

Polygraph

JOURNAL OF THE AMERICAN POLYGRAPH ASSOCIATION

Volume 4

March 1975

Number 1

CONTENTS

Techniques for the Expert Witness Stanley Abrams, Ph.D.	1
Chart Interpretation: An Interdisciplinary Paradigm Ilan Biran	7
C.G. Jung: A Forgotten Psychophysiolgist Remembered Russell A. Lockhart, Ph.D.	18
The Polygraph in Poland Jan Widacki, Ph.D. & Clarence H.A. Romig, M.S.	33
USAMPS: Program of Instruction for Polygraph Examiner Refresher Course	39
The Respiratory Symptoms of Lying Vittorio Benussi (Graz)	52
Bank Fraud and Embezzlement FBI Law Enforcement Bulletin	77
Book Review: Legal Admissibility of the Polygraph (Ed. Ansley) Raymond J. Weir, Jr.	78
Death Investigation (Myre) Clarence H.A. Romig	82
Abstracts	85
Polygraph Review Bobby J. Daily	85
Subscription Form	93

TECHNIQUES FOR THE EXPERT WITNESS

By

Stanley Abrams, Ph.D.

The growing judicial acceptance of the polygraph technique increases the probability that polygraph examiners will be called upon to testify in court more frequently than in the past. Accordingly, this paper was written for those examiners having minimal or no experience as expert witnesses, to offer basic information applicable to their role in the court room setting.

Pre-Trial Preparation

Prior to the trial testimony the polygraph examiner must recognize that, as the expert, it is his role to prepare the attorney. The lawyer must be told which questions should be asked in trial and must be made aware of any weaknesses that might exist in the testimony. Frequently, attorneys prefer to bring out weaknesses during direct examination rather than having this done by the opposing counsel. The attorney, knowing the case, judge, and opposing counsel, is in a good position to give the witness a clear idea of what to expect in court. Moreover, one of the most effective devices attorneys employ in the preparation of the polygraphist is to play the role of the devil's advocate. Through this approach the expert witness can learn to cope with the expected questions and the attacks on his credibility. In addition, it is advised that the testifying polygraphist with no court experience visit a court room. In doing so, he can see for himself the effects various witnesses have upon the jury and the variety of techniques attorneys use.

Prior to the trial the polygraphist should review his notes concerning all aspects of the case that relates to his testimony. The details of the pre- and post-test interviews should be remembered as exactly as possible so the examiner is able to describe this in court, and also to justify the questions used in the examination. In particular, he should be capable of explaining how the relevant, irrelevant, and especially the control questions operate. An explanation of the control question is of particular importance because it, more than any other aspect of the polygraph procedure, is incomprehensible to a lay person. He cannot understand how an innocent subject will respond to a greater degree to the control item than to the threat-laden relevant questions even though telling the truth.

The examiner should prepare an explanation of the charts to the extent that he can point out the changes in the tracings to allow the jurors to understand the basis for the polygraphist's decision. The witness must also be able to communicate the psychologic and physiologic foundation of the polygraph as well as indicate a knowledge of the literature, information on polygraph validity and reliability being of particular significance. The jury inevitably will be impressed by the polygraphist who can quote references to a number of research publications, citing the journal, author, design, and findings.

Generally, it is not advisable for the examiner to allow the opposing attorneys to stipulate to the examiner's qualifications. It is important that the jury be made aware of the examiner's credentials, emphasizing his training, seminars attended, papers published or read, and the number of examinations administered.

Trial Testimony

Two witnesses may present exactly the same material before a jury but the jurors may find one individual completely believable while they disregard the testimony of the other. The witness's demeanor, attitude, dress, speech, emotional reaction, and degree of self-assuredness all greatly contribute to the decision made by the jury. In the adversary system employed in our courts simply presenting the facts is not sufficient.

When appearing in court, the examiner should dress neatly and conservatively, and speak clearly and sufficiently loud so that the farthest juror can hear. The presentation should be serious and directed to the jury rather than to the attorney. One of the most valuable assets of an expert witness is his ability to present scientific and technical data to lay people in a manner that is understandable and meaningful. It should not be accomplished, however, by talking down to the jury. Regardless of how much meaningful data are communicated to the jury, if they are antagonized the testimony loses its value.

Memorizing testimony is a distinct disadvantage. If the witness is interrupted he may lose his place, resulting in a thoroughly confused presentation. Moreover, memorized testimony often seems too pat, giving the illusion of its being untruthful.

Responses to the opposing attorney should be courteous regardless of his attitude. Answers should be fairly definite and avoid phrases such as, "I think" or "I believe." Instead, one should talk in terms of "It is my opinion that ..." There should be no exaggeration or embellishment, but rather, the questions should be answered in a straightforward and honest fashion. Any impression of superiority or infallibility should be avoided for this likely affects the jury negatively; more importantly, however, it places the attorney in a better position to make a fool of the expert witness. The jury may be able to forgive an error in a friendly, courteous, and honest appearing witness, but not in one who is cocky. The polygraphist who acts in a superior manner falls much harder if he loses a point to the lawyer, and the jury will actually enjoy seeing him put down. While an air of infallibility is inappropriate, so too are humble or submissive approaches. One should instead adopt an attitude of being an authority in the field who is knowledgeable because of experience and training. Maintaining one's composure and avoiding nervousness or anger are also important aspects of creating a favorable impression on the jury. Many attorneys purposely attempt to arouse the ire of the polygraphist, knowing that he is apt to err or create a negative impression on the jury.

In interacting with the opposing attorney, one should listen carefully to the questions, being wary of traps. One must be well aware that no matter how gentle the lawyer may appear during cross-examination, he is

constantly looking for ways to hurt the examiner's testimony and destroy his credibility. If the examiner were to appear incompetent in even one area, the value of his entire testimony could be lost.

Answers should be given somewhat slowly so that a well-thought-out response can be presented, as well as to allow the attorney an opportunity to object to the query. The questions should be answered simply and directly, responding only to the question asked. Additional information should not be volunteered. However, if it is necessary to explain a detail, the witness has the right to respond with more than a simple "Yes" or "No". If an error is made, it should be corrected immediately. Should the counsel refer back to a previous statement or to responses in the deposition, which the witness believes is being taken out of context, he should request that this material be read back. One should not hesitate to request that the lawyer rephrase his question if the meaning is not completely clear. The polygraphist should not hedge in his answers if he does not know the answer; it should simply be so indicated. If an attempt is made to bluff, a smart attorney can make the witness look like a fool, and in the process destroy the value of the entire testimony. While an "I-don't-know" response is appropriate, one should avoid being caught in the trap of answering question after question in this manner. The expert witness should also be wary of being manipulated into expressing opinions which he is not qualified to make. At times questions of this type can come from one's own attorney as well, if he is not properly prepared beforehand.

The polygraph examiner must recognize that no matter how well versed the attorney appears to be in polygraphy, it is the polygraphist who is the expert. The lawyer's knowledge in this realm is generally only minimal after having crammed prior to the case in which he is involved. He does have some advantages in that if he should become involved in an area in which he is having difficulty, he can get himself out of it by asking questions in another realm. In contrast to this, when he has the polygraphist in trouble, the attorney can keep hammering away in an attempt to weaken his testimony. The basic strength of the attorney lies in the fact that he is playing this game in his own ball park and using equipment with which he is much more familiar than the witness. He is well accustomed to the interaction that takes place in a court room and has a whole series of techniques to handle witnesses. Some of the time the lawyer is acting out a role in order to influence the jury. While he is responding to the examiner as if he were an incompetent, bungling idiot and derogating him for not being a psychologist or physiologist, he may be considering consulting with the examiner on another case. The witness must, therefore, learn to disregard the looks of disgust and head shaking, remembering that these are a part of the lawyer's armamentarium. The adversary system places the attorney in the position of having to destroy the testimony of any expert witness who might place in jeopardy his winning the case. The most effective means by which he can accomplish this is to cast doubts upon the expertise of the polygraphist.

The witness is sworn to tell the truth and obviously he should not alter it to serve the interests of his attorney. There is, however, a choice of which role the polygraphist will play. On the one hand, it is argued that the examiner should present his findings in an objective, scientific manner,

reporting the facts regardless of whether they are an advantage or disadvantage to the attorney. In contrast to this, some lawyers feel that the examiner should become part of the adversary system. They recommend that the expert witness attempt to convince the jury of his beliefs or else he is doing a disservice to justice. They suggest that the polygraphist be an advocate but still maintain certain reasonable doubts in mind because polygraphy is not an exact science. It should be recognized, however, that some attorneys welcome an expert witness who plays this latter role in that they feel under cross-examination they have a better opportunity of destroying testimony.

In this writer's opinion, the most appropriate approach for the polygraphist is to avoid becoming involved in the adversary role sometimes assumed by expert witnesses. The reason for this is that members of the legal profession know to whom to bring their client; they know which expert witnesses should be consulted to favor the defense, and who will be biased in the direction of prosecution. The result is that opposing attorneys frequently call upon expert witnesses presenting opposing opinions, which is indicative of the low reliability that exists within certain professions.

Frequent Discrediting Tactics

One of the concerns frequently associated with appearing in court as an expert witness is related to the belief that the attorney will employ various "traps" to discredit the witness. While generally the court room examination is carried out in a very straightforward manner, certain techniques are used for the purpose of discrediting a witness's testimony. A long and constant cross-examination in itself can accomplish this by creating fatigue and tension. Being well aware of this, the lawyer may continuously hammer away at the polygraphist, trying to cause him to make a mistake, express anger, or to reach the point where he will say anything simply to get off the witness stand. More specific devices have been used and it might be of value to cite some of these as examples.

In an apparent attempt to determine the expertise of the polygraphist, the attorney may ask if he is familiar with various texts or articles on polygraphy. If the witness indicates that he has not read a current article, the lawyer may then state that he is unreliable and that his testimony should not be accepted. This serves not only to discredit the witness, but also causes him to become defensive. This may result in the polygraphist's exaggerating his awareness of the literature in order to prove his competence. He then is prone to fall into a trap in which he is asked if he is familiar with a particular book of which he has only a brief knowledge and then can be made to look incompetent by being unable to answer a series of questions related to that specific text. There have even been instances in which the lawyer has goaded the witness into stating that he is familiar with a series of books on polygraphy only to have the attorney turn to the jury and report that one of the books he had listed was fictitious.

Other questions regarding writings on polygraphy may be related to whether the polygraphist views a particular author as an authority in the field. Once having attained agreement, the attorney may point out the areas in which the witness had disagreed with this authority. This, however,

should not create any concern since one may view an individual as an authority and still disagree with some of his thinking. The polygraphist should, however, be able to justify the stand that he is taking. One's view does not even have to be the opinion of the majority of polygraphists as long as it is followed by a respectable and reputable segment of the profession.

The question, "Are you getting paid to testify?" if answered in the affirmative, implies that the witness is being paid to say what the opposing attorney wants presented. The appropriate response should be in the negative with an indication that the polygraphist is being compensated for his time away from his office and the costs of any expenses.

When the polygraphist is questioned as to whether he has discussed the case with anyone, his "Yes" answer may be distorted to imply that he has been told what to say. In this regard, one simply has to state the findings were discussed with the police, attorney, or with whomever consultations were held.

Other specific questions to discredit the witness and polygraph technique can also be anticipated. For instance, questions relating to how the examiner knew the subject was in the proper physical, medical, and psychological condition to be examined may well be followed with the expression of doubt about the examiner's ability to make this decision. Since the test itself involves psychology and physiology, the opposing counsel may go into a long argument, indicating that without a degree in psychology or physiology the polygraphist is not competent to administer the examination or of interpreting the results. In response to this, if he in fact is allowed to respond, the polygraphist must be able to present a concise and understandable explanation of the psychological and physiological bases for the polygraph. He should also indicate how the subject's behavior and polygraph tracings gave no indication that either a sufficient psychological or physiological problem existed to invalidate the findings. This should be justified through his training and knowledge, demonstrating through examples how some drug conditions, medical problems, or psychiatric disorders would create obvious distortions that would cause the examiner to label the findings as inconclusive.

As already discussed, questions relating to the accuracy of the polygraph technique are inevitable and a knowledge of the literature related to validity and reliability is a necessity. Specific queries asking if the procedure is infallible quite obviously must be answered in the negative with an indication of the degree of accuracy that has been reported. As to whether an error could have been made in this particular case, the most appropriate response is, "In my judgment it is highly unlikely." If pressed further with ". . . but is it possible?" the answer must be "Yes". To the question, "Could someone 'beat' the polygraph?" an appropriate response should indicate that a very small number of individuals are capable of controlling their physiologic responses to the extent of not appearing deceptive when they are lying. This is, however, a very small percentage of the population. The psychopath is frequently brought up as an example of this, but here it should be pointed out that it is guilt and remorse that are lacking in this individual rather than fear. It is primarily the fear

of detection of a lie and the possible consequences that set off a sympathetic nervous system reaction so that the charts of the psychopath can be as accurately diagnosed as the tracings of others.

The expert witness may be asked if anger can create a response in the polygraph tracings that resembles deception. The answer to this must be in the affirmative. There is no way of differentiating the fear of detection in a guilty subject from the anger reaction of one who is innocent. The anger is more likely to occur on the relevant items just as fear occurs on these questions in an individual who is being deceptive. The only reasonable explanation that the examiner can give relates to the reduction of anger through a good pre-test interview.

Concluding the Testimony

At the conclusion of the testimony, the examiner should leave the witness stand, demonstrating an expression of confidence rather than relief, fatigue, or anger. The entire situation could be treated as an important competitive match in which each opponent plays his role as effectively as possible. Certainly, the stakes are high, but as in any competition, one should remain calm, deliberate, and plan one's moves in advance. Like a chess game, the witness should also be aware of the meaning of each of his opponent's moves, trying to determine what his strategy is so that he will be prepared for it. The examiner should be constantly aware of what is occurring, the direction the cross-examination is taking, and especially look for the setting of any "traps." They will occur but if the polygraphist is prepared for them, he can avoid them.

Recommended Reading

Ratner, P. H.: Instructions for Witnesses. Practical Lawyer 2:44-48, April 1956.

Horsley, J.D.: Expert Witness: How to Prepare Yourself for Cross-Examination. The Journal of Legal Medicine 2:18-20, Jan.-Feb. 1974.

Wecht, C. H.: What the Medical Expert Can Expect from the Trial Lawyer. The Journal of Legal Medicine 2:21-23, Jan.-Feb. 1974.

Bradford, R. T.: Medical Specialists in Legal Medicine. The Journal of Legal Medicine 2:24-29, Jan.-Feb. 1974.

Panel Discussion Moderated by Leonard C. Arnold. The Doctor in Court. The Journal of Legal Medicine 2:9-17, Jan.-Feb. 1974.

* * * * *

CHART INTERPRETATION: AN INTERDISCIPLINARY PARADIGM

By

Ilan Biran

Criminal Identification Department
Israel Police

Introduction

In professional circles concerned with information detection, two typical approaches are known. These are: (a) the field approach, that claims a very high level of validity when the right techniques are applied, and (b) the academic approach which shows a level of validity which is usually significant but still far from fool-proof level (10)(11). This incongruity points to a serious lack of communication between the expounders of these differing approaches (1) and calls for great efforts to construct a system which will make it possible to analyse and develop both the field and academic data, and to join them into one conceptual and methodological paradigm. It seems that only on the basis of an intradisciplinary paradigm we can understand and develop a system which will enable us to function on a highly scientific level and to convince the courts and the public that our psychophysiological methods are very efficient, exact, and a powerful tool working in the service of justice. The purpose of this paper is to present a framework which will simplify the communication between the disciplines involved and will be a step towards a methodological analysis of the polygraph methods applied in the field.

This intradisciplinary paradigm has to include conceptualization which will enable one to compare different field approaches such as the methods described by Inbay (5) and Reid (12) and, Backster (3) and Barland (4), and those in the lab, applied by Kugelmas and Liebllich (7), Lykken (9) and Orne (10). At the same time and for the same purpose, we must try to score the measurements in quantitative terms and try to make them comparable. However, the present paradigm is only the first step towards those aims, and in no way is it a solution to all the problems involved (11).

Conceptual Framework

From contemporary knowledge, there are only three legitimate theoretical assumptions, which form the basis of the present paradigm:

- a) We do not know exactly what psychological processes are involved when a person reacts as he does in a polygraph situation (9)(10). Therefore, the only assumption we can make is that the physiological measures we take reflect some state of the individual under examination.
- b) Because we have a 'black-box' model, the variables involved in our process are the sensory input and the psychophysiological output, that is, an S-R model.

The author wishes to express his appreciation to Gordon H. Barland and Gershon Ben-Shakhar for their helpful comments during the preparation of the manuscript.

- c) The only way to discriminate between the outputs is by using a logical and methodological comparison.

Using this approach, which in a sense is a "no-theory approach," we may describe our input as information of varying kinds and amounts, and the process, as the diagnosis of the information contained in the subject. This diagnosis is made by calculating the extent of the connection between the subject's personality and some information-item presented to him. The extent of this connection is defined as the relative strength of a psycho-physiological reaction compared to those reactions received regarding other information-items. This relative strength is the involvement value of the subject with the given information-item. In the optimal case, this involvement value, more than being a quantity of connection, will reflect the probability that the diagnosis is valid, including the probabilities that the two types of possible error were made - a false negative or a false positive. For the time being, it reflects only the subjective probabilities, as perceived by the examiner.

When dealing with information-items diagnosis, we are as a matter of fact, concerned with some specific problem which usually is a combination of information-items. Each of these items is a relevant (R) one. For the purpose of comparison we use other kinds of information items: Control (C) items, to be compared with relevant ones; base-line (B) items, to be the zero-point for measurement; and, attention (A) items, for ascertaining the subject's awareness. The R items are a function of the problem under investigation. The physiological responses to these items are compared to the responses given to the C items, which are defined later in the part concerning the types of stimuli contents. B items will be described in field terminology as irrelevant questions, whereas the A items are by nature similar to the B items but doesn't call for the same verbal reaction which is given to all the other items.

Mode of Comparison

To be logical and methodological, each comparison must fulfill four basic requirements:

- a) Any given R item must be compared to adequate C items and on the basis of a baseline which is a function of the B items. This requirement is fulfilled by presenting the R items in a cluster of information items as follows:

$$\text{cluster a} = B_{1a} C_{1a} R_{1a} C_{2a} B_{2a}$$

This way of ordering items in the cluster is only an example, and the order can be changed as the function of the methods used or the problem under investigation. Such possible changes are discussed later in the section dealing with actual applications.

- b) To have inner-validity, all the clusters of the global problem must be presented in a sequence, a requirement fundamental also for the applied purpose of the diagnosis.

$$\text{sequence x} = \text{cluster a} + \text{cluster b} + \dots$$

- c) For the purpose of inner-validity, one must fulfill not only requirement (b) but also the requirement of replication - i.e., presenting any cluster more than once.

Total test = [sequence x = cluster a_x + cluster b_x + . . .]
 [sequence y = cluster a_y + cluster b_y + . . .]
 [sequence z = cluster a_z + cluster b_z + . . .]

- d) To make the comparison sensible, the subject is asked to give identical verbal reaction to all the items presented in each cluster. This requirement is dangerous because there exists the possibility that dissociation from the items' content will occur. Therefore between the clusters, attention (A) items which require a differing verbal reaction, will be presented.

Involvement Value

By definition, the involvement value is the function of the ratio R/C. This ratio can be given two kinds of values:

- a) Qualitative value, in which

+ = $R > C$

- = $R < C$

The (+) and (-) signs are consistent with the expression of involvement, as well as with the terms of "false positive", etc. This quantitative approach is derived from the academic point of view but is, unfortunately, the opposite of the quantitative value that has been developed in the field, a value which is based more upon the concept that "positive equals truth" and "negative equals deception". The later field approach by Backster has been established; hence, instead of trying to reverse it, it seems much more useful to multiply the quantitative value presented here by the constant of -1 whenever the scoring is done in a field situation.

- b) Quantitative values as follows:

R/C	...	1/5	1/4	1/3	1/2	1/1	2/1	3/1	4/1	5/1	...		
value	-10	...	-4	-3	-2	-1	0	+1	+2	+3	+4	...	+10

(These values are arbitrary and must be made more sensitive through further research.)

These values are given to each R/C ratio in each cluster presented and for each physiological measure recorded. When there is no psychophysiological record or a bad one, no value is given. The standard field polygraph records at least three physiological measures: i, j, and k, and for each of these, in any cluster, the involvement score (s) can be calculated as follows:

$$S_{ia} = \frac{\frac{R_{ia}}{C_{lia}} + \frac{R_{ia}}{C_{2ia}}}{2}$$

$$S_{ja} = \frac{\frac{R_{ja}}{C_{lja}} + \frac{R_{ja}}{C_{2ja}}}{2}$$

and so on for each recorded measure. These values are given on the basis of knowledge about reaction interpretation. However, it is known that subjects differ in the way they react to each measure, and only basic research will enable us to analyse the correlations between the reactions and to weigh appropriately these different outputs. Thus, as will be discussed later, summing the physiological responses is much more difficult than comparing their relations. This is the reason why the formula for the computation of any score is presented as it is above, and not in a more convenient form which can be achieved by mathematical manipulations.

Scoring System

When the basic scoring unit is the involvement score, we are able to calculate the scores for the different parts of the total test. These calculations use the principle of averages, although more data could be derived from scoring as a function of the involvement scores' distributions and their variances; however, for the time being such data are not available and therefore the only method available is the use of the averages method.

a) Cluster (involvement) Score(s)

This score will be the average of all the involvement scores (s) found in any given cluster.

$$S_a = \frac{S_{ia} + S_{ja} + S_{ka} + S_{la} + \dots}{N}$$

where N is the number of s scores given.

b) Sequence Score (d):

The sequence score is the average of all the cluster scores (s) in any given sequence.

$$d_x = \frac{S_{ax} + S_{bx} + S_{cx} + \dots}{M}$$

where M is the number of the clusters in the sequence.

c) Item Score (p):

The item score is the average of the cluster scores (S) over all the clusters containing a given R item.

$$p_a = \frac{S_{ax} + S_{ay} + S_{az} + \dots}{P}$$

when x, y, z, are the sequences and P their number in the total test.

d) Total Score (T)

The total score is the average of all the sequence scores (d) and of all the items scores (p).

$$T = \frac{d_x + d_y + d_z + \dots}{P} = \frac{p_a + p_b + p_c + \dots}{M}$$

e) Scores Table

Cluster	a	b	c	d	e	
Sequence						
x	S_{ax}	S_{bx}	S_{cx}	S_{dx}	S_{ex}	d_x
y	S_{ay}	S_{by}	S_{cy}	S_{dy}	S_{ey}	d_y
z	S_{az}	S_{bz}	S_{cz}	S_{dz}	S_{ez}	d_z
	p_a	p_b	p_c	p_d	p_e	T

The d scores reflect the involvement with the global problem in each sequence. The p scores reflect the involvement with each R item in the total test, and the T score reflects the involvement in the global problem within the total test.

Information Stimuli Contents

Information Theory defines a bit information unit as the minimal data necessary to distinguish between exclusive alternatives (2). When dealing with the contents of the information stimuli presented to the subject we will apply this concept, but in our special context and without the theoretical connotation associated with it.

The presentation of the information items is usually made verbally in the form of a question which requires the answer 'yes' or 'no'. Theoretically the above characteristics are not necessary, but for reasons of convenience we shall adopt this mode of presentation here.

There are, logically two differing forms of R item content, each influencing the contents of the other items compared with it in the cluster:

Type I content is the one in which R is formulated by definite objective information which has only one meaning. It can be quantitative, numerical information or any kind that has the above requirements in this use. The C items must be of the same content, differing from the R item by a definite number of information bits - the relevant aspect. In other words: the difference between R and C can be defined in objective and exclusive terms such as the difference between 20 and 30, black and white, etc. Therefore, if the R item refers to a theft of a defined amount of money then the C items have to be made up of the same content, differing from R only by the amount of the money stolen, and differing from each other in the same manner. Speaking of the field detection situation, this type of content may be referred to as the Identity content potential, meaning that except for the relevant information, there should be no difference in the subject's involvement.

Type II content is the one in which the R item includes some subjective or indefinite information. The possibility of formulating C items which differ from R by definite number of information bits is not available here because there is no way to define the exact connotations of this R item, and so there is no possibility of a comparison as in Type I. The comparison here is based on the supposed stress potential of each item presented. In the case in which the R items refer to some specific theft, the C items must be formulated in a way that the innocent subject will have more involvement with them than with the R items and vice versa. In the case mentioned above, the C items must deal also with a theft, be exclusive of R and possess the supposed potential to provoke greater stress in the innocent subject, whereas in the guilty subject they should have less potential than the R items. The assumptions made in this context are based on field experience but not upon psychological knowledge. (8)(7)(9)(10)

Decision Making

The actual decision made is a function of two factors:

- a) the diagnosis process,
- b) the information stimuli content.

Factor (b), the R items' content, simply gives the meaning to the decision made. If this item refers to stolen money, the decision will concern this stolen money. If the decision refers to all the R items presented in the test, then this decision will consider the total problem investigated.

As for factor (a), the diagnosis, the decision-making process must be varied according to the type of stimuli content, as follows:

Type I Decision: When the information content is of Type I, the only difference between the stimuli in the clusters is the relevance of the information. In this case any significant difference between the subject's involvement with the R related to C items reflects some connection between the relevant information and the subject. Theoretically, this connection should be assumed in any case in which $R \geq C$. Unfortunately, we have no explanation for the case in which $R < C$, other than to suspect there is something amiss in the diagnostic process - perhaps in our own information, perhaps in the subject's personality, understanding and so on. When adequate distributions can be established - significance will have a statistical meaning. Until then, it means a result which does not fall between the limits of subjective individual inconclusive decision.

Therefore, the rule of decision in this case will be:

H_0 : nonsignificant involvement ($R=C$) - no connection with the relevant information, i.e., "innocent".

H_1 : significant positive involvement ($R > C$) = connection with relevant information, i.e., "guilty".

- : significant negative involvement ($R < C$), i.e., "problem".

Type II Decision: In the case of the type II stimuli content, the C items, by definition, are assumed to possess a greater stress potential than for R in the innocent subject, and less stress potential in the guilty subject.

Therefore, the rule of decision will be:

H_0 : significant negative involvement ($R < C$) = no connection with relevant information, i.e., "innocent".

H_1 : significant positive involvement ($R > C$) = connection to relevant information, i.e., "guilty".

- : nonsignificant involvement ($R=C$), i.e., "problem".

As mentioned above, the scoring in field situations must be multiplied by the number (-1). As a result, in those situations the decision rules must be reversed too.

Knowledge of distributions and variances of the involvement scores will be the basis for the significance assertions. But, at present, there is no other way but trial-and-error to decide what is, in any given case, the amount of deviation from the zero point which will allow us to decide what is a significant involvement score. It seems, however, that the greater the involvement score, the higher further probability that the decision is valid. Again, through further research, the correlations between the scores and the probability of validity can be found.

Examples of application of various field techniques

Presented below are illustrations of how the procedure previously discussed can be applied to some of the field techniques currently in use.

a) Reid's "Control Question" technique:

Construction: A₁ B₁ R₀ B₂ R₁ C₁ A₂ R₂ C₂ R₃ (C₃) (R₄)

Scoring:

$$S1 = \frac{\frac{R1}{C1} + \frac{R1}{C2}}{2} \quad \text{Cons.} \quad S2 = \frac{\frac{R2}{C1} + \frac{R2}{C2}}{2} \quad \text{Cons.}$$

$$S3 = \frac{\frac{R3}{C2} + \frac{R3}{C3}}{2} \quad \text{Cons., Etc.}$$

Stimuli content and decision model: Type II.

b) Backster's "Zone Comparison" technique:

Construction: A₁ R₀ B₁ C₁ R₁ C₂ R₂ B₂ B₂,

or: B₁ R₀ A₁ C₁ R₁ C₂ R₂ A₂ B₂

Scoring:

$$S1 = \frac{\frac{R1}{C1} + \frac{R1}{C2}}{2} \quad \text{Cons.} \quad S2 = \frac{\frac{R2}{C1} + \frac{R2}{C2}}{2} \quad \text{Cons.}$$

Stimuli content and decision model: Type II.

c) "Pure. Relevant = Irrelevant" technique:

Construction: $A_1 B_1 R_1 B_2 A_2 B_3 R_2 B_4 A_3 \dots$

Scoring:

$$sl = \frac{\frac{R_1}{B_1} + \frac{R_1}{B_2}}{2} \quad \text{Cons., etc.}$$

Stimuli content and decision model: Type I. (It may also apply to Type II).

d) "Peak of Tension" test:

Construction: $A C_1 C_2 R C_3 C_4 B$, or: $B C_1 C_2 R_1 C_3 C_4 B$

Scoring:

$$s = \frac{\frac{R}{C_1} + \frac{R}{C_2} + \frac{R}{C_3} + \frac{R}{C_4}}{4} \quad \text{Cons.}$$

Stimuli content and decision: Type I.

e) "Card Test" (or lab. "Numbers. test"):

Construction: $A C_1 C_2 R C_3 C_4 C_5 \dots C_i$ and R randomly placed.

Scoring:

$$S = \frac{\frac{R}{C_1} + \frac{R}{C_2} + \dots + \frac{R}{C_i}}{i}$$

Stimuli content and decision model: Type I.

These examples reflect the great flexibility of the paradigm; it can be applied to any technique and make them comparable, without distorting the technique or forcing substantial changes in it. It is again emphasized that my given method may be described in a variety of forms, and further research is needed for the determination of the final optimal forms. All the calculated scores - clusters, d, p, and T are applicable to these methods in the same way they were presented here.

Discussion

It seems that the present paradigm is a step towards a methodic research which is needed for the understanding, development and validation of our very efficient and powerful system of information diagnosis. It gives us the opportunity to analyze the relative diagnostic power of each psychophysiological measure and to understand the influence of different kinds of information and the ways of presenting it, to see what are the effects of replications, time factor and number of items presented and so on. All this can be done in a methodic way and with an objective and defined frame of concepts, using these to close the intradisciplinary gap. At the same time, the paradigm is applicable to each known field and laboratory polygraph method and so it allows for experimental comparison between these methods, including their principles, assumptions and kinds of interventions.

Nevertheless, in spite of these contributions, there are still some very serious problems which have not been solved. These problems are inherent in the whole field of psychophysiological measurement and deduction, but they are still important enough to be mentioned here.

The first problem is that of measuring objectively and quantitatively the psychophysiological reaction. Except for the measurements of the G.S.R. reactions, all the other measures used in the field can be compared only qualitatively by experience, or the loss of information is too great. The present knowledge allows the comparison of reactions to the different stimuli by evaluating the ratio between them. Still, by quantitative means and from an agreed zero point, we are not able to effectively measure them. Therefore, for example, we cannot fulfill the requirement for an optimal comparison which would demand the following method of calculating the involvement score:

$$S_{ia} = \frac{\frac{R_{ia} - B_{lia}}{C_{lia} - B_{lia}} + \frac{R_{ia} - B_{2ia}}{C_{2ia} - B_{2ia}}}{2}$$

There is no doubt that better ways of measurement are needed for the advancement of the system. Maybe the hope for developing better measures lies in the field of non-metric methods.

A second problem concerns the establishment of the distributions and variances of the diagnostic scores. Until we do so, it will be difficult to discover what are the exact probabilities that our decisions are valid. The solution of this problem depends on the development of measures mentioned previously. Furthermore, serious basic research in this context must be conducted.

Numerous other problems, in addition to those cited immediately above, were mentioned previously. One can only emphasize that good research (which

is greatly needed), depends on control of the intervening variables. We will encounter very difficult problems when applying such controls in the field situation when we must make serious and practical decisions. However, I believe that the only way to advance our system is to conduct research in the field, to face and overcome these problems; it is my hope that the paradigm presented here will be a step in this desirable direction.

References

1. Abrams, S., "The polygraph laboratory vs. field research", Polygraph, Sept. 1972, pp. 145-150.
2. Attneave, F., "Application of Information Theory to Psychology". Henry Holt & C., N.Y., 1959.
3. Backster, C., "Anticlimax Dampening Concept", Polygraph, March 1974, pp. 48-51.
4. Barland, G.H., "An experimental study of field techniques in lie detection," M.A. Thesis, Psychology Dept., Utah University, June 1972.
5. Inbau, F.B., Lie Detection and Criminal Interrogation, William & Wilkins Co., 1948, pp. 2-95.
6. Kubis, J.F., "Analysis of polygraph data, dependent and independent situations", Polygraph, March 1973, pp. 42-58.
7. Kugelmass, S., Liebllich, I., and Berman, Z., "The role of 'lying' in psychophysiological detection", Psychophysiology, 1967 (3), pp. 312-315.
8. Kugelmass, S., Liebllich, I., "The effects of realistic stress and procedural interference in experimental lie detection", J. Appl. Psych., 1966, (50), pp. 211-216.
9. Lykken, D.T., "Psychology in the Lie Detector Industry", American Psychologist, October 1974.
10. Orne, M. T., Thackeray, R. J., and Paskewitz, D.A., "On the detection of deception", Handbook of Psychophysiology, Greenfield, N. and Sternbach, R., 1967.
11. Orne, M. T., "Implications of laboratory research for the detection of deception", Polygraph, 2, (3), pp. 169-199.
12. Reid, J. E., and Inbau, F. E., Truth and Deception, Williams & Wilkins Co., Baltimore, 1966.

* * * * *

C. G. JUNG: A FORGOTTEN PSYCHOPHYSIOLOGIST REMEMBERED*

By

Russell A. Lockhart, Ph.D. **

Camarillo-Neuropsychiatric Institute Research Program

Neumann and Blanton (1970) have provided psychophysiolgists with a valuable survey of the early history of electrodermal investigation. Such fine reviews, however, have a double edge. On the one hand, they bring to the attention of contemporary investigators an appreciation for the foundations of their science and, in many cases, a striking realization of how modern early workers were in their initial probings into the unknown. It is sometimes shocking to learn that our present-day controversies were controversies when electrodermal research was still suffering its birth pains. Such reviews, then, can teach us perspective and humility. Yet, a good review lessens the motivation to seek out and study the original sources and documents except for those few who are fascinated with historical developments. For others, the review itself becomes the primary source.

I must admit that I have not read the original reports of Fere, Vigouroux, Veraguth or Tarchanoff. Until recently, I had not read the papers of Jung and his colleagues Riklin, Peterson, Ricksher, Binswanger and Nunberg. I had, like most, read about these men and their contributions, but not their original papers. I was intrigued particularly by Neumann and Blanton's (1970) assessment that it was Jung and his work in combining the word association test and the psychogalvanic reflex that touched off the intense interest in electrodermal phenomena and its potential for indexing and exploring mental events. When Jung's experimental writings appeared together in one volume last year (Jung, 1973), I began to study these early papers. I wanted to experience what it was that stimulated so much interest in the psychogalvanic reflex.

All the secondary sources and reviews I had previously digested had not prepared me for the rich feast of fascinating ideas, insights, methods, observations and interpretations that I found as I began to explore early papers by Jung and those colleagues that came to work with him.

Stimulated by these papers I have begun a series of studies combining modern psychophysiological techniques with the word association test and various modifications of it as a means for studying certain aspects of

*Prepared for presentation at the Fourteenth Annual Meeting of the Society for Psychophysiological Research, Salt Lake City, October 25, 1974.

**The author is Director of the Psychophysiology Research Laboratory at Camarillo State Hospital, Associate Research Psychologist in the Department of Psychiatry, UCLA, and Research Director of the C.G. Jung Institute of Los Angeles.

[Charts reprinted from The Collected Works of C.G. Jung, ed. by Gerhard Adler, Michael Fordham, Wm. McGuire, & Herbert Read, Bollingen Series XX, vol. 2, Experimental Researches, c. 1973, Princeton University Press. "Reprinted by permission of Princeton University Press."]

cognitive processes. At a later time I will elaborate the relation between the associational phenomena exhibited in the word association test setting and the associational and attentional phenomena found in classical conditioning situations.

My purpose here is not an exhaustive historical analysis of Jung's contribution to early electrodermal research. That is a topic for a separate presentation which I hope will appear next year on the occasion of Jung's centennial. Nor do I wish to contribute yet another secondary source to inhibit the pleasures of first-hand exploration of these early writings. So, I will simply present, and present without substantial commentary, a sampling of bits and pieces of these early works which have struck me as not only of historical interest but of contemporary relevance as well.

First, some background. In 1900, Eugene Bleuler, director of the Burgholzli Clinic in Zurich, initiated a wide ranging series of studies on the mental processes in different categories of mental patients utilizing the association method popularized to that time by Galton, Wundt and Aschaffenburg, among others. But these studies were floundering in a mass of data with little conceptual orientation. Bleuler placed Jung, his senior staff physician in charge of the experiments in 1902. It was Jung who brought to the wealth of material the combination of ingredients necessary to cope with the perplexity. His first task, he felt, was to discover the nature and range of associations in normal subjects. Only from this perspective did he feel the associations in psychopathology could be interpreted. Together with Franz Riklin, Jung reported this work two years later (Jung and Riklin, 1904). In 1905 there appeared papers entitled, "An Analysis of the Associations of an Epileptic," "The Reaction-Time Ratio in the Association Experiment," "Experimental Observations on the Faculty of Memory," and "The Psychological Diagnosis of Evidence." In 1906, appeared those papers which clearly marked out the newly formulated complex theory and offered the first experimental support for the new psychoanalysis of Freud ("Psycho-analysis and Association Experiments," "Association, Dream, and Hysterical Symptom," and "The Psychopathological Significance of the Association Experiment.")

It was also in this year that Veraguth reported on his recent discoveries with discoveries with the galvano-psychophysical reflex at the German Congress for Experimental Psychology (April 18-21, 1906). Three aspects of this report struck Jung immediately: (1) that "the action of the galvanometer was not in direct relation with the strength of the stimulus but rather with the intensity of the resulting psychological feeling-tone," (2) that the reflex did not appear immediately, but after a latent period of one to six seconds, and that (3) reactions could be obtained in the absence of actual stimulation by the mere mention of them, a phenomenon Veraguth termed oscillation through expectation ("Erwartungsschwankung").

At the suggestion of Jung, Veraguth began to utilize the word association test. At the same time, Jung saw the implications of the phenomenon for his own discoveries of the feeling-toned complex and that here was the possibility of extending this concept to the physiological level. Recording procedures to that time were impractical except for the shortest of observations. Veraguth used a photographic procedure with numerous drawbacks. In order to investigate the phenomenon of the galvanic reflex over long periods of time,

Jung devised his own recording apparatus which made possible recordings of more than an hour. His experimental set up is pictured in Figure 1.

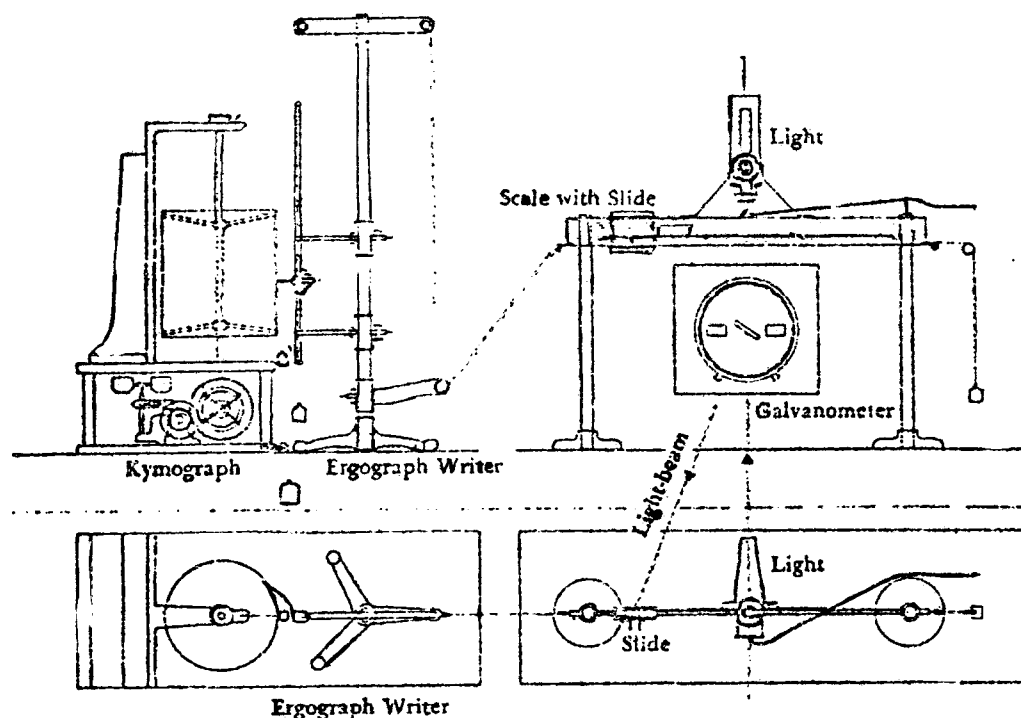


Fig. 1. Apparatus developed by Jung (from Jung, 1973) [Reprinted by permission of Princeton University Press]

The first experimental problems concerned the cause of resistance changes. A variety of unpublished experiments were carried out by Jung, Peterson, Binswagner, Ricksher, and by Veraguth, described in several places but mostly completely in the paper by Ricksher and Jung (1907-8):

"That the epidermis was the seat of resistance was proven by the fact that when the electrodes were placed under the skin the resistance was enormously decreased. This was done by piercing the skin of each arm with a surgical needle and using the needles as electrodes." (p. 190)

"That the blood supply was not a chief factor was proven by exsanguinating the past in contact with the plates with an Esmarch bandage, when it was found that galvanic phenomenon still existed." (p. 190-1)

"That the changes in resistance are not due to changes in contact, such as pressure on the electrodes is shown by the

fact that when the hands are immersed in water which acts as a connection to the electrodes the changes in resistance still occur. Pressure and voluntary movements give an entirely different deflection than that which we are accustomed to obtain as the result of an affective stimulus." (p. 191)

"The time which elapsed between a stimulus and the change in resistance as shown by the galvanometer suggested some change in the sympathetic nervous system or in some part controlled by it." (p. 191)

"The sweat-glands seemed to have more influence than any other part in the reduction of resistance. . . . Experiments were made by placing the electrodes on different parts of the body and it was found that the reduction in resistance was most marked in those places where the sweat-glands were the most numerous." (p. 191)

"It is well known that sensory stimuli and emotions influence the various organs and glands, heart, lungs, sweat-glands, etc. Heat and cold also influence the phenomenon, heat causing a reduction and cold an increase in resistance. In view of these facts the action of the sweat-glands seem to be the most plausible explanation of the changes in resistance." (p. 191)

"Changes in resistance is brought about either by saturation of the epidermis with sweat, or by simple filling of the sweat-gland canals or perhaps also by intracellular stimulation; or all of these factors may be associated. The path for the centrifugal stimulation in the sweat-gland system would seem to lie in the sympathetic nervous system." (Peterson and Jung, 1907, from Jung, 1973, p. 497)

Thus, as early as 1907, Jung and his colleagues had established that the resistance response was epidermal in nature, not the product of vascular mechanisms, not a result of changes in motoric pressure and contact with recording electrodes, sensitive to variation in temperature, most likely sympathetic in innervation, and centrally involving the sweat gland. Only the specialized function of the skin itself (Edelberg, 1972) could be added for a more complete view of the underlying factors in the production of the response.

With the "solution" to the nature of the response, the investigators turned their active attention to explorations with the method:

"The purposes of our research were to ascertain the value of the so-called "psycho-physical galvanic reflex" as a recorder of physical changes in connection with sensory and psychical stimuli; to determine its normal and pathological variations; to study the respiratory innervation curve in the same relations; and finally to compare the galvanometric and pneumographic curves taken simultaneously upon the kymograph, under the influence of various stimuli. In word-associations the reaction-time was also registered for further comparison." (Peterson and Jung, 1907, from Jung, 1973, p. 492)

Peterson and Jung (1907) report their observations of changes in pressure on the electrodes, changes in area of contact with the electrodes, changes in temperature of the electrodes, and the effects of respiration and coughing.

"A deep inspiration alone, or a deep expiration, without alteration in the contact of the hands, increases the deflection of the galvanometer, while ordinary respiratory movements do not affect it." (From Jung, 1973, p. 498)

"Coughing also causes a considerable rise in the galvanometric wave. We are inclined to think that the rise during inspiration, expiration, and coughing may also be of psychic, that is emotional origin. Certainly in the curve we observe exhaustion by repetition of the command to cough or breathe deeply, as in the case of other analogous stimuli." (From Jung, 1973, p. 498)

The investigators were greatly impressed by the sensitivity of the galvanic response to the phenomenon of expectation. In their view, attention, interest, and expectation were all emotional expressions, and thus it was of great interest that the galvanometer would exhibit fluctuations when subjects were in states of readiness or expectation. They write:

"Expectation is not only manifested at the beginning of the experiment in the galvanometer curve, but may also be observed throughout the experiment in connection with every stimulus, sensory or verbal. It is particularly strong in connection with the threat of pricking with the needle, or threat of letting fall a heavy weight. The influence of expectation on the curve becomes less with each repetition of the same series of stimuli, and seems to disappear wholly with indifferent stimuli. . . ." (From Jung, 1973, p. 498)

The investigators thus observed clearly the sensitivity of electrodermal response to the psychological states of attention and expectation and point out their affective or emotional nature. Moreover, their observation of habituation of the expectancy response and its absence in the presence of "indifferent" stimuli are perhaps the first observations of such phenomena.

In relation to emotions, Peterson and Jung (1907) write:

"Excluding the affect of attention, we find that every stimulus accompanied by an emotion causes a rise in the electric curve directly proportional to the liveliness and actuality of the emotion aroused. The galvanometer is therefore a measurer of the amount of emotional tone, and becomes a new instrument of precision in psychological research." (From Jung, 1973, p. 499)

In relation to imagined emotions, they note:

"The amount of deflection seems to stand in direct relation to the actuality of the emotion; but, as Tarchanoff pointed out, the presentation of an outlived emotion to the imagination deviates the galvanometer, such deviations depending naturally upon the facility of the subject in living over the old emotion in his imagination." (From Jung, 1973, p. 499)

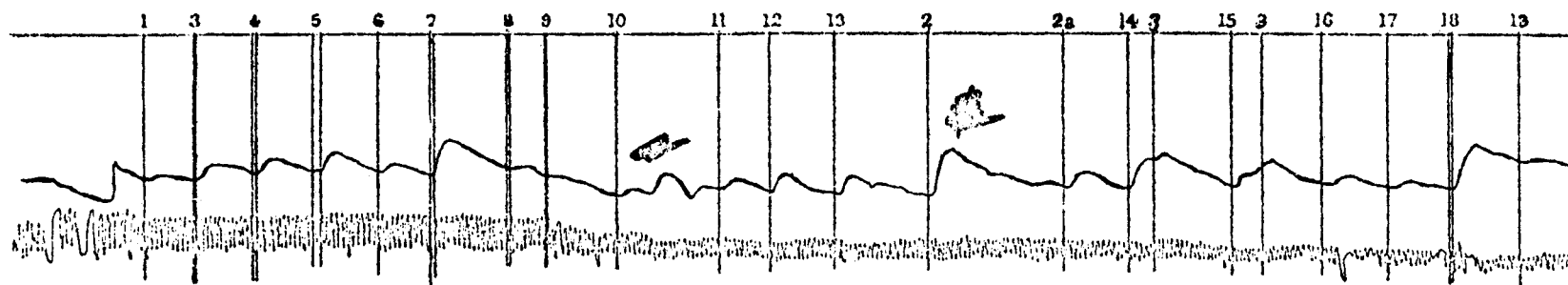
Table 1. Series of stimuli utilized by Peterson and Jung (From Jung, 1973)
[Reprinted by permission of Princeton University Press]

- (1) A loud whistle.
- (2) Actual fall of a weight with a very loud noise.
- (3) Multiply 4 by 5.
- (4) Multiply 9 by 11.
- (5) Multiply 8 by 12.
- (6) Sudden call of subject by name.
- (7) Where do you live?
- (8) What is the capital of Switzerland?
- (9) What is the capital of France?
- (10) How old are you?
- (11) Are you married?
- (12) Were you engaged once before?
- (13) Have you been long at your present employment?
- (14) Threat of prick with needle after counting 1—2—3.
- (15) Threat of allowing heavy weight to fall after counting 1—2—3.
- (16) What is your first name?
- (17) What is the first name of your wife?
- (18) Is she pretty?
- (19) We have now finished.

In some experiments, a series of mixed stimuli were presented (see Table 1). This series of stimuli was typically repeated three times. Figure 2 illustrates the simultaneous recording of galvanic and pneumographic responses.* This curve is of historic interest for several reasons. First, the authors comment on the "smaller and more rounded" curves here presented in comparison with those in the first series. In the initial series of stimuli, "the curves are usually characterized by abrupt ascent and descent with rather sharp summits," but with repetition, "the curves diminish in size and the summits become more rounded in each repetition, showing a slower excitation and slower reaction of the emotion." Second, the response between stimuli 10 and 11 in Figure 2 was occasioned by someone "unexpectedly"

*There are numerous incorrect references to the Peterson and Jung (1907) paper in the literature. Sometimes plethysmograph is used in the title in place of pneumograph. On other occasions, the date of the publication is cited as 1897. Although these investigators did make use of the skin potential technique in some recordings, all reported data derives from experiments utilizing the Fere method of changing resistance to an impressed current, and not skin potential as is sometimes reported. All such miscitations and inaccuracies are traceable to certain historically important reviews which became primary sources for later workers. Without direct experience with the original publication, most investigators are not aware of the errors they are repeating. This is true even in papers that are themselves historical reviews (e.g., Neumann and Blanton, 1970).

Figure 2



Galvanometer and pneumographic curves in a normal person (H., a nurse). The numbers at the top of each stimulus line correspond to the series of nineteen mixed stimuli printed in the text. 2 and 2a representing two falls of the weight occurred between 13 and 14 instead of between 1 and 2 in this curve, which was the second repetition of the series. Between 10 and 11 someone entered the laboratory.

entering the laboratory, an early illustration of a genuine orienting response. Stimulus 2 was presented out of turn. The response to it is quite large and is perhaps the first recorded perceptual disparity response (Grings, 1960). Notice too the absence of respiratory response to the unexpected stimulus.

Concerning the variability in galvanometric curves, Peterson and Jung (1907) note:

"We find considerable difference in the curves made by the galvanometer in normal persons. In some the waves are of rather small and even excursion, corresponding to the unemotional or phlegmatic nature of the subject. In other waves there is wide excursion, with fluctuating or bifurcated waves, rapid ascents and descents expressing great emotional liability." (From Jung, 1973)

Figure 3 illustrates recordings typical of the unemotional type and Figure 4 the emotionally labile type. Figure 5 illustrates the greater frequency of bifurcated waves and electrodermal storms which were found by Peterson and Jung to be characteristic of schizophrenic subjects.

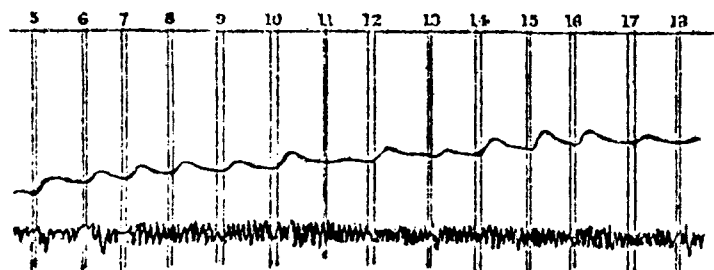
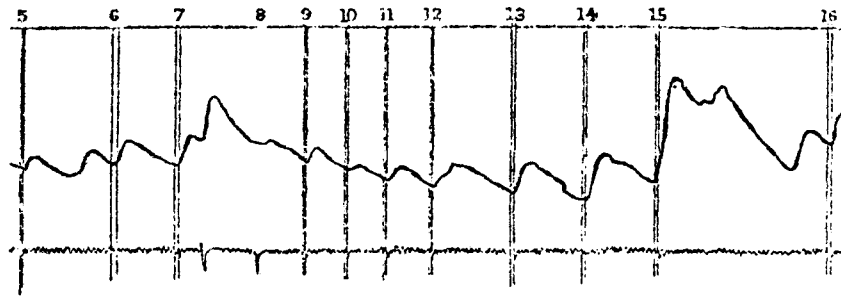


Figure 3

[Reprinted by permission of Princeton University Press]

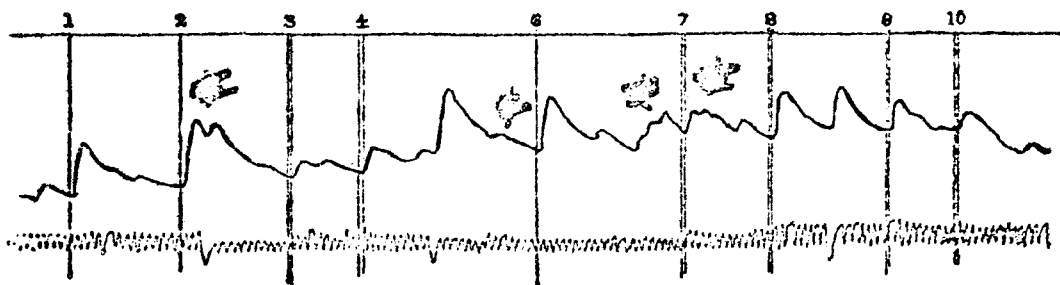
Dr. R., normal curve with rather indifferent word-association stimuli. Unemotional type.



H., an attendant, normal curves, very labile emotions. The numbers here correspond to the series of mixed stimuli; 15 is threat of weight.

Figure 4

[Reprinted by permission of Princeton University Press]



Dr. S., a patient with paranoid dementia (Case No. 3). Extraordinary labile emotions expressed in galvanometer curve. Considerable tension in pneumographic curve from stimulus 2 (fall of weight) on, with relaxation and deeper breathing beyond stimulus 7. An example of perseveration of tension for a long period in the pneumographic curve.

Figure 5

[Reprinted by permission of Princeton University Press]

These investigators studied intensively the relation between respiratory and galvanic curves. They measured the number of respiratory waves during the rising portion of the electrodermal response as well as during the falling portion of the response. Although many differences were observed few consistencies could be found. For these reasons the authors wrote:

"We have, therefore, not been greatly impressed with the value of a possible relation between the galvanometric and pneumographic curves since this is not constant, and the more comparative study we have given to the two

synchronous curves, the more we have been impressed with a surprising divergence between the influences at work upon them." (From Jung, 1973, p. 510)

In reflecting upon this "divergence" the authors conclude:

"There does not seem to be the intimate and deep relationship between respiratory function and the unconscious emotions that exists between the sweat glandular system and these emotions. It is a matter of everyday experience that the respiration is influenced by our conscious emotions especially when they are strong. But perhaps the emotions of the unconscious, roused up by questions or words that strike into the buried complexes of the soul reveal themselves in the galvanometer curve while the pneumographic curve is comparatively unaffected. Respiration is an instrument of conscious. You can control it voluntarily while you cannot control the galvanometer curve." (From Jung, pp. 511-512)

An interesting phenomenon was discovered in their recordings from a patient in catatonic stupor. There was nothing in the patient's behavior to indicate he was affected by any stimuli. In fact, his galvanic curve exhibited only small deflections. However, when the patient was called by name, there was a large change in the pneumograph curve and a slight change in the galvanometer. Later when his name was called again the same pattern was observed. (see Figure 6). The authors state:

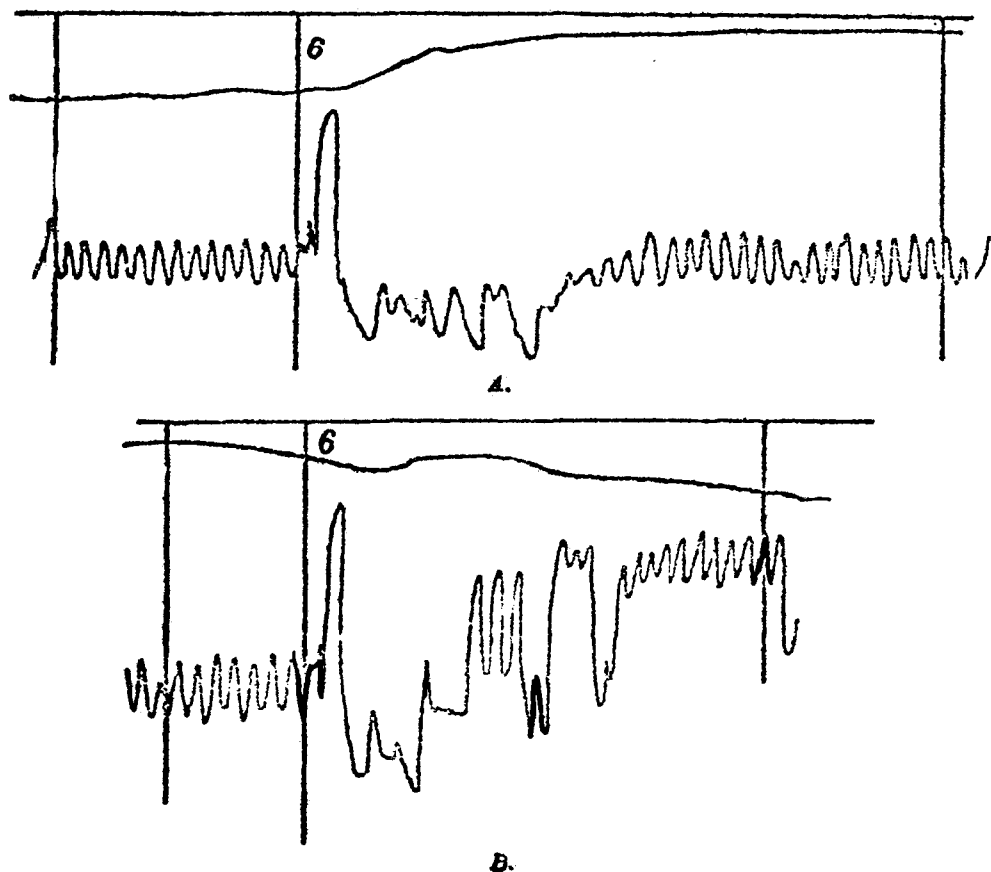
"The only reasonable explanation of this phenomenon in our opinions, is that the call of the name developed a disposition to speak, stimulated the hearing center, and the closely-associated speech center, the motor innervation from which acted upon the respiratory muscles." (From Jung, 1973, p. 513)

To present some idea of the detail these investigators gave even in these early papers, consider the results from an experiment in which a falling weight was used as a stimulus (Ricksher and Jung, 1907). First,

"...the galvanometric curves show great individual differences. In one case, an attendant who was very nervous and frightened at the experiment, the galvanometric deflection was 54 mm. In another case, also an attendant, but of a very phlegmatic disposition, the deflection was only 4.6mm. The average deflection for fifteen test-persons was 20.6 mm." (p. 195)

In relation to latency, the investigators found:

"The latent time, i.e., the time from the moment of stimulus to the beginning of the rise of the galvanic curve varies from 1.5 to 5.5 seconds." (p. 195)



J., acute catatonic stupor (Case No. 10). A is a wave selected from the series in which 6 is sudden call by name. The galvanometer curve is slight, but the change in the pneumographic curve is notable. B is the same stimulus in the repetition of the series.

Figure 6

[Reprinted by permission of Princeton University Press]

They discovered a relationship between latency and amplitude:

"This time while showing individual variations is usually shorter in cases which show the greatest galvanic reactions and averages 2.86 seconds." (p. 195)

They also measured the rise time of the response, the first investigators to do so:

"The time required for the curve to reach its maximum height corresponds roughly to the heights, a curve of 54mm requiring 11.5 seconds and one of 10 mm requiring 2.5 seconds. The average time is 6.93 seconds." (p. 195)

In addition, they measured the frequency and amplitude of the pneumograph during different components of the electrodermal response. The data are shown in Table 2.

Table 2

Frequency and Amplitude of Respiration before the Electrodermal Response, during the Rising Portion of the Response and during the Falling Portion of the Response (Data from Ricksher and Jung, 1907-8, p. 196)

	<u>BEFORE</u>	<u>RISE</u>	<u>FALL</u>
FREQUENCY	3.05/cm	3.02/cm	3.09/cm
AMPLITUDE	11.75mm	10.73mm	11.45mm

The authors conclude:

"Whether the inspiration is slowed or quickened during the rise of the galvanic curve seems to depend on the individual. The majority, however, show a slowing during the rise and a quickening during the fall of the galvanic curve." (p. 196)

In a more complete analysis of the so-called "expectancy curves" the authors note:

"What we have designated as expectation curves are changes in the galvanic curve which occur while the test-person is waiting for the stimulus. Naturally they vary according to the individual. Some of our test-persons had absolutely no sign of an expectation curve while others had quite marked ones. ... In heights they vary as the reactions to the stimuli but are nearly always lower than these. The average height of expectation curves is 15.70 mm. This high average is due to the fact that a test-person who has a great galvanic reaction to a stimulus will have many and great expectation curves. The time required for the curve to reach its maximum averages 10 sec., and to fall to the former level, 12 sec." (pp. 200-201)

This last observation is perhaps the first reported measurement of recovery of the electrodermal response.

In a more refined analysis of respiratory responses, the authors segregated respiratory responses for large and small galvanic reactions. They found that the differences in respiratory rate were much greater for large galvanic deflections than for small ones. In general, and particularly during large galvanic responses, the rate and amplitude of respiration decreased during the rising portion of the galvanic response, and increased during the falling portion of the response.

In comparing the amplitude of galvanic deflections to the subject's basal resistance the Ricksher and Jung (1907-8) report:

"As far as could be determined there was no regular relation between the height of the galvanic reactions and the individual bodily resistance at the beginning of the experiment." (p. 203)

The investigations of patient populations may be summarized in the following statements:

"The intensity of the reaction seems to depend in part on the attention paid by the test-person to the experiment. In cases of dementia praecox where the internal complexes dominate the affectivity and attention the reactions are slight; in alcoholism and in general paralysis, euphoric state, where the excitability is very great, the reactions are correspondingly greater. In organic dementia where all associative power is lost the reactions are almost nil. In dementia senilis, where dementia was very marked even the prick of a needle failed to cause a response." (p. 214)

"While normal reactions vary greatly in different individuals, they are as a rule always greater than pathological reactions." (p. 216)

The authors concluded that the galvanic response was caused primarily by the psychological and not the physical aspects of the stimulus. They based this conclusion on the following observations:

"The reaction is greatest when the stimulus is such as to call up a larger number of associations..." (p. 215)

"A stimulus which causes doubt and perplexity is accompanied by marked galvanic fluctuation ... " (p. 215)

"In cases of dementia where associations are few the reactions are correspondingly decreased." (p. 215)

"The physical intensity of a stimulus does not bear any regular relation to the size of the galvanic reaction." (p. 215)

"The strength of the reaction changes exclusively along psychological constellations. This is shown beautifully in one normal case where an ordinary whistle caused but a small reaction, but the whistle call of the society to which the test-person belonged when he was in school caused a very great galvanic fluctuation." (p. 215)

"If the attention is not directed to the stimulus the reaction is small or nil. Therefore we have no reactions in those cases where the attention is seriously disturbed. This can be proven by letting the test-person count or make lines on a paper at the stroke of a

metranome. In this case the reactions are almost nil."
(p. 215)

This latter statement refers to the first use of a masking task in electrodermal research.

These few quotations are sufficient for the present purposes. Most have been taken from those early papers of direct interest to psychophysiologicals, i.e., those papers which report the recording and measurement of the electrodermal response. Jung's papers on his use of the word association test in assessing emotional processes in normal subjects, patients of every variety, and its use in deception and criminology cannot be reviewed here, but are now readily available (Jung, 1973).

I have been stimulated by these papers to explore the potential use of the word association test in combination with modern psychophysiological techniques as an approach to cognitive processes. The link between the word association situation and conditioning lies in the role of attention in associating processes, about which Jung says:

The association process is an extremely transient and variable psychological process; it is influenced by innumerable psychical events which evade objective control. Among the psychical facts having a supreme influence upon the association process, attention is cardinal. It is attention which primarily directs and modifies the association process, and at the same time it is the psychical factor which most readily submits to experiment. Attention is also a delicate affective apparatus which immediately reacts to abnormal physical and mental conditions and thus modifies the work of association. Attention is that endlessly complicated mechanism which the association process by innumerable threads binds to all other phenomena of psychical and physical origin represented in consciousness. If we knew the effects of attention upon the process of association then we should know, at least in broad outline, the corresponding effects of every psychical event which is able to influence attention. (From Jung's forward to Jung and Riklin, 1904, cited here from Jung, 1969.)

References

- Edelberg, R. "Electrical activity of the skin: its measurement and uses in psychophysiology. In N.S. Greenfield and R.A. Sternback (Eds.) Handbook of Psychophysiology. New York: Holt, Rinehart and Winston, Inc., 1972.
- Grings, W.W. Preparatory set variables related to classical conditioning of autonomic responses. Psychological Review, 1960, 67, 243-252.
- Jung, C. G. Experimental Researches. Princeton: Princeton University Press, 1973. (Volume 2 of Collected Works of C. G. Jung, Bollingen Series XX).

- Jung, C. G. Studies in word association. London: Routledge and Kegan Paul, 1969. (Reissue of M. D. Eder's authorized English translation of Jungs' Diagnostische Assoziations Studien and published by William Heinemann, Ltd., 1918).
- Jung, C. G. and Riklin, F., Experimentelle Untersuchung uber Assoziationen Gesunder. Journal fur Psychologie und Neurologie, 1904, 3, 55-83, 145-64, 193-214, 238-308. (Republished in English translation as "The Associations of Normal Subjects" in Jung, 1973).
- Neumann, E. and Blanton, R. The early history of electrodermal research. Psychophysiology, 1970, 6, 453-475.
- Peterson, F. and Jung, C. G. Psychophysical investigations with the galvanometer and pneumograph in normal and insane individuals. Brain: A Journal of Neurology, 1907, 30, 118, 153-218. (Reprinted in Jung, 1973.)
- Ricksher, C. and Jung, C. G. Further investigations on the galvanic phenomenon and respiration in normal and insane individuals. The Journal of Abnormal Psychology, 1907-8, 5, 189-219. (Reprinted in Jung, 1973).

* * * * *

THE POLYGRAPH IN POLAND

By

Jan Widacki, Ph.D.
Department of Criminalistics
Jagellonen University
Krakow, Poland

And

Clarence H. A. Romig, M.S.
Department of Criminology
Indiana State University
Terre Haute, Indiana 47809

In 1965 the Secretary-General of INTERPOL predicted, in an annual address to the membership, that by 1975 all of the European countries would employ the polygraph on a large scale in their fight against crime.¹ Now that we are within a year of that target date, we will begin to examine the status of the use of the polygraph in various countries throughout the world. The history, experimentation, and laws concerning the use of the polygraph in criminal justice matters in Poland will be explored first.

Although the polygraph was not used for criminal investigation initially in Poland, the polygraph, in the form of a Darrow Photo-Polygraph, was in the possession of the Polish Department of Mental Health in Warsaw before 1939.² In addition to other experimentation, this instrument was used by psychologists for general research concerning emotion caused breath changes.^{3,4} Unfortunately, the war years interfered with the continuity of this scientific experimentation.

Except for a few brief notes in a psychology text, there was a dearth of written information on the polygraph available in Poland during the early post war years.⁵ In 1958, what was considered to be the most comprehensive Polish criminalistics text described the polygraph in a biased and incomplete fashion. The author of that text reported that the polygraph technique had no scientific basis, that interpretations of charts were inaccurate, and that the instrument was merely a device for the intimidation of the person to be interrogated.⁶

In 1963, a polygraph instrument was used for the first time during a criminal investigation in Poland. A murder had been committed in the province of Olsztyn. Two males were identified as being present at the time of the murder, but both accused the other of the crime. The investigating prosecutor called for the assistance of the head of the criminalistics department of Warsaw University, who had experimented extensively with the polygraph.⁷

After obtaining their written consent, the professor examined the two suspects with his polygraph and cleared one of further accusation of the

offense. Of the other subject the professor wrote in his opinion that "in the course of the responses registered during the examination, significant reactions occurred after critical questions . . . which with the hitherto known facts allows for maintaining that they are not symptoms of a truth telling person." Along with other evidence, this opinion and a description of the polygraph technique was accepted in evidence at the trial and the subject was found guilty.

The trial record contained references to substantial evidence in addition to the polygraph examination, yet, because polygraph evidence had heretofore never been offered to the courts, further legal justification had to be provided in event the case was appealed. The trial judge made a firm statement that the polygraph examination was a scientific method and mere lack of precedent cases was no cause for denial of its use in court.⁸ Then, in open court, he conducted an arduous and lengthy inquiry of the polygraph concept, the polygraph technique, and this examination in particular.

Upon appeal the Supreme Court upheld the findings and sentence of the lower court and refused a defense request for a retrial. Specifically mentioned in the Supreme Court holding was the fact that the polygraph evidence was minor in relation to the preponderance of the other evidence presented.⁹ There was no discussion about the admissibility or inadmissibility of evidence concerning the polygraph examination. In view of the upholding of the lower court ruling to accept the polygraph in evidence, other legal authorities assumed that henceforth the Supreme Court would accept this new form of evidence for this and future cases. Thus ended the first judicial review of the use of polygraph evidence in the criminal courts in Poland.

A second court test of polygraph evidence occurred in the latter part of April 1964, in the Province of Lublin.¹⁰ Upon the request of the counsel for the accused the court ordered psychological tests for two subjects who were accused of economic crimes. The professor from Warsaw University cited in the previous case conducted the psychological tests which included polygraph examinations. The results of the polygraph examinations were unfavorable to the accused, and upon objection by the defense counsel this trial court rejected the polygraph evidence based on these written premises:

- a. There was inadequate experience with the polygraph in Poland to date and any experience offered should be considered as experimentation, the value of which is yet unproved.
- b. The criminal procedure of Poland requires the presence of prosecution and judicial personnel during any questioning, inquiry, or examination. The isolation and privacy of the examiner and examinee during the test precluded the witnesses and participants required by the criminal procedure.
- c. In the absence of corroborating evidence the court had no means to determine the credibility of the results of the examinations of the two subjects.

- d. The court could not draw practical inferences of guilt from the mere observations of physical reactions of an accused.

The prosecution did not refer this case to the higher court for review.

These two court cases which include the introduction of polygraph examinations results in the criminal proceedings, created heated discussions in the legal journals of Poland in the period of 1964 through 1966. The lawyers involved in these discussions seemed not to be hampered by the lack of objective information concerning the polygraph instrument or its potential applicability to criminal investigations. Nor were the debates stymied by an unavailability of information about the use of the polygraph in foreign countries and courts. Rather, the controversy centered on the issues raised by these two court cases, whether or not polygraph evidence should be routinely accepted or rejected as evidence in court.¹¹

The polemics of this issue resulted in clear distinctions being made between the polygraph examination and narcoanalysis, which had earlier been declared inadmissible in the courts, and that the polygraph evidence should stand its own test of admissibility.

The importance of this continuing debate over the polygraph cannot be overemphasized. Here were legal authorities discussing the pros and cons of the admissibility of an instrument and technique into a legal system that outlawed narcoanalysis and police station confessions, yet is a system that has a combination of the inquisitorial and adversary proceedings.

All important to these publicized discussions would be the obvious influence upon the Supreme Court and governmental administrators responsible for establishing court precedence or criminal procedure codes accepting or rejecting this new type of criminal evidence.

A similar controversy over the use of the polygraph and its acceptance in court had run its course and resulted in its absolute prohibition by the Supreme Court in West Germany.¹³ In the German case an accountant had been accused of faking a burglary in 1949 to cover his embezzlement of the equivalent of \$1,500.00. He offered to take a polygraph examination to prove his innocence, but the test results, as presented in court, identified him as the perpetrator. He was found guilty and upon appeal to the Supreme Court the findings were reversed.

The West German Supreme Court stated that although the first duty of the court was to determine the truth, the search must be in accordance with the legal principles of constitutional law and criminal procedure and the concept that an individual is a self-accountable, moral personality. The voluntariness of the taking of the polygraph examination was deemed irreconcilable with the accused's freedom of will, because his oral answers to the test questions conflicted with the examiner's opinion. The court held that the polygraph had gained insight to the accused's soul and violated his freedom of decision and action. To prevent any indirect coercion to overcome the freedom of will guaranteed by the German Constitution in future polygraph examinations, the court simply held that such examinations were

prohibited and that the accused could not waive this constitutional prohibition.

An important factor that resulted from the long debate in Poland was the realization that additional experimentation would have to be undertaken in order to provide some answers to questions of reliability and validity of the technique that were as of yet unavailable. The scientific experimentation would also necessarily include the collection of data from similar research conducted in other countries. At this point there was an awareness that the results of the polygraph examination might be useful for investigative purposes, such as when seeking additional evidence.

The third and last time that a polygraph examination was introduced as evidence in court in Poland took place in 1969 in the Military District Court of Bydgoszcz. The opinion of the polygraph examiner was admitted along with other testimony and evidence, and resulted in the conviction of the defendant.

Now that five years have passed since the third and last court case involving polygraph evidence has become judicial history, what is the present status of the use of the polygraph for criminal investigations and criminal court purposes? The disoriented controversy of the 1964-1966 era did not overwhelmingly convince many legal skeptics that the polygraph instrument and technique had a strong position of admissibility in the courts. To date there is an occasional rejection of the polygraph and technique noted in some articles in the professional and scientific journals published in Poland. These voices of rejection reflect the views of a minority; the majority and the interpretation of the laws and codes are in favor of the use of polygraph evidence.

There is no law of criminal procedure code that expressly prohibits the use of the polygraph. The only act that touches upon this question reads as follows: Article 157, Section 2 of the Criminal Procedure Code; Explanations, testimony or declarations made under circumstances, other than the possibility of making a voluntary statement, will not be accepted in evidence.

Because the language of this act clearly states that there is no prohibition against how information is obtained but only rejects involuntary statements as evidence, legal scholars have arrived at two interpretations: one interpretation would allow polygraph examination results that would eliminate suspects, and lead to or identify evidence, rather than provide a statement from the examinee or provide an opinion relative the guilt or innocence of an examinee. The second interpretation would allow an opinion as to the guilt or innocence of the examinee regardless if any statement is made by the examinee. In this instance the examinee's statement would be ignored, but the test results would become evidence.

Both of the interpretations stated above are conjectural and have no legal basis. The Supreme Court has reviewed only one court case that included polygraph evidence, and failed to comment beyond recognizing substantial evidence in addition to the polygraph examination results.¹⁴ At this time the laws and criminal procedure code do not prohibit the use of

the polygraph evidence during the formal investigation by the court and during the actual trial.

In the past few years the polygraph has generated a considerable amount of interest in Poland. Two law school criminalistics texts issued in 1972 and 1973 contain information and recommendations for the use of the polygraph. One text suggests that the polygraph should be employed as an adjunct to psychological tests.¹⁵ The second text strongly supports the admissibility of the examination results if the test was undergone voluntarily by the accused.¹⁶

An article in a criminalistics journal last year favored the use of the polygraph for police interviews and the polygraph examination as a part of the evidence collection process. The author of the article suggested that the polygraph examiner should be a distinct and autonomous expert, who would have to be qualified to provide admissible opinion evidence on an individual basis.¹⁷ So far in Poland the polygraph examination has been conducted for the inquisitorial proceedings, which is the judicial investigation prior to the trial.

Another university criminalist has written that the polygraph examination should serve as an integral part of any interrogation. He suggests that the polygraph should be employed early in the investigation to eliminate suspects and to avoid false or misleading clues. He also believes that the polygraph examiner should be technically trained to provide competent evidence concerning the examination results.¹⁸

At the present there are several areas of polygraphy that are being extensively researched. These experiments primarily involve reliability and validity measures.¹⁹ This research should provide some of the practical and scientific experience necessary to prepare the professional examiners for the most crucial test concerning the polygraph. And that final test will take place in the courts of Poland.

References

1. Napote, J. "The Police and the Crime in 1975". Int. Crim. Pol. Rev., 1965, 194, p. 6-7.
2. Trovillio. "A History of Lie-Detection". J. of Crim. Law and Crim., 1938/39, vol. 29.
3. Zielinska, W. J. "Znaczenie psychologicznej diagnostyki dla celow sledczycho", Bydgoszcz 1939, p. 139-142.
4. Abramowski, F. "Oddech jako czynnik zycia psychicznego", Warszawa, 1913.
5. Kruutz, M. "Podstawy Psychologii", Warszawa 1949, p. 62.
6. Horoszowski, P. "Kryminalistyka", Warszawa 1958, p. 125-128.
7. II Ds 25/63 Prokuratura Wojewodzka w Olsztynie.

8. IV K 94/63 Sad Wojewodzki w Olsztynie.
9. Wyrok, SN - Izba Karna z dnia 11.XI.1964, III K 177/64 OSPiKA.
10. IV K 27/64 Sad Wojewodzki w Lublinie.
11. Bafia, J.J., Bednarzak, M., M. Flemming, S. Kalinowski, H. Kempisty, M. Siewierski. "Kodeks postopowania karnego - komentarz", Warszawa 1971, p. 207.
12. Daszkiewica, W. "Glosa do wyroku SN Izba Karna z 11.XI.1964 III K 177/64, OSPiKA 1965, 156 i nast.
13. Kaganiec, H. "Freedom of the Will in West Germany", J. of Crim. Law, Criminol. and Pol. Sci., 1957, Vol. 47, No. 5, p. 570.
14. Wyrok Sadu Najwyzszego - Izba Karna z dnia 11.XI.1964, III K 177/64, OSPiKA 1965, 10, 465.
15. Czeczot, Z. and M. Czubalski. "Zarys kryminalistyki" Wydawnietwo UW Warszawa 1972, 97.
16. Holyst, B. "Kryminalistyka" Wydawnietwo Prawnicze, Warszawa, 1973, p. 400-401.
17. Hanausek, T. "Ekspertyza kryminalistyczna" Zesz. Nauk. ASW nr 1, 1973 r.
18. Widacki, J. "K problematice uplateni polygrafu pri praktickem vysetrovani PLR" Ceskosl. Krim. 1974, 2, 127.
19. Widacki, J. "Z rozvazan nad istota 'symptomow klamstwa' przy lie-detection test" Arch. Med. Sad. iKrym., 1975, 1, in press.

* * * * *

October 1973

PROGRAM OF INSTRUCTION FOR

7H-F10

POLYGRAPH EXAMINER REFRESHER COURSE

MOS: None
Length: 3 weeks

APPROVED BY: CDR, TRADOC
4 October 1973

[This POI supersedes POI for the Polygraph Examiner Refresher Course,
November 1971.]

Section 1 - Preface

- A. Course: 7H-F10, Polygraph Examiner Refresher.
- B. Purpose: To provide warrant officer polygraph examiners with refresher training for requalification and certification. MOS for which trained: None.
- C. Prerequisites: Warrant officers must meet the requirements outlined in AR 195-6. Must be qualified as Criminal Investigator (MOS 951AK). Must be assigned or under orders for assignment to a position as a polygraph examiner and require refresher training. No security clearance required. Obligated service for Active Army warrant officers: None.

Special information: Personnel selected by chiefs of all Department of Defense and other federal agencies must meet additional prerequisites as determined by that agency.

	Peacetime	Mobilization
D. Length:	3 weeks	None
E. Training location:	U. S. Army Military Police School	None
F. MOS feeder pattern:		
Prerequisite MOS	MOS Trained in This Course	Feeds Following MOS
WO 951AK	None	None

- G. Ammunition requirement: No ammunition required.
- H. Selected training recapitulation: Not applicable.
- I. Standardization of prefix digit 5 training: Not applicable.

Section II - Summary

Course - Polygraph Examiner Refresher, 7H-F10

Hours - 120

Subject	Hours	Annex
A. Academic Subjects		
Polygraph Examination Procedures	28	A
Polygraph Instrumentation	8	B
Polygraph Related Subjects	14	C
Polygraph Comprehensive Practical Exercises	38	D
Examinations	20	E
Subtotal	108	
B. Nonacademic Subjects		
Inprocessing	2	
Outprocessing	2	
Commandant's Time	4	
Open Time	4	
Subtotal	12	
Total	120	
C. Recapitulation		
1. Security Classification		
Unclassified	120	
2. Type of Instruction		
Conference (C)	29.5	
Practical Exercise (PE)	48	
Demonstration (D)	1	
Case Study (CS)	4.5	
Film (F)	1	
Television (TV)	4	
Examination (E)	20	
Nonacademic	12	
Total	120	

Section III - Body

Course - Polygraph Examiner Refresher, 7H-F10

Academic Subjects - Peacetime: 108 hours; Mobilization: None

Annex Title and Subjects	Hours	Annex
Polygraph Examination Procedures		A
Use of the Polygraph in Investigations	1	
Polygraph Regulations and References	1	
Polygraph Question and Test Structure Principles	1	
Semantics	1	
Polygraph Question Formulation	2	
Chart Interpretation Fundamentals	1	
General Question Test Construction	4	
General Question Test Interpretation	2	
Zone Comparison Test Construction	2	
Zone Comparison Test Evaluation	2	
Peak of Tension Test Construction	1	
Peak of Tension Test Analysis	1	
Pretest Procedures	2	
Chart Markings	1	
In-Test Procedures	1	
Post-Test Procedures	1	
Polygraph Records and Reports	1	
Comprehensive Polygraph Procedures	3	
Annex Total	28	
Polygraph Instrumentation		B
Historical Development of Polygraph Instrumentation	1	
Polygraph Maintenance	3	
Polygraph Operation	3	
Other Polygraphs	1	
Annex Total	8	
Polygraph Related Subjects		C
Physiology of the Human Body	4	
Pharmacology	1	
Dynamics of Normal Behavior	2	
Abnormal Psychology	2	
Legal Considerations	3	
Presentation of Court Testimony and Briefings	2	
Annex Total	14	

Annex Titles and Subjects	Hours	Annex
Polygraph Comprehensive Practical Exercises		D
Phase I, Conduct of Zone Comparison Technique Polygraph Examinations and Peak of Tension Examinations	15	
Phase II, Conduct of Modified General Question Technique Polygraph Examinations and Peak of Tension Polygraph Examinations	15	
Phase III, Conduct of Personnel Screening Polygraph Examinations	8	
Annex Total	38	
Examinations		E
Performance Test Number 1	2	
Performance Test Number 2	2	
Performance Test Number 3	8	
Performance Test Number 4	8	
Annex Total	20	

Section IV - Annexes

Annex A - Polygraph Examination Procedures

Purpose - To provide the student with a comprehensive review and latest technique developments of polygraph testing principles and procedures.

File No.	Class	Type of Instruction
10100 - Use of the Polygraph in Investigations		
Hours:	1	U .5C, .5TV
Objective:	The student will analyze proper utilization of polygraph equipment as it relates to criminal investigation, to include use of film to preface summary discussion.	
Ref:	AR 195-6; TB PMG 22; TVR 19-2559.	
10102 - Polygraph Regulations and References		
Hours:	1	U 1C
Objective:	The student will analyze current regulations and reference materials to identify requirements governing the conduct of polygraph examinations within the military. He will discuss examiner qualifications and identify his responsibilities, restrictions and limitations imposed upon	

conduct of examination procedures to be followed.

Ref: AR 195-6; TB PMG 22.

10104 - Polygraph Question and Test Structure Principles

Hours: 1 U .5C, .5PE

Objective: The student will discuss the application of basic polygraph principles and significant considerations involved in the structure of polygraph questions and procedures employed in the formulation of polygraph tests.

Ref: TB PMG 22; Zone Comparison Technique, Backster; Truth and Deception, Inbau and Reid; The Keeler Technique, Harrelson.

10106 - Semantics

Hours: 1 U 1PE

Objective: The student, when confronted with a situation requiring evaluation of semantical considerations involved in the polygraph pretest, will develop questions and construct the test in such a way as to eliminate semantical variables.

Ref: Semantics and Common Sense, Salomon.

10108 - Polygraph Question Formulation

Hours: 2 U .5C, 1.5PE

Objective: The student will apply the principles utilized in the formulation of valid polygraph test questions for subsequent use in polygraph examinations.

Ref: AR 195-6; TB PMG 22; Truth and Deception, Inbau and Reid; The Keeler Technique, Harrelson; Zone Comparison Technique, Backster.

10110 - Chart Interpretation Fundamentals

Hours: 1 U .5C, .5CS

Objective: The student will discuss and identify the terminology and principles associated with interpretation of phenomena recorded on polygraph chart tracings.

Ref: Truth and Deception, Inbau and Reid; Zone Comparison Technique, Backster; The Keeler Technique, Harrelson.

10112 - General Question Test Construction

Hours: 4 U 2C, 2PE

Objective: The student will construct a general question-type and a modified general question-type polygraph test to be applied in specific testing and personnel screening.

Ref: Truth and Deception, Inbau and Reid; The Keeler Technique, Harrelson.

10114 - General Question Test Interpretation

Hours: 2 U .5C, 1PE, .5CS

Objective: The student will discuss and interpret general and modified general question test polygraph charts to determine if the examinee is considered to be deceptive, nondeceptive, inconclusive, or requires further testing.

Ref: Truth and Deception, Inbau and Reid; The Keeler Technique, Harrelson.

10116 - Zone Comparison Test Construction

Hours: 2 U .5C, .5CS, 1PE

Objective: The student will discuss principles of test construction and apply them to zone comparison-type polygraph examination.

Ref: Zone Comparison Technique, Backster.

10118 - Zone Comparison Test Evaluation

Hours: 2 U .5C, .5CS, 1PE

Objective: The student will evaluate zone comparison test polygraph charts to determine additional test question construction requirements and procedures.

Ref: Zone Comparison Technique, Backster.

10120 - Peak of Tension Construction

Hours: 1 U .5C, .5CS

Objective: The student will discuss principles of structure and application of peak of tension-type polygraph examinations.

Ref: Truth and Deception, Inbau and Reid; The Keeler Technique, Harrelson.

10122 - Peak of Tension Test Analysis

Hours: 1 U 1PE

Objective: The student will interpret peak of tension polygraph charts to determine deception, nondeception, or inconclusive results.

Ref: Truth and Deception, Inbau and Reid; The Keeler Technique, Harrelson.

10124 - Pretest Procedures

Hours: 2 U 1.5C, .5TV

Objective: Through the use of television, the student will analyze and discuss the preparation related to polygraph examinations, proper conduct of pretest interviews and other pretest procedures.

Ref: AR 195-6; TB PMG 22; Truth and Deception, Inbau and Reid; The Keeler Technique, Harrelson; TVR 8-70.

10126 - Chart Markings

Hours: 1 U .5C, .5PE

Objective: The student will discuss the utilization of standardized signs, symbols, abbreviations, and other markings on polygrams to facilitate interpretation and identification.

Ref: Uniform Chart Markings, Backster; The Keeler Technique, Harrelson.

10128 - In-Test Procedures

Hours: 1 U 1C

Objective: The student will discuss the considerations related to polygraph in-test procedures to include application of stimulation tests, subject intratest conditioning, test or question modifications, utilization of interpreters, and dealing with exigency situations.

Ref: AR 195-6; TB PMG 22; Truth and Deception, Inbau and Reid; The Keeler Technique, Harrelson; TVR 8-71.

10130 - Post-Test Procedures

Hours: 1 U 1C

Objective: The student will discuss the considerations related to polygraph post-test procedures, including the release

of examination results, and the questioning of deceptive subjects.

Ref: AR 195-6; TB PMG 22; Criminal Interrogation and Confessions, Inbau and Reid; The Keeler Technique, Harrelson; TVR 8-72.

10132 - Polygraph Records and Reports

Hours: 1 U .5C, .5PE

Objective: Through discussion the student will analyze the utilization of standard polygraph forms, format requirements involved in preparation of polygraph examination reports, and distribution and proper disposition of polygraph charts and records.

Ref: AR 195-6; TB PMG 22.

10134 - Comprehensive Polygraph Procedures

Hours: 3 U 1C, 2PE

Objective: The student will apply current polygraph procedures and principles in a series of simulated test situations. He will be monitored and critiqued by qualified instructors. Subsequent to individual critiques, the student will present unusual charts, test questions, and the results to identify errors and corrective action required.

Ref: School material.

Annex Total: 28

Annex B - Polygraph Instrumentation

Purpose - To provide the student with a working knowledge of operation and maintenance of polygraph instruments to include familiarization with new instrumentation.

File No.	Class	Type of Instruction
----------	-------	---------------------

10200 - Historical Development of Polygraph Instrumentation

Hours:	1	U	1C
--------	---	---	----

Objective: The student will analyze the historical development of polygraph instrument recording components. He will discuss the pneumograph, cardiosphygmograph, galvanograph, and kymograph, to include development of modern transistorized instruments.

Ref: A History of Lie Detection, Trovillo; Truth and Deception, Inbau and Reid.

10202 - Polygraph Maintenance

Hours: 3 U 1C, 2PE

Objective: The student will perform maintenance of polygraph instruments to include tests for leakage, checks of sensitivity, procedures for calibration of the instrument, disassembly and assembly of components, and detection and repair of malfunctions performed at the operator and organizational maintenance levels.

Ref: TM 11-5538A; TM 11-6695-200-20P; TM 11-6695-200-35P; TM 11-6695-210-12; TM 11-6695-210-45; Polygraph/Lie Detectors, C. H. Stoelting Co.; Keeler Polygraphs T. P. Manual 70.1, Associated Research, Inc.

10204 - Polygraph Operation

Hours: 3 U .5TV, 2.5PE

Objective: The student will operate an AN/USS-2D polygraph instrument. He will be monitored and critiqued by instructors on his operation and procedure.

Ref: TM 11-5538A; TVR 8-70.

10206 - Other Polygraphs

Hours: 1 U 1D

Objective: Discussion and demonstration on the operation, functions and maintenance of Keeler, Stoelting, and LaFayette polygraphs, emphasizing the variations from the AN/USS-2D.

Ref: TM 11-6695-203-15; TM 11-6695-210-12; TM 11-6695-210-45; Polygraph/Lie Detectors, C. H. Stoelting Co.; Keeler Polygraphs T. P. Manual 70.1; Associated Research, Inc.; Lafayette Instruments, LaFayette Instrument Co.

Annex Total: 8

Annex C - Polygraph Related Subjects

Purpose - To provide the student with a working knowledge of concise and updated information on legal, physiological, and psychological considerations related to polygraph examinations, and to provide a foundation on which to base his preparation for delivering polygraph court testimony and polygraph briefings.

File No.	Class	Type of Instruction
10300 - Physiology of the Human Body		
Hours:	4	U 2.5C, 1F, .5TV
Objective:	The student will discuss human physiology to include organization, structure, and functions of the nervous, cardiovascular, and respiratory systems in relationship to chart tracing phenomena.	
Ref:	<u>Basic Physiology and Anatomy</u> , Chaffee and Greisheimer; CF, "Gatesways to the Mind"; CF, "Hemo the Magnificent"; TVR 8-98631.	
10302 - Pharmacology		
Hours:	1	U 1C
Objective:	Through discussion, the student will analyze the potential effects of depressant - and stimulant-type drugs on the human body and the resultant polygraph tracings to include narcotics, barbiturates, amphetamines, tranquilizers, and hallucinogens.	
Ref:	<u>United States Pharmacopia</u> , JAMA.	
10304 - Dynamics of Normal Behavior		
Hours:	2	U .5C, .5CS, 1TV
Objective:	The student will discuss dynamics of normal behavior in relation to the conduct of polygraph examinations. He will analyze and identify the ego defense mechanisms in reaction to stress situations.	
Ref:	<u>Abnormal Psychology and Modern Life</u> , Coleman; TVR-5142.	
10306 - Abnormal Psychology		
Hours:	2	U 1C, .5CS, .5TV
Objective:	Through an introductory film and a television presentation, the student will analyze and discuss the general classification and characteristics of neuroses, psychoses, character disorders, and other organic and functional disorders of the mind. He will identify abnormal behavior symptoms and other abnormal psychological factors which pose potential polygraph examiner problems in law enforcement.	
Ref:	<u>Abnormal Psychology and Modern Life</u> , Coleman; TVR 8-73.	

10308 - Legal Considerations

Hours: 3 U 1.5C, 1CS, .5TV

Objective: The student will discuss the nature of legal evidence produced by a polygraph examination. He will determine the legal status of examination results, the rights of the subject under the provisions of the Fifth Amendment to the Constitution, and Article 31 of the UCMJ. The student will render appropriate advice to a suspect and evaluate admissions and confessions received during or as a result of a polygraph examination administered under military law.

Ref: AR 195-6; TB PMG 22; MCM, 1969 (Rev); CM Reports; TVR 8-70.

10310 - Presentation of Court Testimony and Briefings

Hours: 2 U .5C, 1.5PE

Objective: The student will discuss the requirements for effective presentation of court testimony by the polygraph examiner, and the principles of delivering effective polygraph briefings. He will participate in simulated courtroom presentations of polygraph testimony, and in simulated briefings.

Ref: School material.

Annex Total: 14

Annex D - Polygraph Instrumentation and Examinations

Purpose - With pertinent references and advice and under minimum supervision, the student will demonstrate the knowledge and skill gained from previous instruction during practical exercises; the student will conduct polygraph examinations in varied situations which require the application of recommended principles, techniques, and procedures common to the field of polygraphy at an acceptable standard of performance.

File No.	Class	Type of Instruction
----------	-------	---------------------

10400 - Phase I, Conduct of Zone Comparison Technique Polygraph Examinations and Peak of Tension Examinations		
---------------------------------------------------------------------------------------------------------------	--	--

Hours:	15	U	3C, 12PE
--------	----	---	----------

Objective: Under conditions simulating a polygraph examination room and given a polygraph instrument, the student will conduct advanced examinations using the zone comparison technique and peak of tension examinations.

The student will be expected to apply lessons previously learned and will be individually critiqued.

Ref: AR 195-6; TB PMG 22; Criminal Interrogations and Confessions, Inbau and Reid; Truth and Deception, Inbau and Reid; The Keeler Technique, Harrelson; Zone Comparison Technique, Backster; School material.

10402 - Phase II, Conduct of Modified General Question Technique Polygraph Examinations and Peak of Tension Polygraph Examinations

Hours: 15 U 30, 12PE

Objective: Under conditions simulating a polygraph examination room and given a polygraph instrument, the student will conduct advanced examinations using the modified general question technique and peak of tension examination. The student will be expected to apply lessons previously learned and will be individually critiqued.

Ref: AR 195-6; TB PMG 22; Lie Detection and Criminal Interrogation, Inbau and Reid; Truth and Deception, Inbau and Reid; School material.

10404 - Phase III, Conduct of Personnel Screening Polygraph Examinations

Hours: 8 U 20, 6PE

Objective: Under conditions simulating a polygraph examination room and given a polygraph instrument, the student will conduct advanced practical exercises in the conduct of personnel screening polygraph examinations and will be individually critiqued.

Ref: AR 195-6; TB PMG 22; Truth and Deception, Inbau and Reid; The Keeler Technique, Harrelson; Annual Report on Polygraph Technique Trends ASI, Backster; School material.

Annex Total: 38

Annex E - Examinations

Purpose - To provide a meaningful evaluation of each student, to measure student progress and the efficiency of instruction, and to further student learning and assist in providing student motivation.

File No.	Class	Type of Instruction
----------	-------	---------------------

10002 - Performance Test Number 1		
-----------------------------------	--	--

Hours:	2	U	2E
--------	---	---	----

Objective: Under conditions simulating a polygraph examination room and given a polygraph instrument, the student will explain the functioning of the instrument, identify the parts of the instrument utilizing correct nomenclature, identify and correct malfunctions, and correctly calibrate the instrument. The test encompasses material presented in 10200, 10202, 10204, and 10206.

Ref: School material.

10004 - Performance Test Number 2

Hours: 2 U 2E

Objective: Under conditions simulating a courtroom and given a hypothetical polygraph examination conducted by the student, the student will present polygraph testimony under both direct and cross examination. This test encompasses material presented in 10310 as the direct object of the test, and generally includes all material covered in the course.

Ref: School material.

10006 - Performance Test Number 3

Hours: 8 U 8E

Objective: Under conditions simulating a polygraph examination room and given a polygraph instrument, the student will conduct advanced examinations using the zone comparison technique and peak of tension technique; the student will be individually critiqued and graded. This test encompasses 10100, 10102, 10104, 10106, 10108, 10110, 10116, 10118, 10120, 10122, 10124, 10126, 10128, 10130, 10132, 10134, 10300, 10302, 10304, 10306, 10308, and 10400.

Ref: School material.

10008 - Performance Test Number 4

Hours: 8 U 8E

Objective: Under conditions simulating a polygraph examination room and given a polygraph instrument, the student will conduct advanced examinations using the modified general question technique. The student will be individually critiqued and graded. The test encompasses material presented in 10100, 10102, 10104, 10106, 10108, 10110, 10112, 10114, 10124, 10126, 10130, 10132, 10134, 10300, 10302, 10304, 10306, 10308, and 10402.

Ref: School material.

Annex Total: 20

THE RESPIRATORY SYMPTOMS OF LYING¹

By

Vittorio Benussi (Graz)

Area of Investigation

Intellectual events, no less than emotional ones, present corresponding somatic phenomena; in other words, there is a constant physical expression by which they reveal themselves. In the final analysis advanced knowledge of human nature rests on a well-developed ability of correctly interpreting such modes of expression, regardless of whether or not they are as obvious as blanching, trembling, blushing, or are barely evident in an inflection of the voice, a changed tone or rhythm of speaking.²

To a large extent all these external symptoms of internal events can be suppressed by practice, or at least attenuated to such an extent that they remain subliminal even for a highly experienced observer. The greater the ability to inhibit external forms of expression the greater will be the non-transparency of the internal human phenomena, and the more difficult their diagnosis by another person.

However, the experimental investigation of external forms of expression begins where the ordinary human power of observation tends to fail to find any clues. Human inability to notice is replaced by the sensitivity of instruments as for instance in measurements of conductivity, respiratory movements, pulse, etc. In the case of these phenomena a voluntary inhibition on the part of the experiencing subject has practically never been observed so far.

The usefulness of this inability for the diagnosis of internal phenomena will be demonstrated again in what follows. Investigations of recent years definitely have shown how sensitive respiratory movements are to psychic changes. Progress here is largely based on the discovery that the finer and more constant forms of expression are not based on frequency or depth of respiration but rather on the distribution of innervation over the different phases of respiration. In the form of respiration, in the temporal proportions of the different phases of respiration, changes of our inner life find their most distinct expression and reveal themselves even when they seem to be able to hide completely from the lurking watch of a fellow human.

The question then, which is to be decided on the basis of respiratory measurements, is as follows: are those internal attitudes which correspond to the sincere or mendacious behavior of a subject accompanied by constant measurable changes of respiratory innervation so that these changes can be considered as symptoms of those attitudes and accordingly can serve as their diagnostic criteria? In other words: do we respire one way when we are sincere and another way when we are not? Do respiratory symptoms for lying³ and sincerity exist - and if they do, how are they related to the

From the Psychological Laboratory of the University of Graz. Leipzig ARCHIV FUER PSYCHOLOGIE in German 1914, pp. 0244 0273.

dissimulation power of a subject, to his mendacious disposition, to his intentions and his effort to disguise such symptoms, i.e., not just to fool the inadequate powers of observation of his fellow-man but even to overcome the greater registration power of sensitive apparatus?

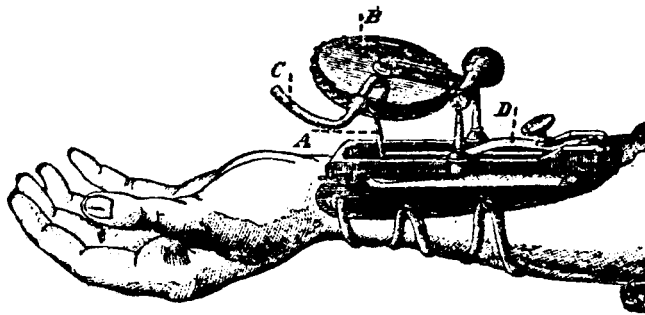
All these questions will find a reply in the results to be presented. In addition there is the following point: a respiratory diagnosis will appear the more valuable, as compared with the direct observations of a third person or several "experts", the more the respiratory symptoms are in agreement with the actual facts, in other words, the more the frequency of agreement between lie (or sincerity) and respiratory change will exceed the frequency of agreement between lie (or sincerity) and (correct) evaluation on the part of observers.

From the point of experimental methods it is thus of special importance to determine two factors and relate them to each other: the reliability of expert observations (v) (Whether a statement of the subject of investigation is truthful or mendacious) and the reliability (V) of the recorded respiration curves. We may note here in advance that the ratio of v to V approaches 0:1. This disproportion shows clearly the impotence of man compared with the power of proper experimental devices.

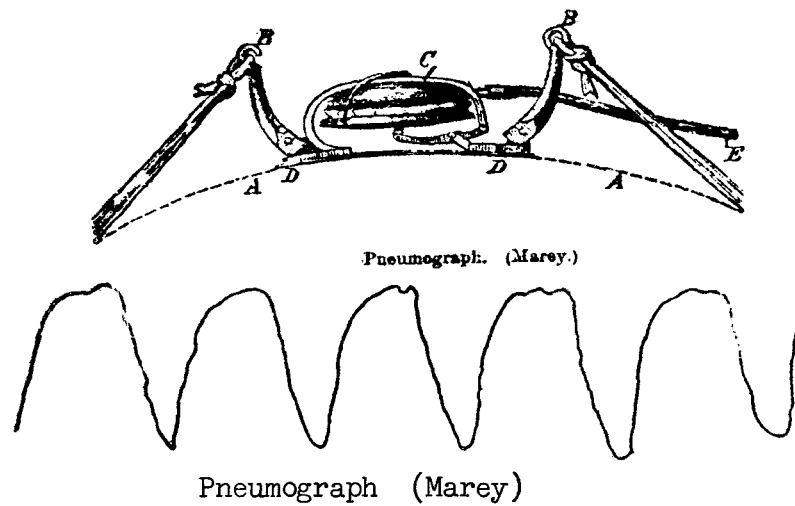
Now a few words about our experimental technique.

Nature and Data of the Individual Experiment

The experimental person (EP) sits comfortably on a wide, easy chair, the left arm is immobilized by an arm support. A position of the arm is selected which does not annoy the EP. For the recording of the pulse we use the Marey or the Lehmann sphygmograph, depending on the position of the arm. A Marey pneumograph is tied around the chest. Two Marey air capsules of small diameter are used for the graphic recording of pulse and respiration. Recording takes place on the smooth writing surface of the appliance for long blackened strips (2.10 m). Special attention is given to the absolutely perfect adjustment of the recording pens (bamboo, 12 cm long). Two screwing devices adjust the writing capsule precisely in a horizontal position, with the writing level of the pen perpendicular thereto. The movement of the kymograph is recorded by second marks. A vertical screen hides the apparatus from the EP.



Marey's Sphygmograph



The EP sits before observers ("experts") whose number fluctuates between 12 and 23. A secretary who has the task of literally recording the statements of the EP sits next to him. For each individual experiment the subject receives from the secretary a square piece of paper (10 x 10 cm) the content of which the EP has to read aloud. The typical form of the slip of paper is shown on Figure 1.⁴ After precise instruction the paper must be read out loud in the sequence 1-5, as follows:

1. Statement of the shape of the arrangement of letters (numbers)
2. Statement of the nature of the material, whether only numbers, only letters, or letters and numbers appear
3. Statement of the number of components
4. Statement of the individual components: from left to right, from top to bottom, etc.
5. Statement about other possible pictures that may appear on the paper.

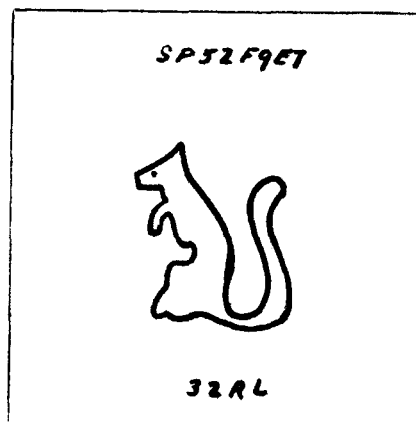


Figure 1

Some (50%) of the slips are marked with a red star at the upper right corner; these are lying slips. In this case the EP in each instance must maintain the correct sequence, but with regard to every individual point he must lie, i.e., he must make a false statement in a forced pretended sincerity.

For instance, if at point 1 (above) the general arrangement is a circular one the EP is free to say square, rectangle, straight line, triangle, etc. the only thing he should not say is circular arrangement, because this statement would be correct.

If (see 2) the lying slip shows letters and numbers the EP must mention either letters or numbers alone, but if only letters (numbers) are shown he must report numbers (letters).

Further, under 3, the EP must report a false total number; he may exceed the number of the actually visible components as much as he cares to, but must not report a number which is smaller by more than 2 or 3 units. The EP must memorize this number so that while he "reads off" the individual letters (or numbers) he must not involve himself in contradictions with his earlier statements and thus betray himself to the observers.

The reading of the individual components must now (see 4) proceed as follows: When only letters or only numbers are visible, the correct letter (or number) must never be "read off". If the slip contains letters and numbers the EP, when reporting "numbers", must only report numbers, but must replace the actual numbers on the slip by others. Similarly, when instead of numbers the EP has reported "letters" as the material of the whole arrangement, then numbers must be replaced (in his statement) by letters and letters by other letters.

In (5) the EP must report pictures which do not correspond to those appearing on the slip.

The EP further has the task in all cases, i.e., whether or not he obtains a lying slip, to behave in such a manner that neither voice nor rhythm or pace of speech, nor his features betray his actual inner behavior. In other words, in all cases he must pretend sincerity and truthfulness to the observer. Every individual observer receives a protocol and after each experiment must record whether he considers the statement of the EP as truthful or mendacious.

The judgments may be correct or incorrect. The ratio of correct to incorrect judgments is a measure for the reliability of the judgments on the one hand and for the dissimulation power of the EP on the other hand. If a is the number of correct judgments, b the number of experiments, R the reliability of the judgments, EP the dissimulation power of the EP, then, setting $\frac{a}{b} = A$

$$R = A; \quad DP = \frac{1}{A}$$

i.e., the reliability of the observer is the greater the more the number of correct opinions exceeds the incorrect ones, and the dissimulation power must be the greater the smaller the number of judgments which are correct.

As regards respiration it is treated as follows: respiration during the statements is ignored. Rather are the 3 to 5 breaths immediately preceding the statement compared with 3 to 5 of the breaths immediately following the statement. Of the breaths which precede the statement normally 3 to 5 fall into the period which elapses between the viewing of the slip which is to be read actually or "apparently" and the beginning of the oral reading. Now one determines for every single one of these breaths the ratio of inspiration to expiration time.

We may call the resulting quotient Q if the statement is truthful, and Q^* if the statement is mendacious.

The quotients of each group are combined into the mean values $m Q$ and $m Q^*$ and their magnitudes are determined.

To facilitate these measurements the record of each individual breath is traced onto millimeter copying paper, and one determines the points of the beginning and end of inspiration, as well as the beginning and end of expiration, with consideration of the distortion resulting from the circular path of the writing pen (by isochronic lines the individual respiration points are projected onto the straight line which corresponds to the horizontal position of the writing pen), and the duration of the individual phases are read off in millimeters or fractions. Since the movement of the kymograph is uniform, space units easily can be converted into time units (1 second = 9 mm). Figure 2 shows the measuring method.

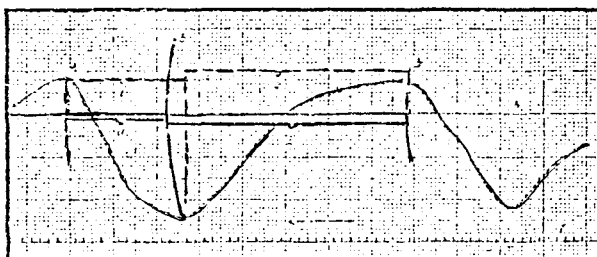


Figure 2.

f = motion curve of pen on the level surface

I, E correctly measured lengths of inspiration and expiration ($I/E = 0.450$)

i, e incorrectly measured lengths of inspiration and expiration ($i/e = 0.529$)

The pulse records and the respiration patterns during the statements are disregarded in the present paper. As it will be seen, this in no way affects the clear and unequivocal character of the respiratory quotients which are to be considered. But first the results of the appraisals must be presented.

Results

(A) The Hit Probability of the Appraisals

As was mentioned, every observer was to present a judgment as to whether or not the statement of the EP appeared to him truthful or mendacious. Thus for every experimental series (comprising 8 experiments, 4 true and 4 false statements, which take about 3/4 hour) the percentage of correct and incorrect judgments can be determined. We have 10 experimental series, distributed over 8 EPs. The percentages are summarized as follows:

EP	Cases of Truth		Cases of Lie	
	Judgment correct (c)	Judgment false (f)	Judgment correct (c*)	Judgment false (f*)
Contin	55.50	44.50	49.95	50.05
Albert	43.98	56.02	52.11	47.89
Weber	41.06	58.94	50.01	49.99
Lorenzutti	70.00	30.00	72.00	28.00
Biehler	68.01	31.99	71.86	28.14
Walther	85.19	14.81	77.87	22.13
Albert	43.90	56.10	30.90	69.10
Kindinger	49.80	50.20	50.20	49.80
Weber	37.30	62.70	42.20	57.80
Pertassek	62.50	37.50	86.00	14.00

Calculation of the mean values for c, f, c* and f* gives the following:

$$c = 55.73$$

$$f = 44.27$$

$$c^* = 57.91$$

$$f^* = 42.09$$

From these data we conclude that, on the average, the resulting judgments are of no practical value. The average values fall in the close neighborhood of 50%; it cannot be decided on the basis of these judgments in which case a statement is true and in which case untrue. The resulting values speak just as well in favor of the dissimulation power of the investigated EP, as in disfavor of the judging power of the observers.

In practical terms the decision on this point is irrelevant, since for the success of a swindle it does not matter whether the swindler is very clever or the deceived very naive. Since I am unable to attribute the last-named characteristic to the participants in these experiments, what remains as result is the unreliability of the judgments.

On the basis of the above summary, this fluctuates between the following upper and lower limits:

Upper limit = 85.19 or 86.00*

Lower limit = 37.30 or 30.90*

i.e. toward some EPs the reliability coefficient of the judgments is relatively high but for others this is not the case at all. While the method may be useful in individual cases in general, its practical application would lead to erroneous accusations.

Using as a measure of the practical usefulness of the judgment frequencies the amount by which the resulting percentage values exceed the value 50, we obtain, as a measure of reliability or hit probability of a judgment concluding truth, the value of 0.0573, and for the hit probability of a statement of lie the value of 0.0791.

That the reliability of the observers must be considered extremely low is obvious from the many cases in which nearly all observers stated "lie" while the case actually was "truth", even though on the part of the EP a slip of the tongue (mistaken speaking) was involved as shown by a comparison of the contents of the slip and the record of the secretary. How often does an examining magistrate find himself in a similar situation when, just like most people, he only uses his logical deductions as a criterion of truth but not expression, voice, or attitude, etc.! The significance of sincerity, which one ascribes to contradiction, in its exclusiveness is only based on psychological ignorance.

Our experimental EPs, as mentioned, formed two groups: those who almost always gave themselves away - though in most cases not by contradictory statements - and those where the observers in almost all cases proved to be incapable of offering a diagnosis which might be even halfway useful.

In the next section we will have occasion to demonstrate that also the typical difference between good and bad liars has a characteristic parallel in the respiration pattern.

Finally we like to mention the following points: if we compare the percentage frequency of the opinion of lie (L) and the opinion of truth (T), without regard to whether the opinions are correct or incorrect, we obtain:

L = 51.73

T = 48.31

which shows (distinctly even though not to a pronounced degree) the tendency to more readily consider a true statement as a mendacious one, rather than a mendacious one as sincere. This implies the expression of a non-humanitarian trait which perhaps in reality is more common than we are generally inclined to believe.

(B) The Quotient Laws of Lie and Sincerity

As mentioned above in regard to respiration we only consider the value of the average quotients I/E (Inspiration time/Expiration time) for the 3 to 5 breaths preceding the statement and the 3 to 5 breaths which follow immediately. These mean quotients, when related to the phase before the statement may be called⁵ Q b, and Q a when related to the phase after the statement. When they refer to a case of truth they may be called t Q b and t Q a and in the case of a lie l Q b and l Q a (i.e. lie quotient before and lie quotient after the statements). On the basis of my experiments (= 120, distributed over 10 EPs) it is true without exception that:

$$t Q b > t Q a \dots (1)$$

$$l Q b < l Q a \dots (2)$$

that is, in relation to the phase before the true statement expiration is slower in the subsequent phase, and in relation to the phase before the untrue statement expiration is more rapid in the subsequent phase. In other words: In regard to distribution between inspiration and expiration phase of a single breath the innervation of the respiratory muscles changes for lie and truth in opposite directions, in that in the latter in innervation of inspiration is relatively stronger in the phase preceding the statement than in the following phase, while in the former case it is weaker.

These symptoms are so distinct that in many cases it would be completely sufficient to measure only two breaths, the one immediately preceding the statement and the only immediately following.⁶

So, while on the average the personal observations yield practically no useful diagnosis at all the respiratory quotients in practically every single case disclose whether the statement of the EP was false or true.

A comparison of the values shows the extent to which the diagnostic aids exceed the ability of the observers - which are by no means unskilled. An expert diagnosis has entirely the character of the accidentally correct hit when it is correct and of the accidentally incorrect hit in the other case (as mentioned above, the evaluation percentages fluctuate around 50%),⁷ while the respiration diagnosis is correct with a frequency of nearly 100%,⁷ - - so that it reaches nearly the highest possible degree of certainty, corresponding to a probability value of one. We present two examples in Figures 3 and 4.⁸

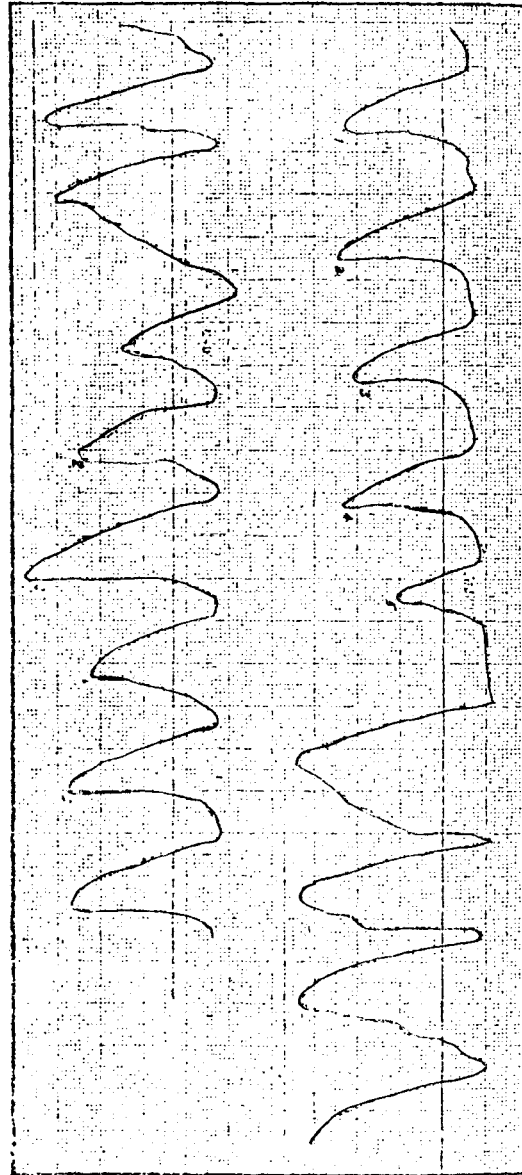


Figure 3

(Example 1) $m Q b l = 0.721$; $m Q a l = 1.254$; A = Statement
EP Albert; III group; 1 - Exp. No. 4

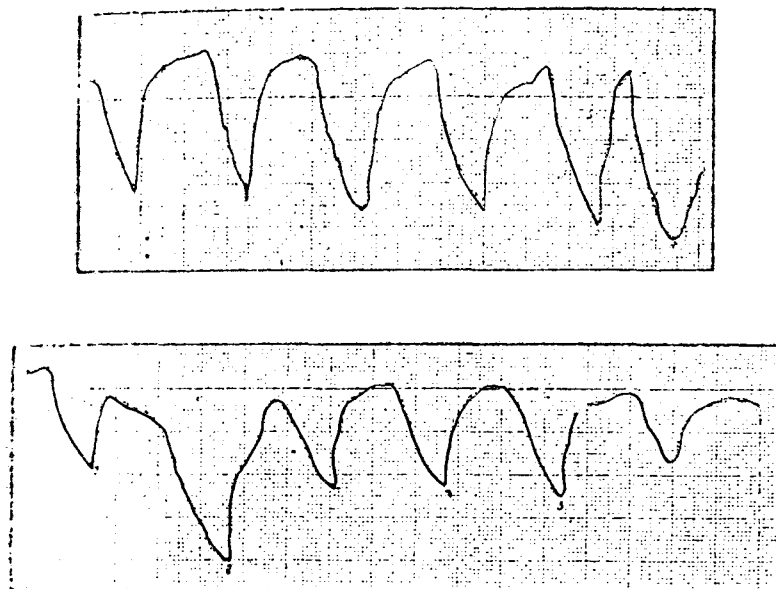


Figure 4

(Example 2) $m Q b l = 0.468$; $m Q a l = 0.979$
 EP Weber; II group; 1 - Exp. No. 3

When we call the mean value of the five I/E quotients before the statement $m Q b t$, if the statement is true, $m Q b l$ if it is a lie, and further call the corresponding quotient mean values of the five breaths following the statement $m Q a t$ and $m Q a l$, we obtain the following summary for the above-listed EPs:

EP	$m Q b l$		$m Q a l$	$m Q b t$	$m Q a t$
^o Contin	0.430	<	0.491	0.358	> 0.337
^o Albert	0.853	<	1.105	0.555	> 0.425
^o Weber	0.986	<	1.399	0.573	> 0.522
*Lorenzutti	0.813	<	1.128	0.898	> 0.732
*Biehler	0.762	<	0.995	0.906	> 0.656
*Walther	0.703	<	1.047	0.913	> 0.617
[Albert]	0.900	<	1.114	0.735	> 0.571
**Kindinger	0.448	<	0.549	0.558	> 0.422
[Weber]	0.406	<	0.773	0.679	> 0.395
*Pertassek	0.405	<	0.741	0.614	> 0.412

when we now compare with each other the rows, or EPs, which have been marked by stars and circles, and refer to the corresponding appraisal results of the summary shown on p. 57, we find the following relations:

Under otherwise equal conditions good pretenders (^o) show separate quotient areas and bad pretenders (*) show crossed quotient areas.

For the former then:

$$\begin{aligned} m Q b l &> m Q b t \dots (3) \\ (m Q a l &> m Q a t) \end{aligned}$$

but for the latter:

$$\begin{aligned} m Q b l &< m Q b t \dots (4) \\ (m Q a l &> m Q a t) \end{aligned}$$

The first quotient law thus retains its full validity in that, compared with the corresponding phases before the statements, the I/E quotients in the phase after the true statement are smaller and in the phase after the untrue statement are larger.

Thus the degree of dissimulation power also finds expression in the respiratory innervation.

In Figures 5-8 I am presenting a few examples of crossed quotients:

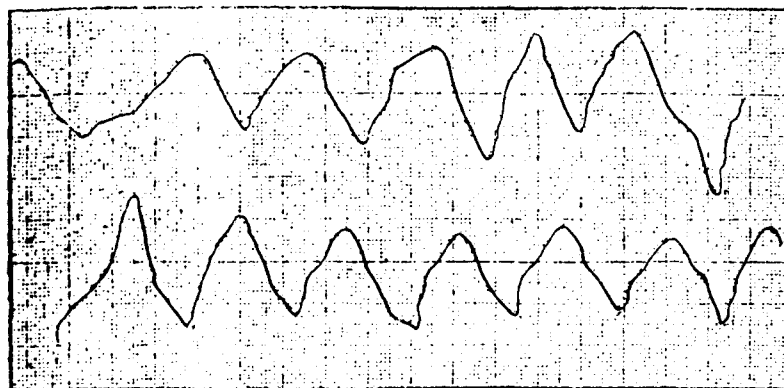


Figure 5
(Example 3) $m Q b l = 0.614$; $m Q a l = 0.988$
EP Biehler; I group, 1 - Exp. No. 3

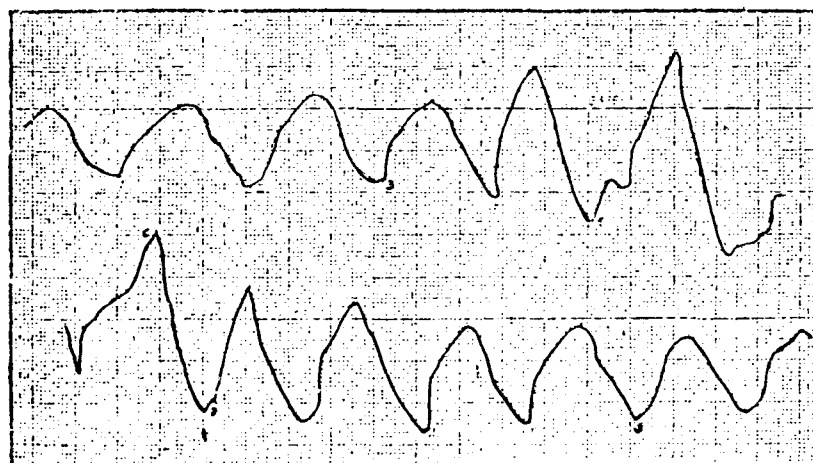


Figure 6
(Example 4) $m Q b t = 0.866$; $m Q a t = 0.687$
EP Biehler; I group, t - Exp. No. 8

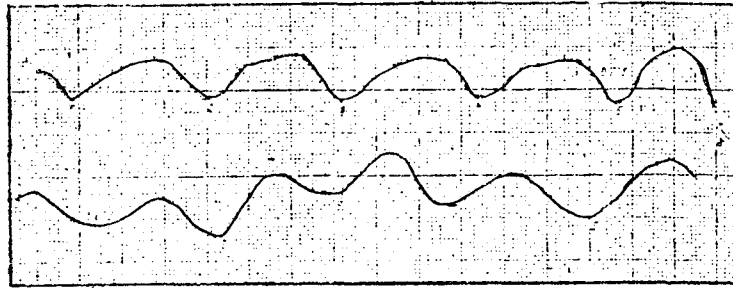


Figure 7
 (Example 5) $m Q b l = 0.592$; $m Q a l = 1.123$
 EP Walther; I group; l - Exp. No. 7

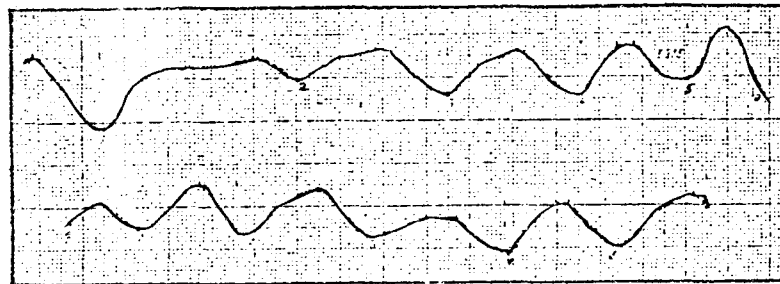


Figure 8
 (Example 6) $m Q b t = 0.903$; $m Q a t = 0.604$
 EP Walther; I group; t - Exp. No. 3

A comparison of the established quotients with the reports of the EPS about their inner attitude during the experiments shows that the magnitude of the difference

$$Q b l - Q a l$$

increases with the difficulty of dissimulating.

Low quotient differences and a low magnitude of all quotients go together with great tranquility and ease of dissimulation.

Thus successful difficult dissimulation shows itself by large differences and separate quotient areas, unsuccessful difficult dissimulation by relatively large differences, but crossed quotient areas.

If for a good dissimulator the performance of lying is made difficult, one finds crossed quotient areas with relatively large quotient differences. One may compare the two bracketed cases in the above summary (see p. 62).

The quotient crossing is based on high attentive tension; this is evident from the case which above is marked with **: a good dissimulator, well gifted for dissimulation, but great initial tension in the attempt to lie.

This point requires additional commentary. As regards the quotient I/E , attentive tension and excitement influence respiration in opposite directions. This fact is completely independent of acceptance or rejection of the three dimensional theory of emotions, *i.e.*, independent of whether or not one sees the characteristic states of tension, resolution, tranquility and excitement as simple psychic states which are on the level of pleasure and displeasure or sees them as sensory complexes and thus denies them a specific elementary emotional character. The recognition of the respiratory symptoms of such states does not in any way touch upon their position in the area of our total experiences.

An EP who is more or less fully aware of his incapacity of dissimulating (for instance EP Walther was fully aware of this) the moment he notices the slip to be read out is a lying slip gets into a state of pronounced inner attentive tension; this incidentally is almost always present when we are confronted with a task which we consider relatively difficult. But compared with the normal state, the inner attitude of the EP in the phase preceding the statement contains unmistakable excitement in case of a lying test. However, in a case of truth there exists in the phase preceding the statement only the mild agitation which in experiments of the present type would seem natural. In the case of a lying test the tension steadily recedes in the course of the "reading", but an increasing awareness of an inadequately mastered task and a desire to suppress revealing forms of expression make for growing excitement. Thus the subnormally low level of the quotient I/E at the beginning of a lying experiment (*i.e.* in the phase before the statement) is due to the factor of attentive tension. It is the basis of the quotient crossing.

Figure 9 illustrates these relations. If n represents normal breathing, and $n I$ and $n E$ the phases of inhalation and exhalation, the respiratory pattern influenced by attentive tension approaches the picture s , but the pattern influenced by excitement approaches the picture e . One sees that compared with $n I/n E$ the corresponding quotient becomes smaller in one case and larger in the other.



Figure 9

As regards the facial expression of attentive tension, most observers (even though they may be only vaguely conscious of it,) notice it instinctively, and this at least in part explains that a crossing of quotients coincides with high reliability levels of the personal appraisals.

When the presented task becomes more difficult, even a good dissimulator — one who is hard to penetrate — develops increasing tension, but is able to suppress its facial expression. The extra effort of successful dissimulation finds its expression in strong internal excitement, so that the phase quotients before and after statement differ by very large amounts.

Finally, we shall try to relate the form of respiration found in the lying tests with the results of the latest investigations about the respiratory symptoms of psychic events.

According to the statements of my EPs the over-all inner state in the case of lying may generally be described in terms of the simultaneous presence of attentive tension, excitement and displeasure. The work to be done is uncomfortable, disagreeable, upsetting and hard. Now the careful determinations of J. Sutor⁹ reveal as constant accompaniments of tense attention, a diminution of the quotient I/E on the one hand, and on the other hand a straightening out of the I- and E- phases: the transitions from exhalation to inhalation and vice versa become more pointed, and the resulting curved phases are relatively linear. Fluctuations of level or depth, or of frequency, occur often but not always¹⁰ and thus for the time being cannot be relied upon as diagnostic symptoms. Straightening out and lowering of the quotient I/E in my data are particularly well pronounced in the case of poor dissimulators. The relaxation of attentive tension obviously must result in a rounding of the respiratory transitions and an increase of the respiratory quotient: in the present experiments this change occurs in the phase following the lie. According to the numerous and precisely performed experiments of H. Sartorius¹¹, displeasure is characterized by decreases in the quotients H_i/H and H_e/H ¹² (where H represents the depth of respiration, H_i the depth of respiration half-way during the inhalation phase, and H_e that half-way in the exhalation phase) so that the respiratory pattern assumes the shape of a funnel. Such respiration patterns are often evident in surprisingly clear form in the phases following the lie. Finally for excitement¹³ one finds: the increase of the quotients I/E; H_i/H becomes larger; and H_e/H in the purer forms of excitement becomes distinctly smaller. This also applies for the curves which I have obtained. Therefore there are no contradictions between the statements of the EPs, the respiratory symptoms and results obtained from other materials.

Finally, we would like to consider two additional factors, namely:

1. How are the respiratory symptoms of the imaginary lie related to those of the real lie?
2. To what extent can the respiratory symptoms of the lie be eliminated, or at least disguised by voluntary control of respiration?

The Respiratory Symptoms of the Pretended Lie

Who lies is not convinced of what he says, he is only concerned with

doing what convinces others. The facts which the liar reports are not supported by conviction on his part, so that his words and his attitude cannot be expressions of conviction. Just the same, the liar can convey the appearance of sincerity by using forms of expression which do not correspond to his inner state. From this point of view, successful lying is a greater accomplishment than to tell the truth, no matter how much the ethical evaluation may be the reverse. After all, someone who reports something he has gained by his insight or which he remembers has hardly anything to perform; he only has to translate into words the thoughts which come to him, without at this moment having to work them out. Normally his entire inner behavior is that of passive waiting. Only the factor or remembering brings something active into his behavior. But even the process of remembering is not an inner effort directed at obtaining new thoughts, but merely a reawakening of thoughts which had already been developed but at the moment are not present.

The intellectual position of a person who is intent upon really lying, i.e., successfully, is quite different; particularly when he not merely states something invented but rather wants to replace or suppress by invention what he knows to correspond to the facts. In the latter case the danger of saying something true between his lies is much greater, the inner effort of mastering this danger is more difficult, and from the point of view of intellectual work must be evaluated higher.

Quite apart from all nuances of the individual lying experience, the intellectual state of the liar differs from that of the person expressing the truth in that the former experiences inner states of active assumptions¹⁴, i.e., states of phantasy, while the latter only experiences passive states of being convinced, and furthermore that only the former has to force himself into a specific form of expression.

Inasmuch as the respiratory symptoms in the case of lie and sincerity show characteristic differences, two forms of interpretation must be conceded. The respiratory changes can result from (a) differences in the intellectual or (b) the emotional states, which differ in the case of lying and sincerity.

The question then is to which account the observed respiratory symptoms should be changed, whether they should be attributed to intellectual or to emotional processes.

Our experiments aiming at a reply to this question go as follows. The EP has to do the same as in the case of lying, namely to read aloud a given slip in a fictitious or untrue manner, but with tone, mien and gestures of sincerity, thus in his normal voice and personal style. The "experts" know that the EP is presenting fiction and the latter also knows that the observers are aware of the actual situation, i.e., they know that they are recording "untruth". This experimental arrangement, compared with the previous one, does not in the least touch the intellectual work of the tested EP, only the emotional tinge of the experiment is different, in that the earlier lie becomes a fictitious lie and thus turns into a game or a fiction and the previous seriousness, the desire actually to mislead successfully, the worry of not being up to the task, the feeling of being severely controlled by many sharp eyes, — all this does not apply.

Under such conditions as in most cases which are based on agreement, it is not difficult at all to speak in a sincere tone.

But to speak in a sincere tone in order to mislead, when the hearers do not know whether the tone is forced or spontaneous, that is a difficult task with distinct emotional overtones.

Such experiments were performed with six EPs. Without exception they turned out negative: the pretended lie shows the respiratory symptoms of the truth.

Therefore, it cannot be the intellectual processes specific for the lie that give rise to the observed respiratory changes. In the pretended lie these processes remain qualitatively untouched and the respiratory symptoms of the lie do not appear.

In Figures 10 and 11, I am showing two respiration examples for the pretended lie (pl).

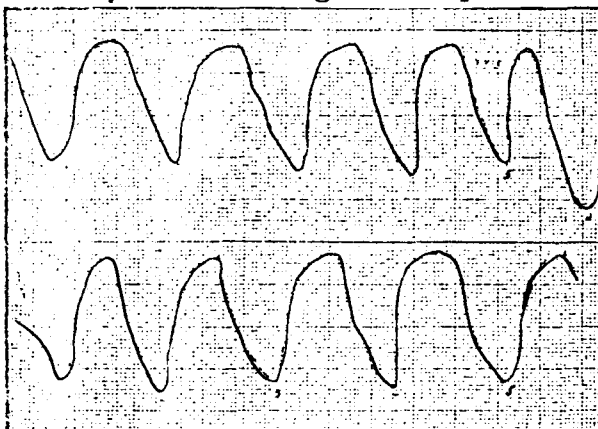


Figure 10

(Example 7) m Q b "pl" = 0.871; = m Q a "pl" = 0.610
EP Albert; IV group; "pl" = Exp. No. 1

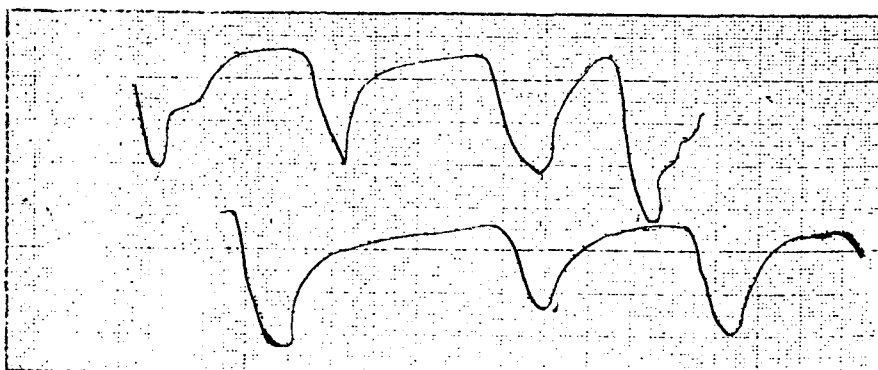


Figure 11

(Example 8) m Q b "pl" = 0.349; m Q a "pl" = 0.228
EP Kindinger; III group; "pl" = Exp. No. 1

The Significance of Voluntary Modification of Respiration

It is obvious that the value of respiratory diagnosis will be the greater, the less the symptoms underlying the diagnosis can be obscured by secondary factors.

Everyone knows that by and large one can breathe as one wishes; otherwise there would not be any breathing exercises. Now the point arises whether this unquestioned control of respiration only applies to its general form; its rhythm, or if it also applies to the more subtle innervational relations between the individual phases of respiration — an area which, apart from our present interest, deserves to be investigated thoroughly.

I shall now report about experiences in which the EP

- (a) had to breathe in the phase before and after his statement in a scheme which he had been given previously and which also had been recorded graphically for a few minutes;
- (b) made up his mind to breathe with great irregularity,
- (c) made an effort to perform in the case of truth the quotients of lie and in the case of lie the respiratory quotients of truth.

Point (a) included the following variants:

1. Uniform breathing according to the strokes of a metronome: 2 seconds of inspiration, 2 seconds of expiration;
2. Uniform breathing with observation of the scheme: very slow inspiration, very rapid expiration, and vice versa; this again performed with slow, rapid, deep, shallow respiration, etc.

The result of these experiments with intended effacement and repression of the respiratory symptoms is as follows:

The voluntary change in respiration can modify to a high degree the absolute magnitude of the I/E quotients, and respiratory frequency and depth are to a very high degree subject to the controlling intention of the EP, but the ratio of the quotients remains untouched.

Regardless of whether all quotients turn out very much smaller or larger, in the phase following the statement the I/E quotients continue to be larger than those of the phase preceding the statement in the case of a lie, while in the case of truth they are smaller.

Some examples: the EP is attempting to reverse the relation of the quotient (Figures 12, 13). He has been carefully informed how to breathe when lying and when speaking truth and so he attempts to produce the breathing type of sincerity in the case of a lie and vice versa: he resolves to expire very slowly after a lie and very rapidly after a true statement.

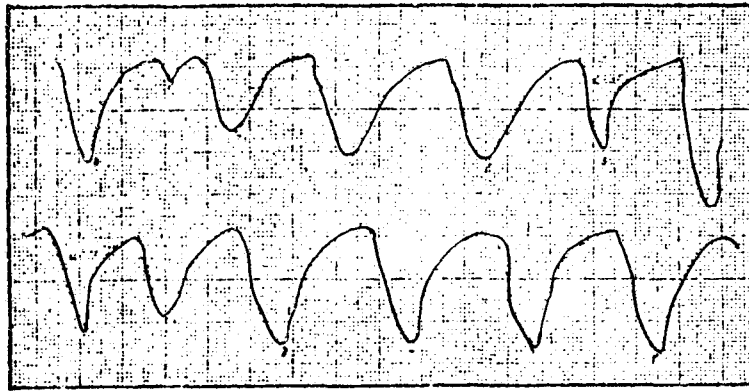


Figure 12
(Example 9) $m Q b l = 0.279$; $m Q a l = 0.455$
EP Kindinger; III group; l - Exp. No. 2

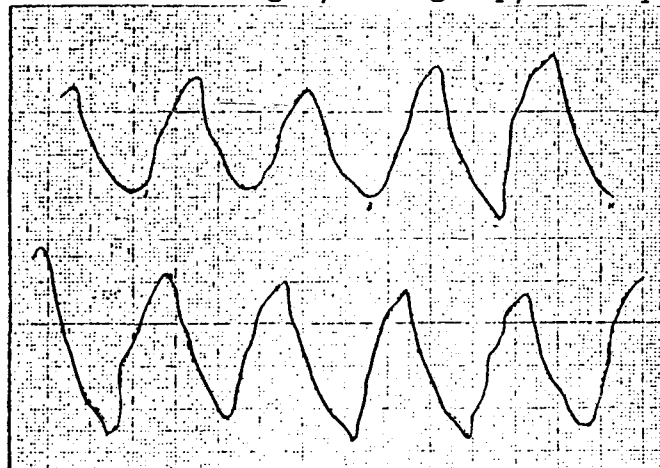


Figure 13
(Example 10) $m Q b t = 0.749$; $m Q a t = 0.630$
EP Kindinger; III group; t - Exp. No. 4

However, the only thing the EP accomplishes is to reverse the absolute amounts of the quotients; while ordinarily the quotients after a lie are larger than the quotients after truth, now the latter are larger than the former; but still the I/E quotient in the case of lie remains larger in the after-phase than in the pre-phase, and in the case of truth the quotient in the after-phase remains smaller than the quotient of the pre-phase.

For instance:

$Q b l$	$Q a l$	$Q b t$	$Q a t$
0.279	$0.455)^{15}$	0.524	0.508
0.280	0.394	0.749	$0.630)^{16}$

The same EP resolves to breathe in the ratio 1:1, i.e., duration of I = duration of E. Before the experiment the EP practices this method of

breathing and during the experiment follows the strokes of a metronome.
A typical example is:

Q b t	Q a t	Q b l	Q a l
0.679	0.557	0.748	0.830
0.932	0.864	0.691	0.923

One sees: the absolute amounts of the quotients have definitely changed, but there is no evidence of a constancy of the I/E amounts.

Therefore, the symptoms of lie and truth cannot be repressed in this manner either, just as they could not be reversed in regard to their distribution in the preceding example.

A further example: the EP intends to breathe rapidly, in such a manner that $I/E = 1$ (1), $= 0.5$ (2), $=$ to less than 0.5 (3), $=$ to more than 1 (4), and he also uses different breathing rhythms. The result is, for example:

Q b t	Q a t	Q b l	Q a l
0.610	0.480 (3)	0.840	1.289 (1)
1.290	0.748 (4)	0.601	0.674 (2)

One sees that at least in some degree the absolute amounts of the quotients correspond to the intention of the EP. But the general quotient law of lie and truth remains untouched, even though the experimental person had made up his mind to breathe the same way before and after the statement regardless of whether this was true or false.

Of special importance are the results of some experiments in which the EP thought that he was breathing without any regularity and felt very confident that he had conquered the respiratory symptoms. Also, here, what yields to the distorting intention is only the depth and frequency of respiration, and its level: the quotient ratio remains unclanged. For instance:

Q b t	Q a t	Q b l	Q a l
1.256	0.537	0.570	1.379
1.380	0.451	0.426	0.612

All of this shows that the intention to wipe out the respiratory symptoms of lie and truth, to obscure, to repress, or even to reverse them are not crowned with success.

It may be possible that such objective could be attained by a great deal of practice; at any rate a mere pretrial before the experiment is insufficient.

This fact reflects particularly well on the usefulness of the diagnostic procedure presented.

* * *

If our experiments should find the reception which, in view of the possibilities of practical application, may not be fully unjustified, it would give me the opportunity to investigate whether reliable diagnosis by measurements of the I/E quotient is not just possible in laboratory experiments but also in dealing with the lie of real life. It might then be of some benefit to pedagogics and practical criminology.

* * *

To conclude, I shall present a few additional graphic illustrations pertaining to this last section, and then briefly summarize the results of this study.

In experiment 9 (Figure 12) the EP tries to breathe, while lying, in the manner he knows is spontaneous under conditions of sincerity; in example 10 (Figure 13) the reverse is the case.

In example 11 (lying experiment) the EP attempts to breathe very irregularly in order to efface and obscure the respiratory symptoms (Figure 14). One sees that he succeeds only in modifying frequency and depth as well as level of respiration, but that the ratio of inspiration to expiration time remains untouched.

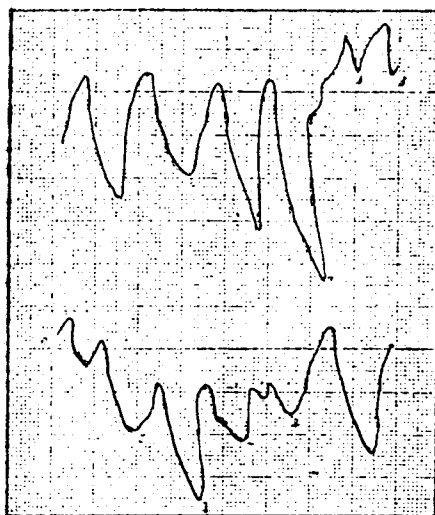


Figure 14

(Example 11) m.Q b l = 0.570; m Q a l = 1.379
EP Albert; III group; 1 - Exp. No. 1

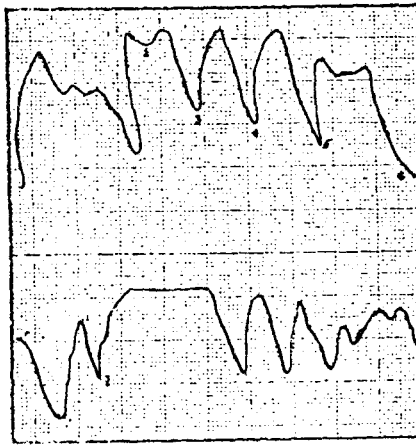


Figure 15
(Example 12) $m Q b t = 1.380$ (or 1.025); $m Q a t = 0.451$
EP Albert; III group; t - Exp. No. 4

The same is evident in example 12 (Figure 15) (truth experiment).

The examples 13, 14 and 15 (Figures 16, 17, 18) represent specific arbitrary kinds of breathing; breathing rapid and short in a constant subjective rhythm (Figure 16, example 13); breathing slow and deep (Figure 17, example 14); slow and deep with very slow expiration (Figure 18, example 14).

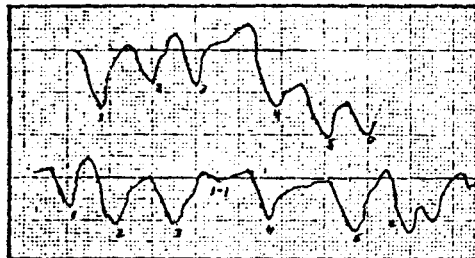


Figure 16
(Example 13) $m Q b t = 0.643$; $m Q a t = 0.618$
EP Pertassek; I group; t - Exp. No. 4

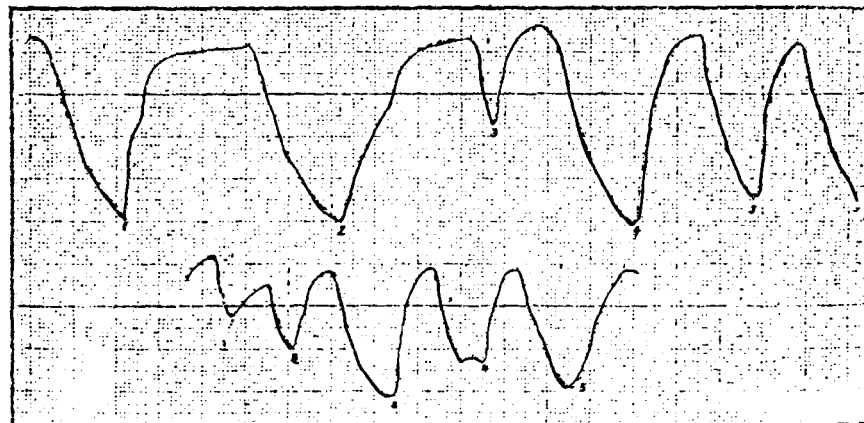


Figure 17
(Example 14) $m Q b l = 0.623$; $m Q a l = 0.674$
EP Pertassek; II group; i - Exp. No. 2

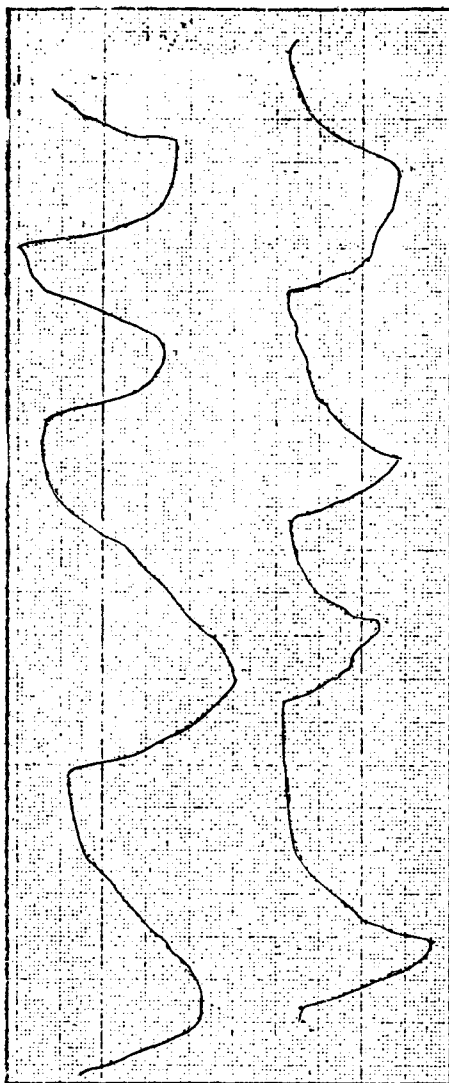


Figure 18
 (Example 15) $m Q b t = 6.10$; $m Q a t = 0.480$
 EP Pertassek; II group; t - Exp. No. 3

It is evidence that all attempts are unsuccessful; the quotient ratios and thus the diagnostic value of the experiments remain unchanged.

Summary

Statement of Problem: If we designate as Ph b a specific number of breaths (3 to 5) which precede a statement from an EP, and Ph a the same number of breaths following the statement, the question is whether Ph b and Ph a show constant alterations that correspond to knowingly true and knowingly false Statements, and thus would indicate with certainty whenever the EP reports a correct statement or a mendacious one; even if the EP presents a completely successful dissimulation, *i.e.*, the appearance of sincerity while lying.

The reply to this question also involves the decision of the further question, whether or not the use of respiratory symptoms is feasible for the diagnosis of lying or sincerity in actual practice.

Furthermore, from the point of view of practical usefulness the related question must be considered in testing whether an experimental person says the truth or the untruth: how does the judgment of a significant number of observers compare with the respiratory symptoms?

Experimental investigation of these questions had yielded the following perfectly clear results.

Results: 1. When we designate with Q_b the mean quotient (of 3 to 5 respirations) of I (duration of inspiration) over E (duration of expiration) during the period immediately preceding the statement, and designate with Q_a the corresponding quotient obtained from the respirations immediately following the statement, we find in the case of lying $Q_b < Q_a$ but in the case of truthfulness $Q_b > Q_a$. Even more briefly this First Quotient Law of Lie and Sincerity may be formulated as follows: the change of innervation from Ph b to Ph a to within the two main phases of a breath runs in opposite directions for lie and sincerity.

2. Further, terming Q_{b1} and Q_{a1} the I/E quotients of the pre- and after-phase of a lying test, and Q_{bt} and Q_{at} the corresponding quotients of a truth test, we find that with different EPs these quotients occupy separate or crossed areas. Thus, either $Q_{b1} > Q_{bt}$ (obviously with $Q_{b1} < Q_{a1}$ and $Q_{bt} > Q_{at}$), or with maintenance of the latter relations (First Quotient Law):

$$Q_{bt} > Q_{b1}$$

$$Q_{at} < Q_{a1}$$

3. EPs with good dissimulation ability show separate quotient areas and those who possess no significant dissimulation power show crossed quotient areas.

4. However, the proportion of the quotient areas is not a direct measure of capacity or incapacity for dissimulation but depends on the presence or absence of an interference between tension and excitement. This interference is characteristic of EPs incapable of dissimulation, and it is this alone which gives rise to the crossing of the quotient areas. Since the mimic expression of attentive tension is a symptom well known to most people such cases are generally judged correctly.

5. The magnitude of the difference $Q_{b1} - Q_{a1}$ gives a criterion of the inner difficulty of dissimulation. The greater this difference the weaker, probably, is the natural capacity for lying or dissimulation.

6. When a lie is merely pretended, in that the observers know when the EP is going to "lie", and the EP is also aware of the situation, the symptoms will be those of sincerity. Thus, the intellectual effort behind every lie, which is based on the development and expression of an assumption, cannot be made responsible for the symptoms of lying since in the case of the pretended lie no intellectual effort is involved. Thus the respiratory

symptoms are related on the one hand to the emotional reaction against lying and the fear of being discovered or found out, and on the other hand they involve the overcoming of the intellectual inhibitions against a calm behavior which arise from the consciousness of the truth during the presentation of the untruth.

7. A mode of respiration which by practice or other means is voluntarily modified in a regular or random fashion can alter the level of the quotients but the symptomatic quotient law retains its validity.

8. Thus an EP who is capable of presenting the appearance of sincerity is not able, because of that, to influence the recorded pattern of his respiratory innervation in such a fashion that a lie could present the respiratory symptoms of sincerity and vice versa.

The investigation of this method in actual practice, which remains to be done, will show whether in addition to its theoretical value for pedagogy and criminology it also can claim a practical value.

Footnotes

1. I have presented a paper on this subject before the second meeting of the Italian Society for Psychology (Rome, 27-29 Mar 1913).
2. On the occasion of the second meeting of the Italian Society for Psychology, Prof. Valli (Rome) told me of the following case. Among two card players one of them never succeeded in bluffing. For all other participants and observers his behavior during the game was completely non-transparent. He remained absolutely calm. But one player was able to recognize the intention to bluff from a very slight swelling of the frontal artery, and thus never fell for it. I also owe to Prof. Valli the suggestion of an investigation of the respiratory changes in card sharpers. I hope to be able to present some relevant data.
3. Lying experiments, such as one can arrange artificially, differ from real lies in the fact that in the laboratory experiments the inner resistance against lying, which for most people is a product of their education, is absent: after all, one asks the experimental person to lie, while under normal conditions truthfulness is demanded and lying is disapproved.

Therefore what the laboratory experiment offers is a considerable degree of approximation to the state of the genuine liar, *i.e.*, of a being who performs the transposition of facts which is designated as lying without ethical reserves, without inner efforts, merely for pure personal advantage. Seen from this point of view the laboratory experiment is of special value just because of its deficiencies. On the other hand, an approximation to the real lie of everyday life is given by the fact that the experimental person must convey the appearance of sincerity, and thus consciously perform a deception. The only thing that is lacking is, as was mentioned, the disapproval and its conquest; but this very lack or this inner freedom after all is a part of lying, at least of that kind of lying which on the part of the liar is considered advantageous and useful.

4. The shape of the letter and number group, the subject shown, the quality

of the individual members of the group, etc., change from case to case. To actually reproduce all slips used in these experiments seems superfluous.

5. [b = before, a = after, t = truth, l = lie, m = mean value]
6. In the specimen figures one may compare the quotients of the breath immediately preceding the statement and the one immediately following.
7. Among all my experiments the respiratory diagnosis only failed in one case of truth and one case of lie. In the former the quotients before and after the statement were equal, in the latter case the post-statement quotient was smaller. These deviations could be easily explained on the basis of the experimental circumstances.
8. Example 1 (Figure 3) also shows the respiration during the statement. In the subsequent examples the respiratory phases of the statement are omitted. Their character will be discussed elsewhere. m Q b l (t) and m Q a l (t) indicate the mean quotient I/E for the five breaths before and the five breaths after the statement. The value of I/E has been especially indicated for the single breaths which immediately precede and follow the statement; a indicates [anfang] the beginning, and e the end of the statement. The comparison of the I/E values shows by far that in most of the cases the diagnosis of truthfulness or lie requires only the consideration of two breaths.
9. "The Relations Between Attention and Respiration" Arch. f. ges. Psych. XXV pp 78-150 (1912)
10. l.c. pp 131 et seq., 134, 141
11. "The Emotional Character of Some Chord Sequences" in Psychol. Studien, ed. by W. Wundt, VIII, p 1 et seq. (1912)
12. l.c.p.34. Stefanescu-Goanga in his "Experimental Investigations of the Emotional Accent of Colors" (Psych. Stud. VII, p 234 et seq., 1911) particularly has emphasized the importance of these quotient ratios and demonstrated them by ingenious experiments.
13. cf. Sartorius, l.c., p. 32. P. Salow "The Emotional Character of Some Rhythmic Forms of Sound in its Respiratory Expression" (Psych. Stud. IV, 1907), L. Drozynski "Respiratory and Pulse Symptoms of Rhythmic Sensations" (Psych. Stud. VIII, pp 83-140 1911) and Stefanescu-Goanga; l.c., p. 325 et seq.
14. cf. the discussion of the lie by A. Meinong in "About Assumptions" second ed., pp 116-120
15. see Figure 12, Example 9
16. see Figure 13, Example 10
[Received 21 June 1913]

BANK FRAUD AND EMBEZZLEMENT

Reprinted with Permission
From

FBI Law Enforcement Bulletin
February 1975

The threat that "white-collar" crimes pose to the community is shown by the seven-fold rise of bank fraud and embezzlement violations committed against federally insured financial institutions during the last decade. While these offenses are only a small part of the total white-collar crime problem, losses from them, nevertheless, rose from \$20.4 million in fiscal year 1965 to \$151.1 million in fiscal year 1974. Prosecutions during the same period resulted in a jump from 604 to 1,200 convictions. The bank fraud and embezzlement convictions during the past fiscal year accounted for 39 percent of all those obtained in white-collar crimes investigated by the FBI.

With the increase in size and complexity of fraud and embezzlement crimes has come the need for more sophisticated approaches by FBI Special Agent Accountants who are assigned these investigations. FBI Agent Accountants are now being afforded advanced accounting and computer training to enable them to cope with intricate embezzlement schemes which are often disguised by the new data processing technology in the banking industry.

Federal criminal statutes relating to financial institutions have been broadened gradually to protect over 64,000 establishments. It is a violation of Federal criminal laws, for example, to furnish false information to a federally insured financial institution to influence action on an application for credit. No longer can a con artist dupe an unsuspecting banker by furnishing stolen or counterfeit securities as collateral for a loan without running the risk of Federal prosecution. Federal statutes also provide for a variety of means by which criminal prosecutions can be used to combat organized crime activities. Some underworld hoodlums have been prosecuted for furnishing false information to obtain business loans and personal loans. Hoodlums seeking loans through legitimate lending agencies are vulnerable since they are often unwilling to reveal necessary information about themselves. When they falsify such background data, they risk prosecution.

Organized crime, however, is not the main threat to banking institutions. A major portion of the fraud and embezzlement losses they suffered during the past 5 years was caused by respected and highly placed officers and directors of the victimized institutions. Prosecution was recently begun against an officer of an eastern bank who misapplied funds in excess of \$8.1 million. Another bank officer in the Southeastern United States was convicted for misapplying in excess of \$4.7 million. The rising statistics over the past decade give every indication that losses in bank fraud and embezzlement matters will continue to increase.

Local and state law enforcement authorities, along with the FBI, have concurrent jurisdiction over thefts and embezzlements from banking institutions.

With the trend toward fewer Federal prosecutions in favor of local prosecution in selected areas where concurrent jurisdiction exists, the need may exist in the near future for a more active role by local police and prosecuting authorities in bank fraud and embezzlement matters. To curtail crimes that could result in staggering financial losses to the community will require not only cooperation among law enforcement agencies but the banking industry as well. The public, too, must become more conscious of the damage done to the community by white-collar crime. The public has the need, and indeed the right, to demand the highest level of integrity from employees of banking institutions. The banking industry cannot operate effectively without the confidence of the public anymore than it can without the vigorous enforcement of laws designed to protect it.

* * * * *

BOOK REVIEW

By

Raymond J. Weir, Jr.

Legal Admissibility of the Polygraph, compiled and edited by Norman Ansley; Charles C. Thomas, Publisher; Springfield, Illinois; 1975; 344 pp., \$33.75.

The first impulse of a potential buyer for this excellent work is to cast an unbelieving eye on the price tag. It is very steep, even in these inflated times. Yet, the book is magnificently prepared, and no expense has been spared in its production, from glazed paper of the highest quality to superbly reproduced charts and tables. Regardless of price, the book is a must for the library of all professionals and others with a serious interest in the polygraph field.

In essence this book consists of a transcript of panel discussions and papers presented at the 1972 Seminar of the American Polygraph Association. Under the aegis of John E. Reid, as program chairman, the seminar was designed deliberately to generate factual data establishing the legal admissibility of the polygraph. Articles and discussions in this book can be cited by polygraph examiners in refutation of the 1923 decision in Frye v. the United States that the polygraph had not yet met standards of acceptance by the scientific discipline to which it belonged. This is still the controlling opinion despite the innumerable advances in instrumentation and techniques which the courts have thus far declined to acknowledge.

There are 34 contributors to this volume, and their papers are grouped around the headings of Law, Validity, Technique, Instrumentation, and Labor-Management Panel. The Law section opens with a novel suggestion by Marshall Houts that the polygraph vests too much power in a single man and that forensic examinations should be conducted by a team of examiners. Such a process does not assure reliability as witness the diverse opinions of expert electroencephalographers in the Jack Ruby case or in almost any case involving opposed medical/psychiatric witnesses. Other forensic testimony such as ballistics, handwriting, and fingerprints, is usually the product of one expert.

With the trend toward fewer Federal prosecutions in favor of local prosecution in selected areas where concurrent jurisdiction exists, the need may exist in the near future for a more active role by local police and prosecuting authorities in bank fraud and embezzlement matters. To curtail crimes that could result in staggering financial losses to the community will require not only cooperation among law enforcement agencies but the banking industry as well. The public, too, must become more conscious of the damage done to the community by white-collar crime. The public has the need, and indeed the right, to demand the highest level of integrity from employees of banking institutions. The banking industry cannot operate effectively without the confidence of the public anymore than it can without the vigorous enforcement of laws designed to protect it.

* * * * *

BOOK REVIEW

By

Raymond J. Weir, Jr.

Legal Admissibility of the Polygraph, compiled and edited by Norman Ansley; Charles C. Thomas, Publisher; Springfield, Illinois; 1975; 344 pp., \$33.75.

The first impulse of a potential buyer for this excellent work is to cast an unbelieving eye on the price tag. It is very steep, even in these inflated times. Yet, the book is magnificently prepared, and no expense has been spared in its production, from glazed paper of the highest quality to superbly reproduced charts and tables. Regardless of price, the book is a must for the library of all professionals and others with a serious interest in the polygraph field.

In essence this book consists of a transcript of panel discussions and papers presented at the 1972 Seminar of the American Polygraph Association. Under the aegis of John E. Reid, as program chairman, the seminar was designed deliberately to generate factual data establishing the legal admissibility of the polygraph. Articles and discussions in this book can be cited by polygraph examiners in refutation of the 1923 decision in Frye v. the United States that the polygraph had not yet met standards of acceptance by the scientific discipline to which it belonged. This is still the controlling opinion despite the innumerable advances in instrumentation and techniques which the courts have thus far declined to acknowledge.

There are 34 contributors to this volume, and their papers are grouped around the headings of Law, Validity, Technique, Instrumentation, and Labor-Management Panel. The Law section opens with a novel suggestion by Marshall Houts that the polygraph vests too much power in a single man and that forensic examinations should be conducted by a team of examiners. Such a process does not assure reliability as witness the diverse opinions of expert electroencephalographers in the Jack Ruby case or in almost any case involving opposed medical/psychiatric witnesses. Other forensic testimony such as ballistics, handwriting, and fingerprints, is usually the product of one expert.

The New Jersey State Police reported on an experiment in team testing in the June 1972 issue of Polygraph. In this technique two examiners were in the testing room, primarily to increase the effectiveness of interrogation. Houts recommends examinations conducted seriatim by independent experts. Houts does not address himself to the problem of solving the contamination of a subsequent examination by the preceding test, nor does he make a convincing argument for admissibility based solely on a team testing concept.

A much more forthright approach to a second look at the precedent in Frye is provided by Andre Moenssens in his paper, "Polygraph Test Results Meet Standards for Admissibility as Evidence." Professor Moenssens points out clearly that the "general acceptance" test of Frye is not a proper criterion for admissibility of scientific evidence. He cites the general acceptance for years of the paraffin test to identify someone who has recently fired a gun. This test has now been discredited completely. He points out the fallacy of admitting a polygraph test by stipulation as if this process magically endowed the test with reliability. Professor Moenssens concluded that "... there is neither scientific nor legal reason for denying admissibility of the results of a polygraph examination administered with the consent of the Subject and his counsel, by a competent examiner." We concur heartily.

Robert Emmett Burns, professor of law at DePaul University, provides an interesting article in, "Why Is The Polygraph Discriminated Against By Courts?" He points out that judges unreasonably insist that polygraphs demonstrate mechanistic certainty nowhere to be found in any other branch of law or justice. He makes the point, often reiterated in other papers in the book - - the polygraph, compared to other evidence which is freely admitted, is certainly at least as accurate, if not more so. Burns closes with helpful instructions as to how to select and process an appealable case which might help to dissipate current objections to polygraph evidence.

Judge Clarence Partee, provides a discussion of how he uses the polygraph prior to granting probation and during probation, as may be required. It seemed to the reviewer that the mandatory nature of the examinations (on pain of denial of probation) was somewhat too harsh to permit widespread acceptance of Judge Partee's system.

Walter D. Braud, an Illinois attorney specializing in criminal defense trial law, made an impassioned plea for the use of the polygraph immediately following arrest, particularly in the case of poor defendants. He points out that these people, even though innocent, are frequently jailed and lose their jobs while awaiting trial, because of their inability to post bond.

Clarence H. A. Romig, Associate Editor of Polygraph who has undertaken to keep track of state and federal legislation regarding the polygraph, presents a paper on the status of such legislation as of June 1972. This should be helpful to examiners who need to be aware of licensing requirements and/or restrictions upon polygraph operations in their state.

The Law Section closes with a highly informative panel discussion chaired by Professor Fred Inbau, one of the pioneers in the polygraph field, co-author of the standard polygraph text, and a respected leader of one of the more conservative schools of thought among lawyers. The panel arrived at

a consensus that polygraph evidence should be admitted, that this admission would present problems to lawyers, judges, and juries, but that these problems were not insoluble.

Section II of the book is concerned with validation studies by behavioral scientists. Philip Ash, Ph.D., Professor of Psychology, University of Illinois, reports on an opinion survey conducted on attitudes toward the polygraph. The study indicates that among four populations sampled, examinees, polygraph examiners, attorneys, and behavioral scientists, all have high respect for the polygraph. Some groups entertain doubts as to validity and ethics in polygraph usage, but significantly not the examinees. It might thus appear that unions and civil libertarians are attempting to provide protection which the populace neither wants nor needs. The survey by Dr. Ash constitutes just the sort of proof of general acceptance which the field needs to overturn the Frye decision.

The lengthy article by Martin Orne, Ph.D., Director of the Unit for Experimental Psychiatry of the Institute of the Pennsylvania Hospital, is curiously ambivalent. Dr. Orne is one of the few authorities in the field of psychophysiology who has conducted extensive research on the polygraph. Also, unlike others in the field, he does not allow violent antipathy toward lie detection to prejudice research into the validity and reliability of current polygraph instrumentation and methodology. On the one hand he expresses respect for the professionalism and ethics of highly competent examiners with whose work he is familiar. On the other, he appears doubtful that others with whom he is not familiar are capable of exercising the delicate controls during the pretest interview, question formulation, test administration and interrogation periods which can contribute so markedly to a successful examination.

Indeed, Orne is so convinced of the extreme importance of the pretest interview that he believes it should be recorded and made available for review and analysis during court trials. Orne is further troubled about the incidence of false positives and false negatives, perhaps created by examiner bias, though he presents only hypotheses instead of field data in support of his worries. He does provide a lucid discussion of validation procedures using conservative criteria in a laboratory situation when ground truth is known. Orne throws some much-needed cold water on the use and misuse of statistics in validation studies. He also shows the extreme difficulty of establishing the validity and reliability of the real-life situation by laboratory studies. This at least provides some rebuttal to the frequent implication by polygraph critics that the lack of validation studies indicates a lack of validity in the process.

On an overall basis Orne's paper is a thoughtful presentation of problems involved in laboratory polygraph validation studies. Unfortunately, he gives few solutions. He expresses confidence that the process has high validity in the hands of competent, unbiased, and ethical examiners. Unflatteringly, he seems to fear that such examiners are not typical of the field.

Gordon H. Barland reports on "The Reliability of Polygraph Chart Evaluations," based on an experiment at the University of Utah on 72 students, half of whom took part in a simulated theft. A Backster numerical analysis was conducted independently by Barland and five other military-trained examiners who were familiar with the numerical scoring technique. Unsurprisingly, he

found high reliability among the conclusions reached by the individual scorers. Similar studies in the past have reported the same results. Barland also reports that he found the GSR to be the most reliable index of deception, a conclusion which seems to be invariably reached in the laboratory situation. Yet, the consensus in the field is that the GSR is the least reliable of the sensors in standard polygraph instruments. This anomaly deserves more investigation than the rather firm belief by each group that the other is rather stubbornly wrong.

Paul Trovillo's paper, "Scientific Proof of the Polygraph Credibility," is a delight, primarily because Mr. Trovillo frequently wanders hilariously afield from his topic. One of the pioneers in the field, Mr. Trovillo reports on a survey conducted twenty years ago at the University of Tennessee. His most significant finding, probably still true today, was that the 711 persons who responded felt capable of commenting on the credibility of the polygraph, even when they had neither administered nor observed an examination. Trovillo expresses the hope that later studies will reflect the increased professionalism of the field and the increased respect it is accorded by social scientists.

Examiners will be interested in the papers presented in the Techniques Section of the book. They serve to establish the continuing interest of professional examiners in the improvement of their techniques and in the objective analysis of truisms which are accepted a priori by the field. For example, Stanley Slowik reports that little in the way of increased validity is obtained by double pneumograph patterns, and that an abdominal respiration pattern is apt to provide more data in the discrimination between innocent and guilty subjects. Alex Magiera postulates that purposeful distortion of the polygraph charts by the Subject is able to mask out normal deceptive responses.

Frank Horvath reemphasizes the importance of observing verbal and non-verbal behavior. He correlates typically innocent and guilty appearance and responses against verified polygraph examination results. Not unsurprisingly, he finds that these responses have validity in diagnosing truth or deception, although he cautions that they should not supplant the polygraph. His findings are not surprising to the reviewer, because nonverbal behavior, prior to the advent of the polygraph, was the primary source of data to interrogators attempting to determine innocence or guilt.

The technique panel, consisting of Cleve Backster, Leonard Harrelson, and John Reid, is especially interesting, in that each man is the foremost exponent of a major polygraph technique. The panel discussion showed points of similarity and honest disagreements as to technique. Skillful direction by panel moderator Lynn March brought out variations in the way each would handle a case, but demonstrated that the techniques were not mutually exclusive. Also of interest is the fact that these men spoke to each other in a friendly fashion, something which is not always true of their most zealous adherents.

In the instrumentation section, Editor Norman Ansley provides a succinct paper on the utilization of capillary responses recorded by a photoelectric plethysmograph during polygraph examinations. Mr. Ansley recommends that the plethysmograph, at its present stage of development, be used as an auxiliary to the cardiosphygmograph and not as a replacement.

One of the most important papers in the book is presented by Dr. John F. Jacobs, Executive Director of the Bio-medical Engineering Center of Northwestern University. Dr. Jacobs reports that the standard polygraph instrument provides data which is as accurate for the purpose as could be obtained by the most sophisticated laboratory apparatus. Ron Decker, who heads the Military Police Polygraph School at Fort Gordon, reports that the Cardio Activity Monitor shows promise of developing into a reasonable substitute for the cardiosphygmograph. Walter A. Van De Werken, who has worked with each of the three major manufacturers of polygraph equipment, suggests a procedure for calibrating and standardizing polygraph instruments.

As in the case of a fourth of July celebration, the fireworks are saved for the end. Representatives of labor and management slugged it out over the use of the polygraph in the commercial field. No common area of agreement was found. The position of the labor representatives was that, even with perfect reliability and validity, they would be opposed to a requirement for polygraph examinations levied upon their membership. They brought out one interesting point of view — that they felt no responsibility for identifying or removing their members who were thieves. That is the sole responsibility of management using some unspecified but presumably ineffective means other than the polygraph. Fred Burki, representing the United Retail Workers Union, was not quite so intransigent as Donald Cohen, whose law firm represents many unions. Mr. Burki would permit limited, supervised use of the polygraph on a strictly voluntary basis. Charles Marino, counsel for the APA, discussed the legal strides which are being made by the polygraph. J. Kirk Barefoot, Director of Corporate Loss Prevention for Cluett, Peabody and Company, and former president of the APA, pointed out that many union publications and officials recommend deliberately impeding efforts by management to cut down on employee theft. The primary value of the panel was to establish that there may in the future develop something other than the violently anti-polygraph position adopted by the Retail Clerks and the Teamsters Union.

One ironical fact brought out by the panel was that even the most virulent union opponents of the polygraph use the services of polygraph firms when they suffer losses from thefts by their employees. It boils down to whose ox is being gored.

In summary, this book is highly to be recommended. Its only real drawback is that horrendous price of \$33.75.

* * * * *

BOOK REVIEW

By

Clarence H. A. Romig
Associate Professor

Department of Criminology, Indiana State University

Death Investigation by David C. Myre. International Association of Chiefs of Police, 1974. 170 pages, \$6.45 hard cover, \$4.95 paper back.

One of the most important papers in the book is presented by Dr. John F. Jacobs, Executive Director of the Bio-medical Engineering Center of Northwestern University. Dr. Jacobs reports that the standard polygraph instrument provides data which is as accurate for the purpose as could be obtained by the most sophisticated laboratory apparatus. Ron Decker, who heads the Military Police Polygraph School at Fort Gordon, reports that the Cardio Activity Monitor shows promise of developing into a reasonable substitute for the cardiosphygmograph. Walter A. Van De Werken, who has worked with each of the three major manufacturers of polygraph equipment, suggests a procedure for calibrating and standardizing polygraph instruments.

As in the case of a fourth of July celebration, the fireworks are saved for the end. Representatives of labor and management slugged it out over the use of the polygraph in the commercial field. No common area of agreement was found. The position of the labor representatives was that, even with perfect reliability and validity, they would be opposed to a requirement for polygraph examinations levied upon their membership. They brought out one interesting point of view — that they felt no responsibility for identifying or removing their members who were thieves. That is the sole responsibility of management using some unspecified but presumably ineffective means other than the polygraph. Fred Burki, representing the United Retail Workers Union, was not quite so intransigent as Donald Cohen, whose law firm represents many unions. Mr. Burki would permit limited, supervised use of the polygraph on a strictly voluntary basis. Charles Marino, counsel for the APA, discussed the legal strides which are being made by the polygraph. J. Kirk Barefoot, Director of Corporate Loss Prevention for Cluett, Peabody and Company, and former president of the APA, pointed out that many union publications and officials recommend deliberately impeding efforts by management to cut down on employee theft. The primary value of the panel was to establish that there may in the future develop something other than the violently anti-polygraph position adopted by the Retail Clerks and the Teamsters Union.

One ironical fact brought out by the panel was that even the most virulent union opponents of the polygraph use the services of polygraph firms when they suffer losses from thefts by their employees. It boils down to whose ox is being gored.

In summary, this book is highly to be recommended. Its only real drawback is that horrendous price of \$33.75.

* * * * *

BOOK REVIEW

By

Clarence H. A. Romig
Associate Professor

Department of Criminology, Indiana State University

Death Investigation by David C. Myre. International Association of Chiefs of Police, 1974. 170 pages, \$6.45 hard cover, \$4.95 paper back.

The mystical aura surrounding death will be short lived when investigations are conducted in accordance with the procedures enumerated by Death Investigation. This subject has been published in texts before, but usually in large, costly books or oversimplified to the point that evidence was not sought, because modern technology would somehow solve the case. In a handbook form, Death Investigation provides to the aspiring detective, as well as the experienced investigator, practical guidelines to follow in the investigation of the causes of death.

Crime scenes may have many things in common. Then again there are never two crime scenes that are exactly alike. In order to prepare an investigator to look for clues that have been productive in the past, it is necessary to provide him with a list of do's and don'ts. All too often the do's and don'ts reflect one author's experiences or apply to certain departmental rules or geographical areas and would have an opposite applicability elsewhere. Hopefully the reader will take dogmatic instructions in stride and adjust them to suit the needs of his current investigative problem.

Just as there are no two crime scenes that are alike, the procedure to be followed at one scene cannot always be repeated at another. In thirteen chapters, some two pages in length and others forty-two pages long, the reader is led from the initiation of the case through the crime scene investigation, autopsy and polygraph examination in an encyclopedic fashion. The text closes with an excellent description of the organization of a crime center by a major crime investigation team.

It is difficult at times to say just how extensive a preliminary investigation should be when one is investigating a run of the mill type of case. That difficulty is eased when the more or less minor assault case becomes a murder or manslaughter while the scene is still under control of the police. Too frequently the cases change their severity long after the scene was released by a uniformed officer who was unaware of the ultimate need for physical evidence. At this point the text suggests that the scene would be too contaminated to summon a laboratory technician. Although much evidence may be destroyed, changed, obliterated or moved in the interim, a more positive view dictates that the scene must be revisited in an effort to gain either physical evidence or an insight to the crime.

Photographs and detailed notes are the suggested medium for recording the scene, and the photography is to continue until any article is moved from its original position. Some specific features of the scene are targeted for photography to ensure that evidence is recorded. Recording the scene by sketching is obviously deemphasized with the add-on instruction that it is to be done whenever possible.

Post-photographic activities include everything that must be done at a scene, excluding the photography, which is done first. These activities range from recording the rectal temperature of the body, getting the weather bureau's climatological data for the day in question; tagging and escorting the body; searching for evidence fingerprints, trace evidence and weapons; locating glass fractures, poisons, handwriting, blood spots; identifying conditions of extreme heat or cold, drowning, electric shock, sex crimes, and others, all explained in their own sections.

Succeeding chapters describe types of deaths, graves, evidence from the body and the autopsy. Separate chapters also discuss murder weapons, vehicles and firearms evidence recovery. A brief recommendation to consider the use of the polygraph and organization of crime centers comprise the last two chapters.

Not considering the typographical errors, there are some important facts that are misleading and detract from this important subject matter. To limit the critical comment, two areas will be discussed. Firstly, the author does not agree with the fingerprint field that the percentages of arches, loops and whorls are 5, 30, and 65 respectively. A minor detail perhaps, but not minor when such conflict of information, in the form of the text, is in the hands of a defense attorney. Secondly, that the packing of bloody clothing would cause the fabric to deteriorate and valuable evidence could be destroyed explains little to help the interested reader understand that wet blood decomposes when improperly packed, which is of greater consequence than the deterioration of fabric. Sometimes truncated technical writing is a disservice, in that it alludes to techniques that are rarely adequately explained or understood.

Generally, the information presented in Death Investigation is vitally necessary for all investigators who hope to maintain the over 80% clearance rate for murders. The information, written by a professional investigator, is much more attractive and convenient in this handbook form than the usual bulky books. The short paragraphs and many subheadings provide for an ease of reading by practitioners of any education or experience level. The very few shortcomings cited earlier are greatly overshadowed by the recognition of the need in the field for this handbook on death investigation.

* * * * *

Answer Key to Polygraph Review on Instrumentation

1. c. A very common cause is a loose or dirty jewel bearing. You should particularly inspect for ink spillage that got into the bearing.
2. b. The built-in switch takes the place of a subject. When the subject's resistance decreases, the pen travels upward on the chart.
3. b. The first step in calibration should be to neutralize the controls.
4. d. The sensitivity control has nothing to do with balancing the subject's resistance with the instrument. It merely determines amplitude.
5. a. The vent should be open to prevent possible damage to the bellows.
6. b. A properly calibrated pneumo system should provide for a one inch upward pen deflection when the pneumo tube is expanded one-quarter inch.
NOTE: Don't rely on each bead of a beaded chain to be one-quarter inch. There is considerable variance in the beaded chains. Use a ruler.
7. c. You adjust sensitivity at the fulcrum.
8. d. When the pneumo vent is closed, the pneumo system is sealed and will now record at maximum sensitivity.
9. b. The centershafts are not interchangeable.
10. c. The standard roll of six inch chart paper is 100 feet long.

A B S T R A C T S

Ruff, G. E. Studies of Psychophysiological Baselines, Final Report. Document available from NTIS, 13 pages.

Research performed in The Department of Psychiatry, University of Pennsylvania Hospital, involved human reaction tests to determine psychophysiological baselines of the autonomic nervous system, including respiratory rate, skin resistance, skin temperature, heart rate, pulse volume, and finger volume. Report number D-685802 AFOSR-69-0409TR. Available on microfiche.

* * * * *

Green, Roger L., Harold A. Dengerink, and Susan L. Staples. "To What Does the Terminal Orienting Response Respond?" Psychophysiology, Volume 11, No. 6, pp. 639-646.

Previous authors suggested that the electrodermal orienting response to stimulus onset (OR) reflects cognitive processes related to the content of a stimulus while responses to stimulus offset (TOR) reflect processes related to stimulus duration. Experiment 1 tested the hypothesis that the OR and TOR are special cases of Ss responding to whatever part of the stimulus contains information necessary to make the requested judgment. The results clearly supported this alternative hypothesis. The Ss responded to stimulus onset when asked to judge the pitch (content) of a constant tone and to stimulus offset when asked to judge the terminal pitch of a varying tone. They responded to both the onset and offset of a stimulus when asked to compare the onset and offset pitch and when asked to judge stimulus duration. Experiment 2 partially replicated Experiment 1 in an attempt to assess the OR-TOR phenomenon in a second sensory modality (vision) and with a second dependent measure. The patterns of both electrodermal and heart rate responses were similar to those of Experiment 1 and to those observed by other authors. [author abstract]

* * * * *

POLYGRAPH REVIEW

By

Bobby J. Daily

How would you score on a licensing examination? Are you sufficiently up-to-date about such subjects as psychology, physiology, instrumentation, test question construction, chart interpretation, interview techniques, etc.? Are you prepared to undergo direct and cross-examination on polygraph subjects in court? A score of 9 or 10 is excellent, 7 or 8 is good, and below 7 may indicate some review is warranted. The review in this issue is on instrumentation and was prepared by Clark J. Tebbs of Augusta, Georgia. (The answers are on page 84.)

A B S T R A C T S

Ruff, G. E. Studies of Psychophysiological Baselines, Final Report. Document available from NTIS, 13 pages.

Research performed in The Department of Psychiatry, University of Pennsylvania Hospital, involved human reaction tests to determine psychophysiological baselines of the autonomic nervous system, including respiratory rate, skin resistance, skin temperature, heart rate, pulse volume, and finger volume. Report number D-685802 AFOSR-69-0409TR. Available on microfiche.

* * * * *

Green, Roger L., Harold A. Dengerink, and Susan L. Staples. "To What Does the Terminal Orienting Response Respond?" Psychophysiology, Volume 11, No. 6, pp. 639-646.

Previous authors suggested that the electrodermal orienting response to stimulus onset (OR) reflects cognitive processes related to the content of a stimulus while responses to stimulus offset (TOR) reflect processes related to stimulus duration. Experiment 1 tested the hypothesis that the OR and TOR are special cases of Ss responding to whatever part of the stimulus contains information necessary to make the requested judgment. The results clearly supported this alternative hypothesis. The Ss responded to stimulus onset when asked to judge the pitch (content) of a constant tone and to stimulus offset when asked to judge the terminal pitch of a varying tone. They responded to both the onset and offset of a stimulus when asked to compare the onset and offset pitch and when asked to judge stimulus duration. Experiment 2 partially replicated Experiment 1 in an attempt to assess the OR-TOR phenomenon in a second sensory modality (vision) and with a second dependent measure. The patterns of both electrodermal and heart rate responses were similar to those of Experiment 1 and to those observed by other authors. [author abstract]

* * * * *

POLYGRAPH REVIEW

By

Bobby J. Daily

How would you score on a licensing examination? Are you sufficiently up-to-date about such subjects as psychology, physiology, instrumentation, test question construction, chart interpretation, interview techniques, etc.? Are you prepared to undergo direct and cross-examination on polygraph subjects in court? A score of 9 or 10 is excellent, 7 or 8 is good, and below 7 may indicate some review is warranted. The review in this issue is on instrumentation and was prepared by Clark J. Tebbs of Augusta, Georgia. (The answers are on page 84.)

1. During a polygraph examination, it is noted that the cardio pen movement is sluggish and jerky. What is the most common cause of this problem?
 - a. The cardio pressure is too low.
 - b. The cardio pressure is too high.
 - c. There is a loose or dirty jewel bearing.
 - d. The sphygmomanometer is defective.
2. The push button 1K and 5K "pip" switches on the Stoelting model 22600 instrument are used to calibrate the GSR system. Depressing the 1K switch causes the resistance within the bridge circuit to:
 - a. increase
 - b. decrease
 - c. remain the same
 - d. none of the above.
3. Prior to starting a calibration check of any component of the polygraph instrument, you should first:
 - a. run a test chart with a subject.
 - b. neutralize the controls.
 - c. adjust the jewel bearings.
 - d. obtain the services of an electronics specialist.
4. When examining a subject with a high level of resistance, how should you adjust the GSR sensitivity control?
 - a. Low, in order for the subject's high resistance to compensate for low setting.
 - b. High, because it is necessary to adjust the sensitivity of the GSR recording unit to the subject's resistance.
 - c. Medium, for this setting allows for the subject's resistance to fluctuate without the usual, but reliable, overload reaction.
 - d. None of the above, as the sensitivity control merely controls the amplitude of the GSR pen tracing.
5. To prevent possible damage to the instrument prior to handling the pneumo chest assembly, you must insure that:
 - a. the vent is open.
 - b. the vent is closed.
 - c. the beaded chain is securely attached to the chest assembly.
 - d. the lock/record bar is in the "lock" position.

6. When performing a calibration check on the pneumo system, expanding the pneumo tube one-quarter inch should cause the recording pen to deflect:
 - a. downward one inch.
 - b. upward one inch.
 - c. downward no more than one-quarter inch.
 - d. upward no more than one-quarter inch.
7. In order to alter the sensitivity of the pneumo recording unit where no leakage or side play problems exist, you adjust the:
 - a. jewel bearings.
 - b. centershaft.
 - c. fulcrum.
 - d. sensitivity control.
8. If the pneumo vent is in the closed position, what effect does this have on the recording unit or system?
 - a. It does not record at all.
 - b. It may record, but at minimum sensitivity.
 - c. It vents the pneumo system.
 - d. It records at maximum sensitivity.
9. The centershaft of the pneumo recording unit of the Stoelting model 22500 instrument is:
 - a. interchangeable with the cardio centershaft.
 - b. not interchangeable with the cardio centershaft.
 - c. interchangeable with the cardio centershaft if placed in an inverted position.
 - d. interchangeable with the cardio centershaft if the crankshaft is attached on the opposite side of the centershaft.
10. The approximate length of a roll of standard six inch chart paper is:
 - a. 50 feet.
 - b. 75 feet.
 - c. 100 feet.
 - d. 150 feet.

* * * * *