, as one piece of information to be integrated with many other pieces of information by as skilled, as experienced, as human a person as can be obtained.

In our democracy, the adjudication of guilt or innocence is a matter of due process, it is a legal, judicial procedure, and it should always remain so.

The second thing I would like to say is evoked by the talk about the insidiousness of the technique. This aspect of it has not been touched on yet in these hearings. In casual conversation last night with a gentleman, he informed me that—I don't really remember all the details of the thing, but it ran something like this. Some crime had been committed in some industrial organization. This gentleman found, much to his surprise in questioning a large number of responsible labor representatives, that a very large number, a very large proportion of these said, why, of course, a polygraph examination was acceptable to them.

This raises the question of the public view, the uninformed public view, I may say, of the so-called polygraph examination.

I consider it a degradation of a scientific procedure, and I repeat, Mr. Reuss, this is basically a scientific procedure. I consider it a degradation of a scientific procedure when the public or people subjected to this procedure are misled as to what is involved.

I strongly would like to see widespread dissemination of the fact that this is an imperfect tool, that false positive errors occur, that false negative errors occur. So that an individual never approaches the examination with the understanding that he can't beat the lie detector. This is practically a force method of eliciting a confession, if my understanding of the field is correct, and I hasten to say this is not based on my personal experience. But if it is indeed true that a polygraph operator says, "This shows you are guilty," and thereby elicits a confession, I am afraid I react very strongly against that procedure.

Now let me point out, and this is a social decision which must be made, that if this information were widespread, if indeed an individual taking a polygraph examination felt that the lie detector was not unbeatable, that it was a record of physiologic responses which change under a variety of conditions, this may lower the validity of the lie detection examination in practical matters. In all ethical views, I think, unfortunate as this may be for the practitioners of lie detection art, this is the only justifiable, democratic ethic.

Dr. DEARMAN. May I say something at this point?

Mr. MOSS. Certainly.

Dr. DEARMAN. It seems that Dr. Kubis thinks that I put a lot of emphasis on this being a single case and we should not draw so many conclusions from it. In medicine, when I discover something, it should be reported, as far as I can see. If it is no good, somebody is going to find out it is no good and they will tell you about it, but if it is good, you get verification.

The only thing I will say about the single case is that this is the first one ever reported. It has brought out information that heretofore I could find nothing about in the literature. And, in my mind, it should raise a doubt in all scientists about such a procedure.

Mr. REUSS. May I ask a question of the panel?

Mr. MOSS. Dr. Kubis wishes to comment.

Dr. KUBIS. I have no objection about a single case because all single cases in the negative should be reported and should be studied so that further information can be gained as to why a mistake has been made. This is absolutely essential. In this particular case, I feel it was a very poor question.

LINO MAS 77

In this case, we go from 15 to 25 percent full scale. To me, it is obvious, then, that the choice of the method of display can influence what your eye sees.

What is not so obvious, and would require even some more arithmetic to demonstrate is, that if you display in terms of beats per minute, what is visually presented to you is more in accord with the so-called law of initial value. If the heart is beating very fast, the intercycle time is very small, very short. Therefore, a small change in rate will not be displayed very much in the tracing of periods. With the law of initial value, a very small change in period wants to be looked at as a big response.

Going from 120 to 124 beats per minute may, for this individual, at that level of function, be very great. Going from 120 to 124 beats per minute would be only a little bit of displacement where we trace period.

At that level, when we are dealing with those numbers, that little change in period becomes a very big change in rate. So, a cardiographometer calibrated in terms of rate where each cardiac cycle is translated into its reciprocal beats per minute will give you a visual picture more in accord with the law of initial values.

Mr. KASS. So if I were to run around the block four or five times—especially running around the CIA building four or five times—my heart would be beating very fast. Presumably even though I were lying, it would not be noticeable to the naked eye at the point where the increase rose?

Dr. LACEY. Yes, that is correct.

Mr. KASS. These are the types of procedures and qualifications and limitations you would place on the use of the polygraph in the Federal Government.

Dr. LACEY. Yes—technical. My feeling is that the ethical ones far outweigh the technical ones. We can solve these technical ones.

Mr. KASS. We could, but are these technical problems solved today in the Federal Government using the commercial polygraphs?

Dr. LACEY. No, not on this display.

Mr. KASS. Since the Federal Government does purchase its polygraphs commercially, I assume that this chart and this polygraph is the same as that used in the Federal Government. So you would say the technique is not solved today in the Federal Government, these problems do exist?

Dr. LACEY. I don't know what machines are that they use.

Mr. KASS. On the assumption it is the same as this one.

Dr. LACEY. On the assumption it is the same as this, they do not take advantage—

Mr. KASS. Dr. Dearman, do you know what instrument was used in that examination?

Dr. DEARMAN. No, I don't. I would assume that it was made by Keeler in Chicago.

Mr. KASS. But you don't know?

Dr. DEARMAN. This is a book that the operator sent me, so that I could learn something about the polygraph.

Mr. KASS. But you don't know?

Dr. DEARMAN. I don't.

Mr. KASS. Dr. Kubis, could we get back to the question I asked you earlier?

Dr. KUBIS. In terms of looking at question 6?

Mr. KASS. That is correct.

Dr. KUBIS. I would agree that the response that measures the changes in the cardiovascular system here is a large response in comparison with other responses in the same record.

I would agree, too, that the galvanic skin response here is relatively nonsignificant. I can't discern any change in it that I would call large or deviant, large in the sense that they connote changes in the skin reactivity of the individual.

Mr. KASS. It is not what you would call positive?

Dr. KUBIS. That is right. I would not call this positive.

With regard to respiration, I would agree with Dr. Lacey that this type of response to question 6 occurs elsewhere in the record but in line with the techniques that are illustrated by Lee in his textbook and Inbau and Reid, this is the first instance where we get a diminution in the respiration size, the amplitude; so the operator may have used this as a clue.

LINO MAS 84

Mr. KASS. That was a study in psychosomatic medicine by Reiser?

Dr. LACEY. Yes.

Mr. KASS. Volume 17, 1955, "Psychosomatic Medicine," page 185.

Dr. LACEY. And other examples like that. That happens to be my favorite study in this area.

Mr. KASS. Dr. Lacey, I have just one further question. We have taken testimony from some of the witnesses earlier in the private usage of polygraph who stated that in the actual fieldwork, contrary to the very fine studies that you and other physiologists have done, GSR is not too good. We have taken testimony today from you that blood pressure and pulse, sometimes, is very difficult to read.

Dr. LACEY. The heart rate, yes.

Mr. KASS. The heart rate. We have also heard from you that it is possible to suppress automatically or voluntarily, whatever it may be, your respiration. What else is left of the component parts of the polygraph?

Dr. LACEY. I don't get the sense of your question.

Mr. KASS. I see three parts to the polygraph. There is the GSR, the galvanic skin—

Dr. LACEY. I understand what you mean. You say, now that doubt has been cast about every channel in the polygraph, what can we make of it? I think an honest and truthful answer to that, Mr. Kass, would involve a statement something like the following.

~~If polygraph examinations are to continue—and I have already stated over and over that I hope they continue only in very limited ways and controlled ways and regulated ways, and only when there are real vital issues at stake—if they are to continue, I as a student of these matters would like to see the technique improved. I think there are many directions in which they can be improved. All these errors, if you will, all these questions, including Dr. Dearman's case, simply are crossing the t's and dotting the i's and putting an exclamation point over the fundamental concept that we must employ whenever you are dealing with a test situation of any kind; namely, that there is no perfect test available in any field. We have all emphasized this over and over and over again; this technique, too, has to be of imperfect validity. Anybody who makes claims to the contrary has to produce the evidence for me. I do not mind saying, as a matter of fact I want to say, that some of the newspaper reports of the field adequacy of this technique strike me as ridiculous. The Dayton police chief, in answer to some publicity about the Moss committee, snorted in public and said in his hands it is 98 percent reliable. I cannot believe it. I just cannot believe it. If it is, he is a lot better man than I am.~~

These errors which we emphasized are simply the sources of the false positives and the false negative which, as we have mentioned over and over and over again, exist. The techniques of the so-called lie-detection procedure, as I have read it and as I have understood it, are, in my opinion, I repeat again, partial protection against this kind of error. Now I say "partial." I think any responsible polygrapher—if that is the term to use—would have to admit that these are only partial protections. I think there are things that we can do about them. That is to say—I hope I don't have to but I might someday become involved in this fearsome venture—I think there are things we can do to upgrade the technique on the technical side. I think some good sociologists and lawyers working together could do something to improve interrogation procedures.

In other words, where the national security requires, if indeed it does, and I make no prejudgment on this issue—where the vital national security, which is the only place I am willing to use this technique, requires that the polygraph examination be used, I would like to see it researched, improved, so that the number of false positives and false negatives are decreased as much as possible. I do not desire to throw out of the picture a potentially valuable adjunct—adjunctive only—adjunctive technique for the gathering of information where it is required.

So, Mr. Kass, in answer to your question, a great deal is left even in such—from the laboratory point of view—even in such a printed record as this.

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Mr. REID. Your judgment that the present use of the lie detector as it has been developed before this subcommittee is widespread and lacks appropriate safeguards and appropriate standards?

Dr. DEARMAN. And it should not be used.

Mr. REID. In its present form?

Dr. DEARMAN. In its present form.

Mr. REID. Is that a fair statement of your views, Dr. Lacey and Dr. Kubis?

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I think it would be very helpful to sum up for this subcommittee really what the validity of this is. Should it be used and, if so, only in limited areas very carefully surrounded with protections to the individual and high professional standards. I think the public has the idea a little bit that this has had widespread use in the Federal Government and that it has some areas of potential infallibility, which the testimony of you learned gentlemen I think has clearly indicated is without thorough foundation.

Dr. KUBIS. Mr. Reid, I would agree completely with the first part of your statement, but I don't feel competent to state how widespread or inadequate such tests are in the Government. I don't feel qualified to make that statement. But the first part is a very excellent statement of what I believe, that is, the first part of your statement.

Mr. REID. Do any one of you three gentlemen wish to add anything in terms of what you think should be done now?

Dr. DEARMAN. You mean as regards the use of the polygraph as it is being used today?

Mr. REID. In the Federal Government.

Dr. DEARMAN. It should not be used today in the Federal Government like it is being used.

Mr. REID. Very good. I take it that is a statement that you would all subscribe to?

Dr. LACEY. No.

Dr. KUBIS. No. We don't know the way in which it is used in the Federal Government at the present time. It would be very prejudicial to make a statement.

Mr. REID. Dr. Lacey has some knowledge of how it is used.

Dr. DEARMAN. This document tells you a little bit about how it is being used. According to this, I would say it should not be used in the Federal Government.

Mr. REID. This is clear. Thank you, Mr. Chairman.

Mr. MOSS. Gentlemen, we are about at the end of this session. We will not resume this afternoon. I would like, if possible, to impose upon you, Dr. Kubis and Dr. Lacey, if you could conveniently at a later date suggest to the committee the type of research or evaluation which should be undertaken by the Federal Government in those areas where it continues to utilize polygraphs.

It seems to me that throughout the course of the committee work today and the hearings we have had, that it is clear that although much research goes on in the laboratory, no research goes on in the field. We seem to have evolving here almost another discipline, perhaps taken into the field far too soon. It is thought in many areas that it is most reliable, but at no time has there been the scientific study of the results obtained, the evaluation which characterizes its use in the laboratories. If it is, in fact, a scientific instrument that we have here, then the evolution should certainly follow some evaluation pattern that would be in accord with scientific procedure.

Do you disagree that there is a lack of this kind of work in the field?

Dr. LACEY. I don't know how complete it is. I certainly know that I am not familiar with any validation figures that I would trust. I think I would be aware of them if these had been published in journals, widespread.

Mr. MOSS. I made this same request of Dr. Orne yesterday before he left. He is going to accommodate the committee. It would be most helpful to us, because at some point we are going to have to file a report and study and consider recommendations to the Congress.

Dr. Dearman, the Chair is informed that the operator who made the tests in the second examination of your patient disagrees with your recollection of the conversations which took place following the examination. In an effort to make the record very clear, I would ask first, if you have any comment on that?