

EUROPEAN POLYGRAPH

PUBLISHED SEMI-ANNUALLY

2020 VOLUME 14 NUMBER 1 (51)



ANDRZEJ FRYCZ MODRZEWSKI KRAKOW UNIVERSITY

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Journal of Andrzej Frycz Modrzewski Krakow University

European Polygraph is an international journal devoted to the publication of original investigations, observations, scholarly inquiries, and book reviews on the subject of polygraph examinations. These include jurisprudence, forensic sciences, psychology, forensic psychology, psychophysiology, psychopathology, and other aspects of polygraph examinations.

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Krakow University
Krakow 2020

e-ISSN 2380-0550
ISSN 1898-5238

European Polygraph offers open access to all its issues:
<http://www.polygraph.pl>
<https://www.degruyter.com/view/j/ep>
The original of *European Polygraph*
is its electronic version.

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Dear Readers, Dear Authors,

we deliver to you the first issue of *European Polygraph* in its revamped edition. Beginning with 2020 our journal will be published not quarterly but semi-annually.

The visual layout is also changing, especially the cover. The main line of the general content, however, continues to be devoted to the methods of lie detection, especially polygraph examinations.

We will continue to publish academic articles, case studies, and book reviews, as well as reports from academic and scientific conferences, and news about the developments in the lives of organisations dealing with what is broadly construed as lie detection. We will also publish announcements of seminars, conferences, and training sessions free of charge.

The basic form of our journal will continue to be its online version with free access to archive articles. The “hardcopy” edition will remain secondary, as it is designed mostly for libraries and authors at request, and also available for sale.

* * *

There is one more change on the post of our editorial assistant, with Margerita (Rita) Krasnowolska, MA, being succeeded by Anna Szuba-Boroń, PhD.

Rita Krasnowolska was our editorial assistant since the establishment of the journal in 2007 and has contributed to the publication on 50 issues of *European Polygraph*. Let me thank her most cordially for the years of cooperation.

* * *

This issue of *European Polygraph* is a special one. It reminds us that the practical use of the polygraph in criminal cases is already a hundred years old. This is the span of time from the moment when young John Augustus Larson entered service at the Berkeley Police Department, and started his work on the construction of the first polygraph for forensic use.

Following an initiative of our colleague and member of the Editorial Board of our journal, Tuvya Amsel, PhD, we turned with two questions to a group of long-serving, experienced polygraphers. They were:

- 1) Suppose you were a polygraph examiner already in the early years of the profession, when the practice was evolving please, outline the foremost changes you have witnessed in the last 100 years.
- 2) Please, disregard technical instrumental development due to the fact that those were basically developed by out of polygraph professionals and were later harnessed to the polygraph needs.

In this issue of *European Polygraph*, we publish their answers. I believe they are interesting food for thought showing the evolution of polygraph use, and the evolution of the examination technique and equipment in the last several decades. I would like to thank all who have submitted their texts very cordially in my name and on behalf of the initiator of the project, Tuvya Amsel.

Jan Widacki
Editor-in-Chief

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DOI: 10.2478/EP-2020-0002



John Augustus Larson (1892–1965)

An American physiologist, policeman, and inventor born in Canada to Scandinavian immigrants, Larson studied biology at Boston University and earned a master's degree in 1915. Interestingly, the subject of his MSc dissertation was fingerprint identification. Later, Larson studied at the University of California, Berkeley, where he obtained his PhD in physiology in 1920. In the same year he joined the forces of the Berkeley Police Department, quite likely becoming the first American policeman with a doctoral degree.

Larson knew Marston's experiments with blood pressure used as a method of lie-detection, and developed it further. First, he combined Marston's test based on the examination of blood pressure with measurements of the pulse, and control of respiration with the use of the pneumograph. In this way, he constructed the first polygraph for the detection of deception. It is worth mentioning that August Vollmer, at the time Chief of the Berkeley Police Department, supported Larson in his experiments.

Larson's polygraph (called "sphygmomanometer", or shortly "sphyggy") is included on the 2003 List of the 325 Greatest Inventions of All Time of the *Encyclopedia Britannica Almanac* along with the hot air balloon of the Brothers Montgolfier, the Flyer (airplane) of the Wright Brothers, Torricelli's barometer, A. Jeffreis's DNA fingerprinting, Willem Einthoven's electrocardiograph, and many others.

Larson is an unquestioned pioneer of using polygraph in criminal investigations. When the use of polygraph examination spread widely and wildly (notably, with no scientific control) in many fields of life, Larson lost interest in the polygraph and turned to psychiatric practice. He is alleged to have said that he "*At times I'm sorry I ever had any part in its development*". Anyway, a hundred years ago, a new era of criminal investigation began in Berkeley, California. The era of criminal investigation supported with polygraph examination.

Jan Widacki

John Augustus Larson

Modification of the Marston Deception Test

In his latest article in this JOURNAL, Marston describes a test whereby deception or the emotional syndrome involved in lying may be detected in an individual. In brief, he studies the changes in the systolic blood pressure which are produced by emotional disturbance (4). According to his description he has obtained 100 per cent accuracy in cases upon which the tests were tried, both in court cases and upon a number of individuals in an army test. Before mentioning his own technique, Marston sums up, or rather criticizes, the hitherto prevalent methods for the determination of the presence of emotional disturbances. For our own purpose it may be well to mention them briefly.

The first and very common psychological test is the so-called "association test." The second is the galvanometric test, and the third is physiological. In his work Marston considered all methods, but later dispensed with all except that of the blood pressure. We agree with Marston that the association test is often cumbersome and difficult to interpret and not very satisfactory for presentation before courts. However, the second method, that in which the galvanometer is used, is not to be so easily disposed of. The great difficulty experienced in the ordinary use of the galvanometer lies primarily in the instrument. It is well known that the ordinary galvanometers give results which are very difficult to interpret properly and show too many variations. If the proper use is made of the string galvanometer, the results are highly satisfactory and important. The most interesting work in relation to the test that is to be described is that of Hyde and Scalapino (3). They studied the effects of music as indicated in the electrocardiogram. Here they found definite changes in the electro-motive force, and in addition, changes in the systolic and diastolic blood pressures. The changes in blood pressure were studied by the use of a modified Erlanger apparatus and a Tycos Sphygmomanometer.

Prior to Marston's time Benussi (1) was the first to show definite results from the lying processes upon respiration. Benussi found a characteristic ratio of inspiration to expiration, symptomatic of "inter-

¹Ph. D., Member of the Police Force, Berkeley, Cal.

nal excitement" caused by lying and this was found to be stronger in the case of clever liars than in the case of easily detectable ones. In the latter case such excitement may injure and modify the truth of the records if the test is not carefully controlled. The work of Benussi (1) is of especial interest to this investigation since both respiratory and circulatory changes are to be considered.

Marston's articles should be consulted for a description of various tests made by him upon students and offenders (4). His work is of especial interest to us since his so-called deception test consists in the recording of changes in the systolic blood pressure produced by emotional disturbances. It is important to note that Marston found that sustained intellectual work showed no appreciable effects on the blood pressure. Since he found that the diastolic pressure was less readily controlled, this was not utilized. This should answer such objections as that blood pressure might be influenced by the solution of short mathematical problems to the same extent as that caused by the basic emotions such as those involved in lying. But this objection might, however, be put to the use of the plethysmograph in recording effects of emotional disturbances, since here there are so many slight changes involved and these are so variable as to render the interpretation at times impossible. Therefore the plethysmograph, which involves any slight vasomotor change, is not nearly as practical as the direct measurement of the systolic blood pressure.

Marston obtained very definite results in correlating changes in blood pressure with what he termed "the deception process." In his experimental work with students and offenders he obtained as high as 100 per cent accuracy in determining whether or not a suspect was telling the truth. He conducted three investigations in which the blood pressure was used directly as a criterion of guilt, or better, deception. In the first he had students deliberately lie if so inclined, but if they did so he detected it from the pressure curve obtained. Of course there is a possible objection to this investigation, since the lying might seem artificial in most cases, but still the result is of great importance, for if an artificially created condition will cause enough deviation from the curve obtained when telling the truth, how much more will this result be intensified given an act of real deception. Such a condition Marston obtained in his last investigation, in which he actually tried his testing upon persons suspected of misdemeanors. Wherever he used cases in which the results were subsequently checked up by the outcome of the cases, he reported 100 per cent accuracy. In another investigation previous to this one he obtained over 90 per cent accuracy,

working with a group of army men at a training camp. The condition of this experiment was more nearly the same as that of the investigation first mentioned, and again, although the result was not a vital issue to the men concerned, any deception was at once detected.

.. The only criticism of Marston's technique is in the method utilized. He took the pressure by feeling the pulse. This method is being gradually superseded by the auscultatory method, in which a stethoscope is utilized to get the sound. This method has the advantage over the palpitory method in that there is not such a personal factor involved. Often two physicians of long experience disagree as to the exact reading by the palpitory method, whereas in the auscultatory method the systolic pressure is more accurately detected. However, if the pulse method be used, an apparatus such as the Dudgeons Sphygmograph should be used, for in work of this kind it is desirable to eliminate all personal factors wherever possible, for in making interpretations or readings much depends upon the individual. Marston mentioned this latter method, but did not use it. Another objection is the discontinuous method used by him, for he took readings at certain intervals, say two or three minutes, but during the intervening periods, any fluctuations were lost.

.. In our work the aim is to eliminate all the variables possible. Thus, if for no other reason than to determine the effect of respiration upon the heart rate, a pneumographic record is taken simultaneously with the blood pressure. In addition to the rhythmic rise and fall in blood pressure produced by respiratory changes, there are irregular changes in the pressure curve which appear in certain persons, but these are best detected with the pressure slightly below systolic. The blood pressure is obtained by the use of the Erlanger Sphygmomanometer, which has the great advantage that a continuous record can be taken. A modification of this apparatus will subsequently be made, since different investigators disagree as to the accuracy of this instrument in recording the exact moment of the appearance of the systolic pressure. However, in the present working this would not vitiate the results since they are qualitative and relative, for all the emotions are studied commencing with the same initial pressures, and furthermore, each factor is checked up by a determination of the systolic pressure by a Tycos Sphygmomanometer and stethoscope. In all cases the systolic pressure is the one made use of, since Marston found that the diastolic was so easily affected by external stimuli.

In the work of Hyde and Scalapino (3) the effect of music upon the electro-cardiogram and blood pressure was studied by a string gal-

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vanometer and a modified Erlanger with a Tycos Sphygmomanometer. But these investigators used both the systolic and diastolic pressures.

In our apparatus, in addition to pneumograph and Erlanger, the time and the exact moment of asking the questions are recorded separately on two drums working together. For the former a Jacquet chronometer or a signal magnet operated by a metronome or some similar device may be used; for the latter an ordinary signal magnet connected in series with a key and a battery can be used. By the use of ordinates crossing all the lines, the heart beats and respirations can be recorded as well as the exact instant that the stimulus question or association word is applied. In addition, by a modification of the Erlanger the pressures can be obtained directly and recorded on a separate line. However, at the present time we obtained the quantitative changes of pressure throughout the entire investigation by means of the Tycos Sphygmomanometer and a stethoscope. These readings are taken on the opposite arm to that to which the cuff of the Erlanger is attached, and while the subject is resting from a tracing made by the Erlanger; and since continued application of the pressure necessary for tracing on the Erlanger often becomes very uncomfortable and painful, the investigation should be divided up into intervals of from three to ten or more minutes, depending upon the comfort of the subject, but this interval should be the same for all of the subjects.

There is still one important variable to be controlled and that is the method in which the questions are applied, for the subject can get many hints from the manner of intonation of the examiner. To obviate this the questions should be delivered in uniform monotone, with no change of inflection, and by one experienced in conducting such examinations. However, this objection can be wholly overcome by having all questions or important association words written and placed on a drum which is made to rotate before the subject, who should face this drum and who should be screened off from the sight of any other drums or the examiner. Their questions can be timed and by the use of a suitable device, such as pegs projecting from the top of the drum which will automatically make and break a circuit and by means of a signal magnet, these instantly can be recorded underneath the pressure readings.

There are other very important factors to be considered which may modify the interpretation of the results. Thus a query is raised that, given two persons, a suspect and an innocent person, and accuse them of committing a serious crime or felony, the reactions of these two persons may be alike. Thus an innocent person accused of mur-

der will naturally experience several emotions, the chief of which will be fear and possibly anger, but fear is the emotion which should dominate when an individual is suddenly confronted with a strong accusation and in an unusual environment, where his entire future is at stake. However, it has been found by trial that any such initial emotions are of short duration and do not affect the interpretation. Another way of controlling any possible initial emotion of the innocent is to control the results obtained by the innocent with those obtained by the suspect or the guilty, and this can be done by subjecting them to the same conditions, and it is *very important* to emphasize that here all the questions *should be the same*. In addition to controlling the innocent person against the suspect, the questions should be so planned that the emotional response of the same individuals should be controlled as fully as possible. This can be done by alternating questions bearing upon the subject at hand, usually of an accusatory nature, with those arousing other emotional response, such as intense interest, anger, etc. In this light it is interesting to note that in one investigation, although all the individuals were given the same questions in the same sequence, there was a marked variation in response shown by subsequent inspection.

In all the so-called controls, even though one individual gives different responses than the other, the curve of blood pressure and respiration shows a marked uniformity throughout. The subjects afterward said that their only feelings were of marked interest and that the only effect of accusation was to arouse a feeling of resentment, but this was not intense enough to influence the curve. In one case an individual was told to lie deliberately (this being a person from whom certain articles were taken, and although the subject lied about every other question this was manifested by a very perceptible pressure change, although the individual said there was no definite motion involved in the lie, such as pleasure or pain, except that there was a feeling that something was being done which should not normally take place.

By way of recapitulation, the essential features of this test will be enumerated. All important changes in blood pressure, heart rate and respiration are recorded by the apparatus described, with special reference to the effect of emotion upon these changes. It is impossible for a subject to prevent any emotional changes from showing on the drum, and any involuntary inhibitions of breathing and movements are recorded as well. If the subject makes any muscular movement, there will be a resultant change in the drum which can be labeled and discounted later.

SUMMARY

In this investigation the effects of the emotional changes upon the circulatory and respiratory systems during an intensive cross-examination are recorded.

The following instruments are made use of:

An Erlanger and Tycos Sphygmomanometer, a pneumograph, and in addition to these, various signaling devices are also employed.

USE OF THE MODIFIED DECEPTION TEST IN A PRACTICAL TEST

It may be interesting to note the results obtained by the above test in a recent investigation. A description of the cross-examination and other results will tend to elucidate some of the variables met with and a way in which these may be overcome.

The problem involved was to find out who, out of one hundred girls living together in a large hall, was responsible for a series of thefts. Several thefts, aggregating about \$600.00, had centered in a definite corner of the building, within two or three rooms in fact, and the suspicion narrowed down to three or four of the girls. That is, all of the evidence which the officer investigating the case had accumulated seemed to point to these girls, and yet it was nothing but hearsay evidence. It was thought desirable to make a blood-pressure test, and incidentally it might be noted that in the circumstances surrounding the thefts it was practically impossible for the officer, ordinarily, to go further. But none of the girls could refuse to help us by submitting to any tests that we might use. In fact about twenty-five girls were chosen, all of whom lived in the vicinity of the place where the thefts were committed. The test was purposely made without first ascertaining who might be responsible, so that the interpretation of the record might not be biased. We were prepared, if necessary, to submit every girl to the test, but found the party responsible before going through the second group of subjects.

The test was divided into two series, in the first of which 12 girls were taken, including the three thought by the officer to be responsible. Of the girls whom we examined, three were set aside for further investigation, as this first test was but very short and was what might be termed a spotting examination. These three girls included the one who eventually admitted being responsible. The irregularities in the tracings of the other two were but slight and they were taken in the final test not on account of their showing, but more on account of the circumstantial evidence, as the evidence accumulated by the officer

seemed strong enough nearly to convict one girl in the minds of several. In addition to these three, ten other volunteers, selected at random from different parts of the house were taken. At this point it should be mentioned that all of these girls served as so-called norms and it is very important to note that all were subjected to the same treatment. That is to say, all were given the same preliminary statements as to their being under suspicion of possible complicity in the affairs being investigated, and all the girls who volunteered knew that they were under suspicion until the culprit was found. It was found advisable to shorten the investigation as much as possible, but it should be emphasized that all were questioned the same length of time. The chief reason for shortening the investigation is that if the subject be allowed to rest, irregularities occur in the record through the readjustment and the ascertaining of the systolic pressure anew. Of course, if the case was such as to warrant very extensive examination, the time should be cut up into no longer than five-minute intervals, and as all the norms are treated the same, irregularities due to the interruptions of the test can be discounted. It was therefore deemed advisable to run every girl through a six or seven minute examination, and then the test was stopped. The time need not be so long, for if the questions are properly chosen, a few are better than many. Two methods were utilized in asking the questions. In the first series of tests the questions were alternated. That is, a control question, or one not concerning the subject under investigation, and yet calculated to stimulate various emotions, was alternated with one pertinent to the investigation. In the second series it was thought best to run the irrelevant questions all together and then to pile up those concerned with the job. In this way a cumulative effect can be secured and associations called into play by the crucial words or questions allowed to have their effect, whereas in the former method the interspersing of indifferent questions might tend to vitiate this effect.

After the test was over, each girl was asked to introspect carefully and to tell us her real feeling and to analyze her emotions as far as possible during the test. The chief feelings as stated by all concerned, wherever any emotions were experienced, were those of extreme interest, anger at the thought of possible suspicion, and worry or fear ("nervous feeling"), as during an examination. But it is noteworthy that none of these emotions was intense enough to show upon the records. Both the respiratory curve and that of the blood pressure showed marked uniformity throughout and no difference was found between the effect produced by the irrelevant questions and the "dyna-

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mite" questions. The actual variations in mm. of mercury was ascertained by the Tycos Sphygmomanometer, auscultatory method (this being taken on the opposite arm), was not more than from four to six mm. of mercury during the entire examination, the average variation being about 5 mm. of mercury, which was readily accounted for by respiratory effect, as Marston found that there might be a variation of eight mm. However, in the case of the girl who was picked out from all the others, the systolic rose from 118 to 148 mm. of mercury during the seven minutes of investigation.

The importance of having as many norms as possible cannot be over-estimated, for by these we are able to eliminate such variables as the fright of an innocent person at being accused of crimes, as well as the natural anger and indignation at being made an unwilling party to such an investigation.

The following questions were used during the last test:

- (1) This test is to determine whether you are in any way responsible for the thefts committed at X. The test will prove whether or not you are telling the truth. The questions are framed with a view to obtain your emotional reaction to them. And in so far as it is possible we would like to have you analyze your feelings at the end of each question and explain to us later just what your feeling was following each of the questions. We solicit your co-operation and beg of you not to divulge the questions here propounded to any other person. You are especially enjoined not to attempt to make any explanation of our feelings or to comment on the questions asked you.
- (2) Do you like college?
- (3) Are you interested in this test?
- (4) How much is 30×40 ?
- (5) Are you frightened?
- (6) Will you graduate this year?
- (7) Do you dance?
- (8) Are you interested in mathematics?
- (9) Did you steal the money?
- (10) The test shows that you stole it. Did you spend it?
- (11) Do you know where the stolen money is?
- (12) Did you take the money while the rest were at dinner?
- (13) Did you take Miss T's ring?
- (14) Do you know who took Miss B's money?
- (15) Do you know who took Miss S's hose?
- (16) Did you at any time lie to shield yourself or others?
- (17) Are you accustomed to talk in your sleep when worried?
- (18) During the past few nights do you remember having dreamed when you might have talked in your sleep?
- (19) Do you wish at this point to change any of your statements regarding the thefts?

All of these questions were asked of every girl and the time consumed during the entire investigation was made nearly the same as possible for all of the subjects. With one exception, the records of all the girls investigated showed a marked uniformity, and except for rhythmic changes due to respiratory effects, and one or two involuntary movements, which were duly noted and indicated on the drum, no differences could be noted between the effects of the indifferent questions and those appertaining to the thefts. However, in one case the record showed very marked effects, both in the respiratory and in the blood-pressure curve, and this record was not completed, as the subject "blew up." In one instance there seemed to be an involuntary holding of the breath and a nearly complete cessation or marked drop in the height of the beats, following which there was a marked increase in rate pressure and amplitude. At the point at which the subject forced us to discontinue the experiment, the pressure rate and force of contraction were steadily increasing. The record of this girl showed very clearly another advantage of the continuous method of recording all changes on the drum. In addition to the ordinary respiratory effects upon blood pressure, and increased rate, force of each beat and rises in pressure, marked irregularities were noted. These were chiefly inhibitions in breathing and apparent slowing or skipping of heart beats. Thus it is to be noted that, although the blood pressure may rise markedly during a cross-examination, yet this may not be by any means the sole determining factor in making the interpretation, for in the record irregularities may appear which are themselves of great significance.

As the Tycos reading was being taken the subject jumped to her feet and ran over to the drums, and while protesting vehemently at the questions asked and stating that the entire performance was an outrage of the worst sort, she kept looking over the record. She then went out of the room and told one girl that she wanted to tear the paper record into pieces, and informed another girl that she wanted to "smash the officer's face." She then went directly to her roommate and asked her if she had told us anything in the last few hours, for she was the only one who could have known the things that we asked her about. Here she was referring to the talking in her sleep, an episode which was merely conjectural. It was found that she had been addicted to talking in her sleep. A few days later she admitted committing the thefts under investigation. Upon studying her personality, she seemed to present all the indications of a psychopath, in all probability of a manic-depressive type.

Through the use of the above apparatus we were enabled to clear

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up a puzzling series of thefts and have had success even with experimental subjects, such as patrolmen who volunteered to be questioned. Experimental investigation will be made upon other cases and also the effects of different emotions studied separately. By the use of the apparatus on thousands of cases, interpretations can be made of most, if not all, of the emotional changes found.

NOTE.—In view of a recent article by Langfeld and Marston ("Psychophysical Symptoms of Deception," *Jour of Abnormal Psychology*, XV, 5 and 6, 319 ff.), Dr. Larson has sent us an *Addendum* to the foregoing. We regret that it was received too late to be included in this number. It will be published in our next issue.—(Ed.)

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Reprinted from: *Journal of Criminal Law, and Criminology* 1922, 12, 390-399.

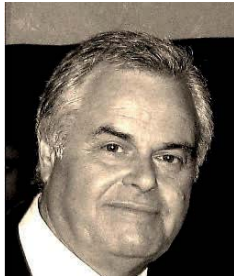
**The Centennial Introspection Project
100 Years of Polygraph Practice**

EUROPEAN
POLYGRAPH

PUBLISHED SEMI-ANNUALLY
2020 VOLUME 14 NUMBER 1 (51)

DOI: 10.2478/EP-2020-0003

The Centennial Introspection Project 100 Years of Polygraph Practice



Tuvya T. Amsel

Foreword

The notion that our body displays physical cues indicative of deception has been recognized since early days of mankind thus produced numerous methods to detect deception, most of which relied on the concept that God will help the truth-tellers to survive the ordeals and tortures suspects were subject to. Only in the nineteenth century researchers with academic background utilizing medical measuring apparatuses, were able to demonstrate the connection between intentional deception and its' physical responses i.e. the "psychophysiological connection".

Around 1920 the polygraph has advanced from its early laboratory experimental stage to nowadays operational practical stage. In 1921 the first polygraph police laboratory was inaugurated in California's Berkley Police Department. And already in 1923, the US Supreme Court referred to of the systolic blood pressure test in its famous Frye precedence.

In spite of not having an exact date of birth, it can be estimated that the polygraph is celebrating nowadays its' first centennial anniversary, a mile stone that calls for an introspection of what has been achieved since its' "birth". For that, publications of the profession's forth fathers who laid the practical foundation (such as; Marston, Larson, Keeler and others), were reviewed in order to compare early days practice to current practice. Although the review focused on the early twenties of the twentieth century later publications which detailed the early practice – including suggestions from the thirties were reviewed as well.

In order to broaden and enrich this review, nowadays prominent professional researchers and practitioners were asked to share their point of view in this matter by answering the following question:

Suppose you were a polygraph examiner already in the early years of the profession, when the practice was evolving please, outline the foremost changes you have witnessed in the last 100 years.

Please, disregard technical instrumental development due to the fact that those were basically developed by out of polygraph professionals and were later harnessed to the polygraph needs.

* * *

While researching these old publications the similarities between old days practice and current practice was surprising and somewhat annoying. Yet, in spite of the similarities it seems that hundred years ago, examiners practiced an **intuition-based practice** while today, examiners are practicing an **evidence-based practice**. Old days practice leaned on individual examiners experience which led to different schools of thoughts while today regardless of the differences between the various approaches they all should be rooted on researches.

i.e. standardized practice opposed to difference schools of thought practice which was based on individual experience.

Last 100 years excelled in revolutionary scientific changes, a revolution that seems to neglect the polygraph practice. In spite of not witnessing a revolution there is an ongoing evolution that after hundred years can be considered as a revolution.

And to all those innovation and ground-breaking zealots and fanatics who claim “stagnation”, keep the wheel in mind. The wheel was invented some 8000 years ago. The basic shape and form stayed the same since. Innovation and advancement came in the shape of material: from stone thru wood thru metal to nowadays rubber with steel walls. Yet, the original shape and form stayed the same for an obvious reason: ‘If it’s ain’t broke don’t fix it’!

EUROPEAN
POLYGRAPH

PUBLISHED SEMI-ANNUALLY
2020 VOLUME 14 NUMBER 1 (51)

DOI: 10.2478/EP-2020-0004

In my opinion...

Gordon Barland

- The widespread expansion of polygraph for screening job applicants, especially by police and intelligence organizations.
- The development of standardized protocols, including institutionalized quality control. [The demise of “Nobody else can read my charts.”]
- The explosion in polygraph usage by many (most?) countries worldwide.
- The development of resistance, initially by union/legislative action, later by countermeasure literature and personalized training.

EUROPEAN
POLYGRAPH

PUBLISHED SEMI-ANNUALLY
2020 VOLUME 14 NUMBER 1 (51)

DOI: 10.2478/EP-2020-0005

In my view...

Bill Fleisher

In my view, the greatest advances in the polygraph profession in the last 100 years, outside of instrumentation, have been in three areas. The first, is the evolution of testing techniques particularly in Zone of Comparison testing. Second, the use of numerical scoring and systemizing chart analysis through a better understanding psycho-physiological indicator of deception; scoring rules; and statistical probabilities. Lastly, the advances in recognizing and understanding countermeasures and the improvements in counter-countermeasures tactics.

EUROPEAN
POLYGRAPH

PUBLISHED SEMI-ANNUALLY
2020 VOLUME 14 NUMBER 1 (51)

DOI: 10.2478/EP-2020-0006

My point of view...



Mark Handler

1. The technology has advanced to computers that allow much more reliable processing and storage of the data.
2. The instrumentation has changed in that the A-D technology is much better and we can collect more finite data without having to torture the subject with mechanical cardio.

3. We have studied the science to where we have learned what principles seem valid, and which “old school lore” are just BS.
4. We have been able to use what we learned to develop techniques that capture the most data per chart.
5. We have learned what features, transformations, rules, and reference distributions best allow us to maximize correct classification in TDA.
6. We have developed a number of algorithms that outperform 90% of human scorers.
7. We have published a body of literature, including several meta-analyses or meta-analytic reviews to defend the science.
8. We have published a number of manuscripts, along with subject matter experts outside of the profession, to describe the physiology we are capturing.

A Hundred Years of Polygraphy: Some Primary Changes and Related Issues



Frank Horvath

The question at hand:

The question to be addressed is essentially: “Supposing you were a polygraph examiner in the early years of the field, what are the foremost changes you have witnessed in the last 100 years?”

Early Practitioners

I’ve been affiliated with the field of Polygraphy for quite a long time. Most of what I have learned about the early formative years in the United States came from reading the material written by some of the leading spokespersons at that

time, among them Leonarde Keeler (1930, 1933), Dr. John Larson (1932) and Dr. William M. Marston (1938). I've learned about those persons from more contemporary writings that provided useful biographical material such as what Alder (2007) and Bunn (2012) have written. (See also: Horvath, 2008.) And, I was fortunate to learn in a different way about those years from those who knew personally some of the early practitioners but who were most active in a somewhat later time period. These included Professor Fred E. Inbau, John E. Reid, Esq., Leonard Harrelson, Warren Holmes, Cleve Backster and my good friend who, fortunately is still with us, Mr. Lynn Marcy. In addition, I learned a lot from persons who were active in Polygraphy in government service, such as Norman Ansley, Ronald Decker, Raymond Weir, and Walter Atwood who is now the oldest living member and Past President of the American Polygraph Association (Starks, 2019). And, there are many others whose names would not be so well recognized but who were experts willing to share their knowledge.

I mention many of the early practitioners not because I want to recount anything they said but rather because they represent a wide range of thinking about the early years and more generally about the field of Polygraphy. If any of the names I've noted are not familiar to you, I urge you, the reader, to read what they wrote. You'll see that in spite of what advances have been made much of the early thinking is still with us and, though the field may seem to have advanced considerably, it is actually at the beginning. There is a lot that remains to be discovered. And, importantly, there is a need in the field for much more, and more honest, attention than has been apparent.

I presume that the question at issue here is directed at changes observed over time in more technical areas, such as the development and evolution of the Reid developed "comparative response question; "testing processes, known generally as testing 'techniques;' the change from analog to digital instrumentation; the use of different forms of comparison questions; the use of different manual and computer-assisted polygraph data 'scoring' methods; refinements in scoring (physiological) features and other similar topics. I'm confident that many of these will be covered by others who are addressing the same question I've been asked. And, though I'll offer an overview of some of these at a later point I'd like to address first issues that broaden the scope of the question at hand beyond narrow, technical considerations. My emphasis will be on factors that have changed Polygraphy over time—at least in my experience—some of which occurred largely beyond the control of those in the field. These, I think, tell us more about where we are—

and maybe where we're going—than most of the so-called improvements that now seem to dominate the professional literature in the field.

Polygraphy—the use of a polygraph instrument in a structured clinical process to assess credibility—was one of many developing forensic techniques. And, it was one that, in its early years, received a lot of public attention, perhaps more than most other nascent forensic procedures that were developing at that time.

Polygraphy was initially applied, as the public was told in the popular media, in efforts at “lie detection.” More important than that simple misnomer, however, was that Polygraphy was seen as a primary means of sorting those who were involved in known criminal events from those who were not, or, in different terms, sorting liars, if you will, from truth-tellers. (That's different, I think, from sorting “lies” from “truth” as the term “lie detection” would imply.)

The early application of Polygraphy being devoted to investigation of criminal events is the place I'll start. It is well known that many of the founding practitioners were well educated and had scientific and professional training in their background. For example, William Marston was a student of Hugo Munsterberg, a well-known, highly respected, academically trained psychologist, who gave considerable thought and writing time to “lie detection.” And Marston himself had academic training as both a psychologist and a medical doctor. Dr. John Larson held a doctoral degree and unlike his contemporary and well-known colleague Leonarde Keeler, sought to improve Polygraphy with greater emphasis on science-based processes. Keeler seemed to resist this idea and apparently was very idiosyncratic in his testing methods. He appeared to be highly reliant on the force of his reputation—which was of high order—and personality. Professor Fred Inbau and John Reid both held law degrees and both held strong positions in trying to ‘professionalize’ Polygraphy. They were very active in trying to eliminate or, at least, minimize what were seen in their day as abusive police practices, particularly in police interrogation.

I believe that the training and background of these early practitioners gave the developing field a high degree of acceptance and respect. They were all seen as being devoted to the need to investigate and resolve criminal events in support of a societal need for law enforcement. While each of them engaged in the media-driven controversial possibility of “lie detection” what they did in practice was well regarded and seen as a positive contribution of scientific advance.

Event-free Polygraphy

This, I believe, changed in time. Keeler, presumably because of his public reputation and self-promotion, initiated—along with some others—the use of “lie detector” testing of employees in private organizations as well as government agencies calling for secure environments. This testing for “loyalty, integrity, reliability, mental stability and suitability” (Alder, 2007), whether of employees in private organizations or of scientists and others involved in governmental work (Testing done for the Atomic Energy Commission in the 1940’s is an example.), represents what in my view is one of the most significant changes the field has seen in its 100 years of existence.

Keeler opened the first private practice in Polygraphy in the U.S. (Alder, 2007). Because of his reputation he was often called upon to investigate/resolve criminal events. The use of Polygraphy in these matters today is referred to as event-specific testing. However, there is another use of Polygraphy apparently initiated by—or, at the least—strongly promoted by Keeler referred to generically as event-free testing; depending on circumstances it may also be referred to as periodic testing, employment screening, routine testing, or more often just as ‘polygraph screening.’ It is critical to distinguish this use of Polygraphy from that involving known events. While both involve the use of a polygraph and both rely on analysis of physiological data to determine if an examinee is lying or telling the truth the differences between the processes are quite pronounced. While there isn’t room here to go into great detail regarding these differences let it suffice to say that when there is a known-event polygraph testing, properly carried out, has a high degree of accuracy. For example, if an examinee is asked: “Did you shoot John Doe?” in a properly constructed examination one can conclude that the outcome is likely to be correct regarding the specific issue that was covered in the questions the examinee was asked. On the other hand, in an event-free examination the examinee may be asked something like: “Did you ever use an illegal drug?” It is obvious here that a testing outcome leading to a determination that an examinee has been “untruthful” does not lead to any knowledge of what produced that result. That is why I’ve referred to this kind of result in other contexts as the “So What.” result. That is, what is important in the contexts in which such a result is gotten is not the result itself but rather what the examinee might have done, if anything, to produce it. In other words, “So what?” if there is a physiological response to a question about drug usage? Did he/she use marijuana one time or one-hundred times? Or, was it marijuana that was used or heroin? When? How

often? And so forth. In other words the value of event-free testing—at least as it is currently carried out—rests on the acquisition of information (which is often not otherwise available), not on a simple testing outcome. Keeler, of course, as well as his colleagues at the time, was highly regarded for his ability to produce information from those he tested.

From the time when Keeler was active (1930's – 1940's) until the mid-1980's the use of event-free testing became over that period the dominant testing procedure. At the same time it also became a leading source of criticism of Polygraphy, even though it was not often seen in isolation from known-event testing. The testing of applicants for employment in private business as well as in governmental agencies, and the periodic testing of employees, grew sufficiently to trouble many, particularly labor unions and 'civil rights' groups. Because they had considerable political influence they were able to raise congressional concern. Enough concern that a federal agency, the Office of Technology Assessment (OTA) was called upon by the U.S. congress to investigate research on Polygraphy. The OTA published its report in 1983 (OTA, 1983). Not surprisingly it was a very critical report, particularly regarding usage in event-free situations.

The OTA report led to a congressional effort to engage the growing field of Polygraphy. That effort, although initially focused on the use of polygraph testing within federal agencies, broadened to include usage in non-governmental, mainly commercial businesses where labor unions were most heavily focused. Congressional attention eventuated in what is now known as the Employee Polygraph Protection Act of 1998 (EPPA, 1998). This was indeed another significant development in Polygraphy. This act essentially prohibited the use of Polygraphy in all private commercial businesses though it did not affect usage in federal agencies nor in non-federal agencies with a demonstrable interest in law enforcement and certain security tasks.

EPPA had a dramatic effect on the use of Polygraphy outside of the federal government. Because most of the non-federal polygraph testing was dominated by event-free testing, which was the primary source of income for polygraph examiners outside of the government, many of them were forced to close their businesses. Those that were able to sustain themselves did so by focusing their efforts on testing (mainly screening) for police agencies, carrying out known-event testing for legal purposes, often at the request of attorneys and engaging in other non-polygraph-related services.

Not surprisingly, the passage of EPPA also had an effect on membership in professional organizations representing polygraph examiners. This can be seen in the drop in the membership of the American Polygraph Association (APA) after EPPA was passed. Prior to passage of EPPA the APA had about 3,000 members; after passage membership dropped to about two-thirds of that. As I write this APA membership is about where it was prior to EPPA. What led to this renewed growth is of interest here.

A new use of Event-Free Polygraphy

After the APA experienced its drop in membership two significant events occurred, both leading to recovery of numbers of members. One of these, interestingly, was a result of growth in and application of a rather new form of event-free polygraph testing. The second, starting in the mid-1990's resulted from deliberate efforts on the part of some active examiners to encourage and promote international interest in Polygraphy. Each of these, in its own right, represented a significant change in the field.

In the first instance the use of event-free polygraph testing to monitor the behavior of sex offenders attracted many professionals who were involved in such treatment or supervision programs. Many of these saw value in relying on Polygraphy to encourage sex offenders to engage more fully and more deliberately in prescribed treatments. Others, already involved in offender-related supervision programs, such as probation agencies, were encouraged to seek out training in polygraph testing so that they could apply it directly in their work. In addition sex offender testing eventually became a primary focus of commercial polygraph examiners, both those who had been able to continue their services following the passage of EPPA and those who were new to the field.

While there are some exceptions almost all of the sex offender testing that is done is of the event-free mode. And, like other forms of such testing little is known about its use in that application. The American Polygraph Association has assumed responsibility for the regulation of its members who engage in that testing. And, there have been some research efforts to document the effectiveness of that testing mode (Grubin, 2016). Nevertheless, it has been assumed, without sound evidence, that testing of the sex-offender population can be carried out in a way similar to other event-free testing as applied in its many other applications.

My focus on event-free testing as one of the significant developments in the field is partly because it is and has been, since the early 1950's in the U.S., a widely used but obscure application. In spite of its usage—and the variety of ways it is applied—it is different enough from known-event testing that little is known about how, or how well, it works. It is so widely used because it serves a purpose not addressed by other methods in the circumstances in which it is applied. It is usually applied as one of the procedures employed to screen job applicants. However, regardless of its application, event-free polygraph testing is most useful in producing information, often unique information not otherwise available. But as a means of “lie detection” it is not likely that it permits the certainty of known-event testing. It is the information produced by event-free testing that promotes its continued use.

I have often asked those in the polygraph community as well as those who were at the levels above operational personnel “Why is it that 90% of the testing done in the government—as well as outside of it—is event-free testing but only 10% of the research and writing about polygraph testing is directed at known-event testing? Stated in a different way, we know a lot more about known-event testing than we do about event-free testing [The OTA (1983) report and the subsequent government sponsored report by the National Research Council (2003) make this point evident]. The two modes of testing are not the same and one cannot generalize from what is known in one context directly to the other. This situation, of course, persists and remains as problematic as it was when Keeler was active.

International Growth in Polygraphy

While for many decades following the 1950's there was an interest in Polygraphy in countries outside of the U.S. the growth was not pronounced. In the late 1980's and early 1990's there was a stronger movement in this direction. One example of this occurred in Singapore. In that country there were several polygraph examiners and one in particular who had been trained in the U.S. and who was noticeably effective and was recognized as such amongst governmental agencies. His performance and encouragement led law enforcement and intelligence agencies to seek out training for a select group of their employees. A leading U.S. examiner, Mr. Lynn Marcy, who was highly regarded and well known in the field, was chosen to do this. He, along with a support staff he assembled, brought his training program to Singapore and over a number of years built up an agency-wide polygraph testing program in

that country. The number of examiners in that country grew in a relatively short time and, reportedly, were quite successful.

In the mid-1990's after being elected to the Presidency of the APA I encouraged the APA Board to engage in activities to promote international growth in the field and in the organization. While not all members were in agreement we moved in that direction. One of the things that was done was to provide an annual luncheon for representatives from outside the U.S. during which those in attendance would meet with and hear directly from Board members. At the first of these, as I recall, there were perhaps 20 or so persons in attendance, many from Canada who, while 'international' had their own established effort in Polygraphy. Over time, however, the APA's international membership grew, as did the number who attended the APA luncheon. In fact, the luncheon was eventually discontinued, largely because the number of attendees grew too large to handle.

I mention the APA's action here because it was my belief that growth in Polygraphy outside the U.S.—generally seen as the most advanced environment—would lead to research and other positive developments in which the understanding of cultural, social, legal and political effects would become clearer and ultimately be of benefit. That has not yet occurred, at least not in a very noticeable way. But what has happened is strong and widespread growth in the use of Polygraphy outside of the U.S. And, that in turn has led to growth in APA membership. That organization has recovered its loss of members from the effect of EPPA. The total membership is now about where it was prior to EPPA, 2,700 members. This, in large part, is due to increasing numbers of international members, now almost 30% of all members. Moreover, of the current twenty-five APA accredited training "schools" that provide initial instruction in Polygraphy, 12 of them are located outside of the U.S. Of the remainder situated in the U.S. many provide regular training in other countries. Thus, it is clear that Polygraphy, with its primary home in the United States, is now truly international in scope. It remains to be seen what such a change will bring to what once was a mostly localized concern.

In addition to the actions in the APA to promote international usage, there has been in more recent years another impetus. This has been a very significant promotion of Polygraphy by U.S. government agencies. Largely because those agencies had an interest in securing relationships with allied countries efforts were made by them to implement and support the use of polygraph testing. In furtherance of this the agencies funded training programs and related activities in outside countries that had neither the funding nor sufficient self-interest in developing their own

programs. Much of this effort went forward in Mexico and other Latin-American countries and it continues today.

Because of this international growth, polygraph testing has become a common activity in many countries across the world whereas before there was little, if any, usage. Although this change has not yet led to substantive advances in many areas of importance there is now a clear potential for that to occur. For example, little is known regarding the effect of cultural differences on polygraph testing, whether of the known-event or event-free type. Advances in knowledge of such differences are much more likely because of the expansion of testing outside of North America.

The Effect of the Internet

Some have called the development of the Internet the greatest invention of all time. Even if that is a bit overstated, there is little doubt that the use of the Internet has had led to changes in Polygraphy. While for many decades a lot of information on that topic was available in training manuals, monographs and other publications these, generally, were accessible in public libraries. An interested person needed to make a special effort to access such documents. The Internet, of course, has changed that and, with respect to Polygraphy, there is now a large amount of information readily available to anyone, even information that had previously been held in a protected way. And, the one aspect of Polygraphy that dominated the concerns of the scientists who prepared the report for the National Research Council (2003), the use of countermeasures, is now a topic of in-depth discussion on a number of World-Wide-Web (WWS) sites. Moreover, this topic is often presented in such a way that anyone preparing to undergo polygraph testing can learn about what are believed to be (by those who prepare the web sites) effective ways to alter favorably the outcome of a polygraph examination. This development has influenced the practices of polygraph examiners. Whether the testing involves event-free or known-event testing the problem of countermeasures continues to warrant more and better research than what is now available. In fact, what is now available is not very helpful and quite limited in coverage.

One of the more popular—and most informative—sites found on the WWW went online in the year 2000. In the past two decades it is likely that every action examinees are instructed to engage in on that site in order to affect favorable polygraph testing has been regularly seen in field practices. No doubt sometimes these tactics have been successful. But, even if that is untrue there is little question that practices

in Polygraphy have changed. Easy access to information, reliable or not, and whether or not dealing with the effect of countermeasures, has necessitated, among other things, revised testing approaches and more advanced training programs. Changes in the field are continuing perhaps at a faster pace and in ways not anticipated prior the advent of the Internet.

Technical Changes

The broader changes I've mentioned appear to me to have been powerful and of widespread effect. But, there are some more technical changes that have been important to Polygraphy. I'll turn to some of these, perhaps more briefly than deserved, but I wish to at least make note of them. All of these were brought about internally; that is, by practitioners.

First among these technical issues is the development by John E. Reid (1947) of what he referred to as the "comparative response question". In its early usage this question was often referred to as a 'control' question'; today, it is called simply a 'comparison' question. The use of this question, an important change, moved the field away from what was in Keeler's time the Relevant-Irrelevant Technique (RIT), highly prone to false positive errors—especially when decisions are based only on collected physiological data—to what is now, generically, the Comparison Question Technique (CQT). The RIT and the CQT are actually a family of procedures. A third family is what I refer to as the Information Recognition Technique which includes the Guilty Knowledge Test (GKT), the Concealed Information Test (CIT), and other similar procedures.

The CQT is now and has been for decades the primary mode of testing in the U.S. and in much of the rest of the world. Although the procedures within that family have been the source of controversy regarding which is the 'best,' they are fundamentally similar. There is no reliable evidence to show that they lead to significant differences in outcome.

Between the 1950's and to about 1970 there were not a lot of what I regard as significant, substantive changes. Some might indicate that changes within the CQT family were of real importance. For instance, the most well-known CQT approaches, the Arther, the Backster, the Reid and the Federal Zone Comparison Techniques all claimed certain advantages over the others. While that may be the case, most often it was the difference in format, not the "Technique," that was seen to be significant. In my view, and I believe the evidence is compelling, format differences

(Format refers to the structure and composition of the question list.) does not have any real effect on outcome differences (Horvath, 2019). (I am not aware of any honest and comprehensive assessments of “CQT Technique” differences.)

In that period there were two changes that did have significant influence. The first of these was the addition of a method for capturing movements of examinees to detect deliberate attempts to influence the polygraphic data. This was initially developed by John E. Reid (1945) and, in principle, it has been used on a regular basis by many examiners since it was introduced. It is now the case—decades after Reid first suggested it—that the use of a motion-sensing device is a standard, almost essential, addition to polygraph instrumentation.

The second important development in that time was the manual numerical scoring method advanced by Backster. This was derived from the earlier ‘check-mark scoring system’ (Horvath, 2019) and it offered several advantages. It facilitated the training of examiners; it helped to permit clearer assessments of examiners’ agreement in their analyses. Also, such scoring made Polygraphy appear to be more scientifically grounded, though the evidence to date does not show that it improved the accuracy of outcomes in comparison to the system from which it was derived. Finally, numerical scoring facilitated statistical analysis of data for research purposes. Nevertheless, numerical scoring—in its original form—is not now a preferred method, but irrespective of that, it was a noteworthy change in response to the question at hand.

Two significant events, technical in way, happened after 1970. They each had a real effect on the development of Polygraphy, particularly the CQT. The first of these was the publication by Horvath and Reid (1971) that showed, for the first time, that CQT data derived from real-life testing circumstances could be objectively blind-reviewed with a high degree of accuracy. Basically, what was done in that report has been replicated many times over the successive years. And, while these replications have revealed as yet unexplained concerns, they do support the principal point made in the Horvath and Reid study: Real-life CQT data are susceptible to a useful, accurate and informative objective review.

A second event of importance, interestingly at about the same time the Horvath and Reid study appeared, was a research report by Gordon Barland (Barland, 1972). In his study Barland showed for the first time that CQT testing, largely as it was being done in real-life instances, could be directly assessed in a controlled, laboratory environment. His study opened the door for additional research, much

of which has been devoted to attempts to understand better some of the factors that influence CQT outcomes. The Barland report, considered in context with the report of Horvath and Reid study revealed that CQT testing was open to useful and positive contributions from both practitioners and interested academic researchers. This, in my view, is largely what has provided the impetus for today's ongoing efforts to advance Polygraphy, again especially with respect to the CQT.

Partly because of the interest developed by the Horvath & Reid report and Barland's laboratory study the years between those studies and now have seen more research and academic attention on Polygraphy than was noted in most previous times, perhaps with the exception of the Keeler-Marston-Larson period. Much of this was directed or done by Dr. David Raskin and his erstwhile students. Although their research covered a number of topics there are two that may offer the most promising change. The first of these is the development of one of the extant versions of a "scoring" algorithm that analyses digitally collected (CQT) polygraph data. This has been shown to yield outcomes equal to what good examiners are capable of, at least in some circumstances. However, it is not certain that this algorithm or one of the others now available or under development (or any of them) will prove to be a "standard" in the field. The use of such algorithms is at the present time an unsettled issue. The APA has only recently announced the organization of a group to investigate the value of the currently available scoring algorithms (Starks, 2020).

The second development, largely a result of research by Dr. John Kircher, is the assessment of ocular changes for purposes of "lie detection." Ocular sensors are now available for integration in standard polygraph instruments, though currently they are used only by a small number of practitioners. On the other hand, as I would think all examiners know, there is at least one ocular sensor system that is currently being marketed as a standalone device, reportedly able to yield outcomes comparable to that of polygraph testing. Such devices seem to be largely in the preliminary developmental stage—the marketing and other promotional literature notwithstanding. It is not yet certain if ocular-based data will contribute in a meaningful way to standard CQT polygraph testing. Moreover, whether or not standalone devices based on pupillary data will best serve very specific purposes or will, on the other hand, actually have practical value similar to polygraph testing is now unclear.

Closing Comment*

I am grateful to Tuvya Amsel and Professor Jan Widacki for raising the question I and others have responded to. As I said earlier in this paper, we are at the beginning stages of this field and there is much to be done. I encourage all of those who find some value in what I and others have written to start doing it. Our pace, to date, has been slow and rather haphazard. More involvement in the right direction by the dedicated persons in the field will move things forward surprisingly fast.

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* The difference between event-free and known-event testing is certainly well-recognized by those who are active in Polygraphy. However, it may not be as well appreciated by those who are simply observers with a casual interest. It is useful for that reason to comment briefly on the accuracy of Polygraphy in regard to its different uses. When Reid and Inbau (1977) published their final volume on Polygraphy, they included in their forward this comment:

“...the polygraph technique, properly employed, possesses a degree of accuracy commensurate with, and even superior to, most of the presently approved forms of evidence, scientific as well as nonscientific, that feature in criminal and civil trials.” (p., viii). It is clear that this comment was directed at known-event testing. And, what Reid and Inbau meant was that polygraph testing, applied and evaluated in the context of their CQ Technique, had a high accuracy. They did not mean to suggest that either their CQT or any other version would yield a similar high accuracy when applied and evaluated in a context different from their experiences, such as, for example, in controlled, laboratory environments where much of the information present in real-life is absent. I also need to mention here another important point directly related to the difference between known-event and event-free testing. It is to be noted that the 1977 volume by Reid and Inbau dealt exclusively with Polygraphy. Absent from that volume was discussion of the many aspects of proper criminal interrogation procedures that both Reid and Inbau had published on authoritatively and widely in prior years. Thus, their 1977 publication was clear indication that the authors now recognized that known-event CQT Polygraphy was a standalone practice. That is, it didn’t necessitate the use of “interrogational” procedures in the context of polygraph testing in order to “know” – or determine – an examinee’s truthfulness.

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EUROPEAN
POLYGRAPH

PUBLISHED SEMI-ANNUALLY
2020 VOLUME 14 NUMBER 1 (51)

DOI: 10.2478/EP-2020-0008

Five Milestones in the History of the Polygraph



Donald J. Krapohl

Looking back through the lens of history I believe there were five critical events that brought the polygraph profession to where it is today. Here are those events.

The Idea

Polygraphy began as the simple-yet-profound idea that cognitive activities revealed through physiological monitoring could be exploited for the practical purpose of assessing the statements of suspects. That idea was proposed by Hugo Münsterberg, the father of forensic science, in the early 1900s. In his classic text *On the Witness Stand* (1908), Professor Münsterberg presciently suggested that changes in respiratory, cardiovascular and electrodermal systems could be brought to bear on the

problem of detecting deception. Among the many readers of his book no doubt was a young Ph.D. student at the University of California (Berkeley), John Larson, who would take the next step.

The Test of the Idea

In about 1920 Dr. John Larson set up an assemblage of laboratory apparatuses to determine whether deceptive intent was accessible through bodily changes. They were. The following year Dr. Larson conducted the first real-world criminal polygraph test of record on April 19th in the College Hall thefts about which he wrote in the first polygraph article later that same year. While Dr. Larson eventually left the field, others working with him, C.D. Lee and Leonarde Keeler, created portable devices and captured the public's attention with their ability to solve high profile crimes.

The Standardization of the Protocol

In the early days of polygraphy examiners did not have defined testing and scoring protocols as we understand them now. It would not be until about 1960 when Mr. Cleve Backster introduced standardized testing and analysis procedures to his students. These important contributions made it possible for different examiners to come to a common conclusion regarding polygraph data, something we take for granted today. Mr. Backster's innovation also paved the way for independent quality control.

The Validation of the Protocol

Polygraph research was spotty, at best, before 1970. In the early 1970s then-graduate student Gordon Barland introduced Dr. David Raskin of the University of Utah to the polygraph. Dr. Raskin and his students subsequently began an unprecedented series of studies on the polygraph, developed almost all of what is known about polygraph countermeasures, improved manual scoring, created the first computerized instrument and algorithm, and refined testing procedures. Their body of work laid the groundwork for a field that heretofore had been dominated by practitioner-developed procedures to an endeavor with evidence-based methods.

The Shift to Best Practices

For most of the history of the polygraph, the polygraph school an examiner graduated from accounted for almost all of her or his philosophy toward polygraph testing. There were substantial methodological differences taught in the various polygraph schools, leading to large schisms in the polygraph community. In the early 2000s there was a gradual shift in the policies of the American Polygraph Association (APA) toward evidence-based practices. In 2007 the APA Board approved a standard that its members must use methods that are supported by scientific evidence beginning in 2012. The APA published a survey of defensible polygraph techniques in 2011 which led to a culling of the number of recognized polygraph techniques from more than 60 to fewer than a dozen. Today a test can be called invalid because it departs in a meaningful way from the supporting evidence rather than personal views shaped by different polygraph schools.

Conclusion

Tuvya Amsel's Introspection Project turns our attention from our local concerns to the big picture. Developing the long view of polygraphy rewards those who make the effort with patterns and trends that reveal the trajectory of polygraphy from how it began to what it might become. Little could the early pioneers have envisioned what 100 years of polygraphy would bring: polygraph programs around the world, computerized marvels to help conduct testing and analyze the data, a significant and growing body of supporting scientific evidence to guide our practices, and professional standards based on that evidence. We are living in a remarkable period thanks to the contribution of a relatively small number of individuals doing the right thing at the right time.

Like the forefathers of the polygraph, we cannot know what will come in the next 100 years. What great innovation is sitting in the mind of someone somewhere at this very moment that will transform the field yet again? What will the sixth milestone be?

I, for one, cannot wait to find out.

Foremost Changes in Polygraph in Last 100 Years



James Allan Matte

When I attended the Backster School of Lie Detection in New York City in January-February 1972, there were five primary polygraph techniques in use at that time. Namely, the Relevant-Irrelevant Technique, the Reid Technique, the Arther Technique, the Marcy Technique, and the Backster Zone Comparison Technique. The changes that followed in the next forty years were significant, and too extensive for discussion in this paper, hence the interested reader is directed to the voluminous textbook (Matte 1996), updated with a Supplement (Matte 2002–2012), available at amazon.com.

Since 2012, two major movements for significant change have ensued.

The first is substitution of the traditional Probable-Lie Comparison Question (PLCQ) with the Directed-Lie Comparison Question (DLCQ). The PLCQ requires great skill in its introduction, due to its threatening nature, whereas the DLCQ requires relatively no skill, and is readily accepted by the examinee, due to its non-threatening nature. It is the non-threatening nature of the DLCQ which opponents of the Directed-Lie are most concerned with. For a full, detailed discussion and critique of the DLCQ, the reader is directed to (Matte 1998, Matte 1999, Matte 2015).

The second major movement for change is the awarding of the Electrodermal Activity (EDA) signal greater weight than the Pneumograph and Cardiograph tracings, to wit: 50% for the EDA, 25% for the Pneumo, and 25% for the Cardio tracings. The reader is directed to (Marin, Barbey, Rosenbaum, Hammoud, Orr, Milad (Jan 2020), Matte 2015, Nelson 2019, Selle, Agan, Ben-Shakhar, (Sep 7, 2019).

I'm sure that other changes not discussed in this paper will be forthcoming in the summations solicited from other examiners and researchers.

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Critical Changes Over the 100 Year Evolution of Polygraph Practices



Stanley M. Slowik

I believe the most important evolutionary changes to polygraph procedures and practices over the last 100 years were all the result of the creation of the first modern day crime laboratory in 1930 at the Northwestern School of Law, shortly thereafter to become the Chicago Police Scientific Crime Laboratory and the many years of polygraph field research and practice by John Reid and Fred Inbau. These critical changes include the separation of polygraph from the art of interrogation, the creation of the probable lie comparison question and the development of investigatory interviews such as the Behavioral Analysis Interview which in forensic settings can

be used as both a check of polygraph opinion accuracy and a standalone diagnostic procedure.

Separating Polygraph and Interrogation

Throughout polygraph's evolution, the most frequent practitioners and users of polygraph and interrogation have been law enforcement, the military and various government intelligence services. It was and is today, the norm for a single person to perform both functions, usually in the same setting. Contrary to claims made by some critics of police practices, the objectives of both polygraph and interrogation are mutual and compatible: to obtain the truth – not a mere acknowledgement of guilt. The procedures, however, are functionally very different (Slowik, 2016). Polygraph has always been primarily a non-accusatory, investigatory procedure (“Did you do it”) while interrogations are essentially accusatory (“You did it. We need to know why and how you did it in a way we can corroborate.”). As Reid and Inbau soon discovered at the Crime Lab, early Relevant/Irrelevant polygraph procedures were not particularly accurate with high rates of false positive and inconclusive results. Since there are numerous reasons why a subject might produce a deceptive looking response to a Relevant Question besides actually being deceptive, it was not uncommon for examiners to run a chart, confront the subject over a deceptive looking response (interrogate) and if a statement confirming deception was not obtained, to simply continue the examination, conducting additional tests with the same questions. While this type of practice is specifically prohibited today by all recognized polygraph associations and schools, it was justified in earlier times since the goal was to obtain the truth and many people who believe they have been caught, give up and “confess”. The psychological principle that people who believe investigators have a way of determining when they are lying are more likely to “confess” has always been known to investigators and is the sole basis today for devices such as the Computer Voice Stress Analyzer (CVSA) which all credible research indicates has no scientific validity in determining truth or deception. What Reid and Inbau were able to show was that charts conducted immediately after an accusatory interrogation contained even more false positives and inconclusive results than charts conducted without any kind of pre-test interrogation when using the Relevant/Irrelevant Technique. The reasons are somewhat self-evident. Anger can produce deceptive looking responses (false positives). People, who are falsely accused of lying or committing an act they did not do, often become angry and upset. In addition, people subjected to

lengthy interrogation can quickly become “drained” (adrenal exhaustion) which often result in a complete lack of response on subsequent charts (inconclusives). When Reid and Inbau first began to report and write about their early Crime Lab research and findings, they combined everything about interviewing, Behavioral Symptom Analysis, polygraph and criminal interrogation in a single 1953 text, *Lie Detection and Criminal Interrogation* (Reid, Inbau 1953). As it became apparent that interviews and polygraph examinations conducted immediately after an accusatory interrogation were consistently negatively effected, they went so far as to report subsequent research in two separate and distinct texts: *Truth and Deception: The Polygraph (Lie Detector) Technique* (Reid, 1966; 2nd Edition, 1977) and *Criminal Interrogation and Confessions* (Reid, 1967) with four subsequent editions. Their recommendation that interrogations should never be conducted immediately prior to polygraph examinations was included in the first polygraph licensing law (Illinois, 1963) and subsequently incorporated into the By-Laws and Standards of Practice with the creation of the American Polygraph Association in 1966. It should also be mentioned that prior to this time, other than several lectures Keeler would give as part of a week-long training session offered at the original Northwestern University Law School Crime Lab, there were no formal polygraph schools. Students of polygraph either simply read the Reid and Inbau books and declared themselves “preceptor trained” or attached themselves to practicing examiners and learned by observation and tips informally passed along by their mentors. There were a few notable exceptions. In 1958, the Central Intelligence Agency arranged for Zvi Aharoni, one of the most remarkable members of Israeli Mossad, to study for a prolonged period directly under Reid and Inbau and incorporate the Reid and Inbau methods into the original Israeli polygraph school (Aharoni, 1998). Aharoni is credited with planning and participating in the capture of Nazi war criminal Adolf Eichmann two years later. Aharoni wrote that he was very much opposed to the use of torture and coercive interrogation tactics commonly used in the Middle East at the time and specifically praised the Reid and Inbau polygraph and interrogation procedures he learned in Chicago as the best way to obtain the truth and avoid false admissions. This philosophy and the Reid Probable Lie Comparison Question Technique soon became the basis for the initial Israeli polygraph school and a revised approach to Mossad interrogations. It is further critical to point out that contrary to several false media reports, the Reid Interview and Interrogation Technique remains the procedure specifically cited by both the U.S. Supreme Court (twice) as proper and legal.

Creation of the Probable Lie Comparison Question

Leonard Keeler is not only credited with introducing polygraph to the Northwestern University Law School Crime Laboratory upon its creation in 1930 but basically supporting the entire operation during the Depression by conducting polygraph examinations for a fee for private sector clients, primarily banks and retailers. Later, when the Crime Lab was purchased by the Chicago Police Department in 1936, Inbau was appointed Director and he in turn assigned newly minted lawyer, John Reid, to look into the high false positive and inconclusive rates of polygraph examinations, estimated to be around 40% (Slowik, 2019). All polygraph examinations at the time used the Relevant/Irrelevant Technique and on a more limited basis, Concealed Information and Peak of Tension tests. Although Reid never wrote about how he came up with the idea of creating and incorporating the Comparison Question into the existing I/R Technique he had learned from Keeler, I personally heard him tell a story of testing a subject on a robbery or perhaps a bank theft case during which the subject, after denying stealing the specific amount involved in the case, challenged Reid to ask him on the polygraph test if he ever stole anything at any time in his life, which the subject also denied. Reid told me that he decided to take the subject up on his challenge and subsequently noticed that although the subject responded in a deceptive manner to the Comparison Question (“Did you ever steal anything in your whole life?”) he responded even more deceptively to the Relevant Question (“Did you steal that missing \$xxx?”). Following a post-test interrogation, the subject admitted to the theft including details that led to the recovery of the amount under investigation thus corroborating the admission with physical evidence and thereby converting the admission into a confession as defined in Steps 8 and 9 of the Reid Nine Steps Interrogation procedure. This same story was also told to Reid student and former CIA Chief Polygraph Examiner, Robert Peters though Bob’s recollections include a few more colourful details regarding the location of the subject’s challenge. Peter’s article on how to select, introduce and properly develop Comparison Questions in specific issue examinations remains today far and away the most authoritative and descriptive work on the topic and should be mandatory reading in all schools teaching the Probable Lie Comparison Question Technique (Peters, 2012). It should be noted that although Reid originally referred to his creation as a Comparison Question, subsequent editions of the Reid and Inbau texts used the term Control Question in compliance with various psychological conventions of those times. However, beginning in the 1980’s forward, most references to Reid’s procedure have reverted back to the original Comparison Question terminology.

All of the high quality validity studies published in recognized, peer review Journals, including the original Office of Technological Assistance (OTA) studies which includes my own validity study of the Reid Technique (OTA, 1983) and the latter National Academy of Science (NAS) studies (NAS, 2003) involve the use of Reid's Probable Lie Comparison Question. There appears to be no limit on the number of variations of his concept with regard to the number and placement of Relevant and Comparison Questions, the use of time exclusionary question qualifiers or the addition of "extra" questions (Symptomatic, Sacrifice Relevant, etc. Questions). In fact, the "techniques" cited in the OTA and NAS reports are nothing more than variations on Reid's Probable Lie concept. The probabilities that this many "techniques" could all have nearly identical reported statistical validity and reliability can only lead to the same conclusion: they are really the same thing. Further demonstrating the same point, Reid's original Comparison Question Technique typically used four or five Relevant Questions and two Comparison Questions but by the late 1970's had pretty well fixed on the present day three Relevant, two Comparison Question format. Similarly, various writings describe at least eight "Utah Techniques" which are not significantly different from each other or the original Reid Technique. Innovations such as Backster's use of numbers to replace the semi-objective scoring check mark system taught to him by Reid's student, Dick Arther, are not really changes to technique. Finally, though various Directed Answer procedures have long been known and practiced (the Known Number stim test, Horvath's "Yes" test, the wrongly named "Directed Lie" test), none of these procedures should be confused with any of the validated procedures described in the OTA and NAS reports.

Investigative Interviews

From the very beginning of their research and attempts to improve polygraph accuracy, Reid and Inbau took turns watching each other interview, polygraph and interrogate actual criminal suspects, victims and witnesses and recording what they were asked and both they said and how they said it, i.e. their verbal and non-verbal behaviour. They soon noted that there were observable and recordable differences between subjects telling the truth and subjects lying to the same questions, the veracity of the subject established by substantiated confessions and/or physical evidence. From this evolved the formal Behavioural Analysis Interview (B.A.I.), a carefully crafted set of questions that originally acted as a check on polygraph interpretations (Horvath, 2007). In simple terms, if the polygraph charts indicated the subject was

being truthful and, based on the B.A.I., they looked and talked more consistently with previously verified truthful subjects, one could assume greater confidence regarding the stand alone polygraph opinion. It should be noted that most polygraph specific issue pre-test interviews actually contain three different kinds of interview questions: information gathering questions (though most of these should have been asked prior to the polygraph examination by the field investigators who supplied the case facts necessary to conduct the examination), position questions or the subjects admitted involvement/denial in the issue under investigation and diagnostic questions of which the B.A.I. is the only investigation interview to have its predictive accuracy researched and reported (Jensen, 2011). Since the 1970's, the B.A.I. has been used primarily by police investigators independent of polygraph and is far and away the most accepted and commonly used formally taught investigative interview procedure not just in the United States but by numerous countries and cultures around the world. There was a period during the evolution of polygraph practices where examiners were taught to minimize interactions with subjects during the pre-test interview. Basically, proponents of this approach would only determine the subject's suitability for testing and review the actual test questions. In some extreme cases, the subjects were placed in an isolated booth and the question/answer process took place using speakers and microphones. More recently, the polygraph profession has rediscovered the value of Reid's Behavioural Symptom Analysis, the evaluation of the veracity of verbal and non-verbal exhibited during interviews, going so far as to rename the process a form of credibility assessment.

Conclusion

I am now in my 51st continuous year of conducting 200 or more polygraph examinations each year with many years exceeding 1,000 examinations, albeit of a very simplified, screening sort. I have personally interviewed, polygraphed and interrogated subjects from numerous countries and cultures and professionally trained thousands of investigators, examiners and interrogators from all over the world. What never ceases to amaze me is how well the Reid interviewing, polygraph and interrogation techniques work – when practiced as taught – regardless of language, crime, religion or personality. Since most of our training clients have been annual customers for generations of investigators, I'd like to credit my abilities as an instructor for the acceptance of the programs but must give nearly all the credit to the techniques themselves. In short, they not only work across a universe of cultures and situations but can also be taught, learned and applied across the same universe. No other program of this sort can demonstrate the depth and length of

field acceptance. Perhaps this is also due to the reality that as societies and criminal activities have evolved, so too have our interviewing, polygraph and interrogation techniques. Hopefully this evolution will continue for the next 100 years.

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A Half-Century of Experiences with the Polygraph



Jan Widacki

I obtained my first expert knowledge of polygraph from a course book of criminalistics by Paweł Horoszowski published Poland in 1958. The author provided his descriptions of the polygraph and examinations with an ideological commentary (among other things like this: “lie-detector is an imperialistic tool of torture”).

Having returned from the US, where he held a scholarship from Ford Foundation and purchased a Stoelting polygraph device, Horoszowski changed his opinion and now considered polygraph examinations useful for criminal cases, and began to perform polygraph examinations in criminal procedures himself.

Beginning with the 1970s, polygraphs began to be used in Poland for examining people suspected of committing ordinary crimes, mostly homicide. Reid Control Question Technique was used for that purpose, as described in a book by Reid and Inbau (*Truth and Deception: The Polygraph ("Lie Detector") Technique*, Williams and Wilkins, 1966).

In 1976 I began my experiments as a junior researcher at the Jagiellonian University using a LaFayette (model 76058). At the time I co-authored, with Frank Horvath, a work entitled "An experimental investigation of the relative validity and utility of the polygraph technique and three other common methods of criminal investigation" published in *Journal of Forensic Sciences* and in *Polygraph*.

Since 1977 I used polygraph for criminal, mostly murder, cases, initially only using Reid technique, which was used by Polish polygraphers working on criminal cases.

The evaluation of the curves was only performed qualitatively. The results of the examinations were delivered to the examining officers together with comments, and played an auxiliary role in the investigations. Only around 10% of results of examinations later reached the court as evidence. Apart from the analysis of the reactions reflected by polygraph curves, attention was paid to the behaviour of the subject during the examination, attempts at interfering with the results, and the subject's statements before and after the test. Assessments covered the strength of reaction to Question 3 ("Do you know who killed?") compared to Question 5 ("Did you kill?"). These grounds were used for drawing conclusions for the investigating officers. The result of the examination was more of a suggestion for the people in charge of investigation than evidence for the court.

Following a suggestion of Gordon Barland, with whom I exchanged letters and who visited Poland twice, beginning with the late 1970s I began to use numerical assessments of the subjects' reactions, employing a 7-point scale, ranging from +3 to -3, and I also began to apply Backster's technique.

Using numerical assessment, I only applied strict quantitative criteria, according to which the result of examination qualified the subject into the group of deceptive (DI) or non-deceptive (NDI) individuals, or made us consider the examination as inconclusive (INC). Interpretation of the subject's behaviour, assessment of reactions to individual questions, etc. moved to a more distant plane, and was of clearly

auxiliary significance, and that only if the quantitative result was on the DI/INC or NDI/INC border.

The examination was not as much focused on suggestions for the investigating officers as on evidential purposes.

The opinion from the examination contained the formula “the subject reacts to the critical questions of the tests in a way usual for the people who answer such questions deceptively, that is lie or withhold the information they have” or “the subject reacts to the critical questions of the tests in a way usual for the people who answer such questions honestly”. In the case of subjects who could not be clearly assigned to the DI or NDI group, the opinion read: “the result of the examination does not allow an unambiguous decision whether the subject reacts to critical questions like DI or NDI individuals”.

The result of a polygraph examination concluded with such an opinion only provided circumstantial evidence and was never treated as direct evidence.

The question how to interpret the phrase “reacts (...) in a way usual for the people who” was answered with a reference to the diagnostic value of a polygraph examination, namely that “this is the reaction of around 90% of subjects who answer honestly” or “this is the reaction of around 90% of subjects who answer deceptively”. Thus interpreted, the results of the examination always required confrontation with other evidence collected for the case.

The historical breakthrough in the practice of polygraph examinations came early in the 1990s with the emergence of computer polygraphs that practically succeeded traditional analogue polygraph machines in the space of a few years.

As much as in the 1970s and 1980s polygraph examinations were used in Poland mostly in criminal cases, today such examinations are but a few percent of all the procedures. A great majority of examinations is performed for pre-employment and screening purposes.

From the time of the breakdown of the USSR, more polygraph examinations have been conducted in Russia, Ukraine, Belarus, Kazakhstan, other Asian republics of the former USSR, and China than in the US, Latin America, and Europe. These examinations are performed both for the organs of the states, and in private business for pre-employment and screening purposes. There is much to suggest that such examinations are abused, and also their quality raises doubts.

Despite such a significant increase in the count of polygraph examinations in the world, the number of experimental studies in the field does not grow, and judging by the number of publications in scientific journals, it can even be dropping. There is also a shortage of methodical analysis of the praxis, which is a reason for concern that the practice of polygraph examinations has escaped the control of science and academic centres. This, unfortunately, sets polygraph examinations apart from most forensic sciences in whose case the control exerted by academic centres over practice is clear, and scientific and research centres provide practitioners with ever more perfect tools.

Another reason for anxiety is that the professional associations that are generally rich, to mention the American Polygraph Association, only earmark very little funds, if anything at all, to scientific research. The lack of scientific cooperation between such associations and societies of psychologists is impossible to understand, and even more so are their mutual antagonisms.

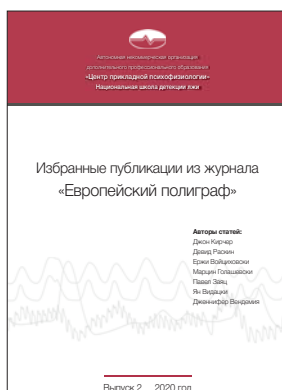
Book reviews

EUROPEAN POLYGRAPH

PUBLISHED SEMI-ANNUALLY

2020 VOLUME 14 NUMBER 1 (51)

DOI: 10.2478/EP-2020-0012



Избранные публикации из журнала «Европейский полиграф». Выпуск 2 – Izbrannyye publikatsii iz zhurnala „Yevropeyskiy Poligraf”. Vypusk 2 [Selected publications from *European Polygraph* journal, No. 2] Moscow 2020

Centre for Applied Psychophysiology, Moscow published the second issue of the Russians translations of selected 4 articles by 7 authors that had been published earlier in *European Polygraph* in the years of 2014–2016. In the first issue (in 2019) they published articles from 2011-2015 (see: *European Polygraph* 2019, 13, 1 (47) p. 43).

The articles included to second issue are:

J. Kircher, D. Raskin: Laboratory and Field Research an the Ocular-motor Deception Test”, *EP* 2016, 10, 4 (38);

J. Wojciechowski: Detection of Concealed Information with the P 300 Potential Amplitude Analysis, *EP* 2014, 8 , 4 (30), 167–188;

M. Gołaszewski, P. Zając, J. Widacki: Thermal Vision as a Method to Detection of Deception. A Review of Experiences, *EP* 2015, 9, 1 (31), 5–24;

J.M.C. Vendemia: fMRI as a Method of Detection of Deception. A Review of Experiences, *EP* 2014, 8, 1 (27) 5–21.

Each article (in Russian translation) received a short gloss fro the Editors of the volume.

Now, Russian language is a lingua franca in many former soviet republic in Asia, as well as in Ukraine and Bieloraussia. So, translation of articles published in English into Russian, extends the numbers of our readers.

Jan Widacki

EUROPEAN
POLYGRAPH

PUBLISHED SEMI-ANNUALLY
2020 VOLUME 14 NUMBER 1 (51)

DOI: 10.2478/EP-2020-0013



Особливості проведення передтестової бесіди в дослідженнях із застосуванням поліграфа: методичні рекомендації, уклад.: В.О. Шаповалов, Д.О. Алексєєва-Процюк, Київ: Національна академія внутрішніх справ, 2019, 76 с. [Special considerations of pre-test interview in polygraph testing, methodological guidelines V. Shapovalov, D. Alieksieieva-Protsiuk, Kyiv: National Academy of Internal Affairs, 2019, 76 p.]

Methodological guidelines “Special considerations of pre-test interview in polygraph testing” were developed by practicing polygraph examiners from Ukraine – Vitalii Shapovalov and Diana Alieksieieva-Protsiuk.

The subject area of the guidelines is the first part of polygraph examination, namely: pretest interview procedure.

The authors point out that professional polygraph literature, ASTM international standards in the field of psychophysiological detection of deception and the standards of practice of American Polygraph Association (APA) do not have clear and rigid rules or requirements for the algorithm and sequence of pre-test interview. General rules for conducting a pre-test interview as an integral part of the polygraph examination have been drafted over the decades of using polygraph in the field and experimental research and reflected in scientific articles, standards of practice and manuals. They might vary in minor respects, but most of the components are mandatory, regardless of the author or polygraph technique in use.

The authors are trying to provide ordered information for practicing polygraph examiners regarding the policy and procedure of a pre-test interview during investigation (in criminal proceedings, during internal and private investigations) as well as during screening multi-issue tests.

The guidelines provide detailed information on:

- arrangements preceding polygraph examination;
- a separate detailed algorithm for a pre-test interview during diagnostic and screening tests;
- different strategies and tactics applicable during a pre-test interview.

The objective of the present study is to provide general guidelines an individual examiner might consider using, and should not be perceived as a rigid algorithm for conducting a pre-test interview. The authors were seeking to introduce contemporary world practices to the reader and share their own on-the-job experience acquired over the years of routine work in the field.

The work was recommended for publication by the Scientific and Methodological Council of the National Academy of Internal Affairs (Minutes #9 of May 20, 2019).

Vitalii Shapovalov

EUROPEAN
POLYGRAPH

PUBLISHED SEMI-ANNUALLY
2020 VOLUME 14 NUMBER 1 (51)

DOI: 10.2478/EP-2020-0014



**Технологія застосування тестових форматів Utah CQT
в поліграфологічних дослідженнях: методичні рекомендації,
уклад.: В.О. Шаповалов, Д.О. Алексєєва-Процюк, Київ:
Національна академія внутрішніх справ, 2019, 88 с. [Structure
and administration of Utah CQT test formats in polygraph
examinations: methodological guidelines, V. Shapovalov,
D. Aliksieieva-Protsiuk, Kyiv: National Academy of Internal
Affairs, 2019, 88 p.]**

Methodological guidelines “Structure and administration of Utah CQT test formats in polygraph examinations” were developed by practicing polygraph examiners from Ukraine – Vitalii Shapovalov and Diana Aliksieieva-Protsiuk.

The authors-compilers of these methodological guidelines were trying to bring together and marshall up-to-date relevant information collected from different scientific sources on Utah CQT test formats structure and administration in one manual.

The authors explain the relevance of this publication by the fact that Utah ZCT technique (Zone Comparison Test) with three relevant questions is believed to be one of the most accurate and reliable test formats of any polygraph examination protocol according to meta-analysis conducted by American Polygraph Association (APA) and is recommended as Evidentiary Technique, therefore it is extremely important for modern polygraph examiners to learn and perfect this technique.

Among the objectives of this study was to introduce Utah CQT technique itself, provide background information about its authors, give examples of Utah ZCT test format with 3 RQ and Utah MGQT with 4 RQ, describe the algorithm for pre-test interview, provide recommendations for question review both before running the charts and during between-chart-stimulation, explicate the rules of test data analysis and decision criteria using a 7-position numerical scoring approach of the University of Utah and ESS-M.

The authors emphasize that Utah test is highly accurate and reliable not only due to special position of questions in the test structure, but also due to clear rules that apply to the entire test procedure and its administration, therefore to ensure maximum accuracy of test results the examiner should be familiar with test specifics and follow the rules to the letter.

The work was recommended for publication by the Scientific and Methodological Council of the National Academy of Internal Affairs (Minutes #9 of May 20, 2019).

Vitalii Shapovalov

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For example (in references):

Reid J., Inbau F. (1966), *Truth and Deception: the Polygraph ("Lie-detector") Techniques*, Williams & Wilkins, Baltimore.

Abrams S. (1973), *Polygraph Validity and Reliability – a Review*, Journal of Forensic Sciences, 18, 4, 313.

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