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Minimum Number of Polygraph Charts Required to Reach a Conclusion of Truth or Deception in Psychophysiological Veracity Examinations

Key Words: conclusion of polygraph examination, minimum number of polygraph charts

For many years, the American Polygraph Association's standards of practice required that a minimum of two polygraph charts containing the same test questions had to be collected before a conclusion of truth or deception could be rendered. The assessment of the validity of any psychophysiological veracity test is based on the assumption that the test consistently measures the same properties. This consistency, known as reliability, is usually the degree to which a test yields repeatable results, i.e. the extent to which the same ex-

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aminee retested is scored similarly (Matte 1996). This long-standing standard was in concert with APA-accredited polygraph schools.

However, recent changes to that standard have been implemented by the Federal, Utah and Integrated Zone Comparison Techniques, which now require that a minimum of three polygraph charts must be collected to reach a determination of truth or deception. Nevertheless, the minimum two polygraph charts requirement is still the standard for the Backster Zone Comparison Technique, the Quadri-Track Zone Comparison Technique and the Reid Technique.

In order to satisfy both schools of thought, the American Polygraph Association (APA) and the American Society for Testing and Materials (ASTM) have changed their standard as follows:

Division III: APA Standard of Practice.

3.9.6. Examiners are required to collect a sufficient number of charts so as to acquire sufficient data for proper evaluation, in conformance with a validated testing technique.

ASTM Designation E2062-10

Standard Guide for PDD Examination Standards of Practice.

7.4. Examiners shall collect a sufficient amount of physiological data suitable for evaluation in compliance with the format utilized.

Nonetheless, two recent quality-control reviews of a polygraph examination conducted in a criminal case that is being pursued in a court of law have criticized the original polygraphist for rendering a decision of deception on the basis of only two polygraph charts, even though the technique used required only two charts. This is an example of polygraphists in positions of authority imposing the requirements of their technique of preference on other techniques without supporting scientific evidence. It became apparent that a review and analysis of field cases needed to be conducted to resolve the issue which generated this study.

Method & results

The raw data from three published field studies on the Quadri-Track Zone Comparison Technique,¹ a uni-faceted single-issue test that offers two threats to the examinee – the relevant questions and the control questions – was reviewed and analyzed.

The first field study by Matte & Reuss (1989a, b), comprised a total of 122 confirmed cases. The base rate of deception was 64 out of 122 (52%). Of the 64 confirmed deceptive subjects, the polygraphists' decisions were DI in 62 (97%), NDI none, and Inconclusive in 2 (3%). Of the 58 confirmed nondeceptive subjects, the polygraphists' decisions were DI none, NDI 53 (91%), and Inconclusive in 5 (9%). The polygraphists were correct in 115 of 122 cases (94%), wrong in none of the cases, with inconclusive results in 7 cases (6%).

The total number of charts collected in the aforementioned 122 cases was 319 charts, which, when divided by the number of cases (122), equals an average of 2.6 charts per case. Further analysis revealed that 66 cases (54%) collected only two charts.

The second field study by Mangan, Armitage, Adams (2008) comprised a total of 140 confirmed cases. The base rate of deception was 91 out of 140 (65%). Of the 91 confirmed deceptive subjects, the polygraphists' decisions were DI in 89 (63.6%), NDI none, and Inconclusive in 2 cases (1.4%). Of the 49 confirmed nondeceptive subjects, the polygraphists' decisions were DI none, NDI 49 (35%), and no inconclusives. The polygraphists were correct in 138 of 140 cases (98.6%), inconclusive results in 2 cases (1.4%), with no errors.

The total number of charts collected in the aforementioned 140 cases was 306 charts, which, when divided by the number of cases (140), equals an average of 2.1 charts per case. Further analysis revealed that 133 cases (80.7%) collected only two charts.

The third field study by Shurany, Stein, Brand (2009) comprised a total of 57 confirmed cases. The base rate of deception was 28 out of 57 (49.1%). Of the

¹ A detailed explanation of the Quadri-Track ZCT is published in *European Polygraph*, Volume 1, 2009, Number 1(7); *Physiology & Behavior*, 95, 2008, 17-23, and *Polygraph*, Volume 18, 1989, Number 4.

28 confirmed deceptive subjects, the polygraphists' decisions were DI in 26 (92.9%), NDI 2 (7.1%), and no inconclusives. Of the 29 confirmed non deceptive subjects, the polygraphists' decisions were DI none, NDI 29 (100%), and no inconclusives. The polygraphists were correct in 55 of 57 cases (96.5%), no inconclusives, and 2 (3.5%) false negative error.

The total number of charts collected in the aforesaid 57 cases was 175 charts, which, when divided by the number of cases (57), equals an average of 3.0 charts per case. Further analysis revealed that 11 cases (19.2%) collected only two charts. The two false negative cases were each based on three charts. There were no errors made on any of the cases based on two charts.

Discussion

The above data from the three field studies clearly supports the use of the two-chart minimum standard in the decision-making process of truth and deception. This is especially important to practicing polygraphists who are usually confronted with more than one target issue to resolve through polygraph testing. The administration of a psychophysiological veracity (PV) examination involves the mandatory conduct of a stimulation test, plus the collection of at least two polygraph charts on the first target issue, which could easily require an additional chart if the scores are marginal on the first two charts. If the polygraphist is faced with two or three target issues, each requiring a minimum of two charts, he is then faced with the prospect of collecting a minimum of seven charts (including the Stim test). Should the polygraphist be required to collect a minimum of three charts per target issue (test), he would then have to collect a minimum of ten charts. When we consider the physical and emotional fatigue factor, it can readily be appreciated that a three-chart minimum requirement would most likely cause inconclusive results in the third and possibly in the second target issue, depending on the physical-emotional endurance of the examinee.

The review of the aforementioned field studies revealed that in the Matte & Reuss (1989a,b) study, the average score per chart for the Truthful was +6 and for the Deceptive was -9, which would tally to +12 and -18 for two charts. In the Mangan et al. (2008) study, the average score per chart for the Truthful was + 7.1 and for the Deceptive was -10.0, which would tally to +14.2 and -20.0 for two charts. In the Shurany et al. (2009) study, the aver-

age score per chart for the Truthful was +5.39 and for the Deceptive was -6.08, which would tally to +10.78 and - 12.16 for two charts. These scores for two charts are well above the minimum score threshold of the Quadri-Track Zone Comparison Technique at +6NDI and -10 DI for two charts. It is therefore not surprising that no errors were made on those cases whose decision of truth or deception were based on two charts with scores that far exceeded the minimum score threshold, especially in the Matte & Reuss and the Mangan et al. studies, where the acquired scores doubled the required threshold scores. However, when the polygraphist acquires marginal scores from the first two relevant charts, he is obligated to continue his collection of additional charts until satisfactory scores have been obtained. When the polygraphist is confronted with only one target issue, he has the freedom and luxury to collect additional charts beyond the minimum two-chart requirement.

As a matter of practice, this author usually conducts and collects a third chart when confronted with only one target issue to augment reliability and further solidify the results in case of adversarial court proceedings. However, when confronted with more than one target issue for testing and the scores for the first two charts significantly exceed the score threshold as indicated in the Matte-Reuss and Mangan et al. studies, that test is concluded with two charts, and the next target issue is tested in accordance with Backster's Examination Reliability Rating Table (ERRT); see Figure 1 (Matte, 1996). The ERRT is used during the case preparation to determine which issue has the combined greatest Adequacy of Case Information, Case Intensity, and Distinctness of Issue, using a 5-point scale. If anyone of those three requirements fails to attain a score of 3 or higher (preferably higher), the case file is returned to the requester for additional information or else aborted. The target issue with the greatest overall score is administered as Test A, followed by the next target issue with the second highest score administered as Test B, and so on. This process minimizes inconclusive results and assures that tests are conducted only in those cases where there is ample and accurate case information from which to formulate the test questions, and that the issue being covered is sufficiently distinct and intense to elicit the examinee's psychological set without offering an opportunity for rationalization.

Figure 1.

Target Information "Adequacy" Rating						
Inadequate	1	2	3	4	5	Adequate
Score	=7	=14	=21	=28	=35	:

Target "Intensity" Rating						
Trivial	1	2	3	4	5	Serious
Score	=7	=14	=21	=28	=35	:

"Distinctness of Issue" Rating						
Cloudy	1	2	3	4	5	Clear
Score	=6	=12	=18	=24	=30	:

EXAMINATION RELIABILITY RATING TOTAL: _____

The highest reliability estimate would be
a score of 100, lowest would be 20.

This author believes that the current standard of practice regarding the collection of polygraph charts mandated by the American Society for Testing and Materials and the American Polygraph Association adequately addresses that issue which relies on conformance with validated polygraph techniques.

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SLOVENIA

Complementary Use of Profiling and Polygraph Method in Slovenia During the Period 1997-2004

Key Words: polygraph and criminal profiling, criminal profiling, polygraph examination in Slovenia

1. Information deficit in the investigation of violent crimes

Violent crime investigations are often faced with the need to bridge a shortage of information. This can, to an extent, be neutralized by the use of the profiling of unknown perpetrators of criminal offences and by polygraph examination (the credibility assessment) (Selič, Juratovec, 2004).

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Psychological research into individual personal characteristics and structural elements (character, emotions, temperament, adaptation potentials, coping mechanisms, personal maturity etc.), conducted by psycho-diagnostic tools with appropriate measurement features, has confirmed that, in general, perpetrators of criminal offences do not differ from control groups composed of “ordinary” citizens (Selič, 2001). It is therefore important that psychological factors, particularly innate potentials, which are activated in certain conditions of socialization or in specific triggering situations, should be taken into consideration.

Many scientific disciplines and no small number of experts strive to explain violence and to predict the dimensions and dynamics of this interpersonal and also global phenomenon. Unlike experts, the investigators of severe criminal offences are more eager to search for concrete perpetrators than to detect latent socio-dynamic roots. Identifying a perpetrator can be accelerated using the findings from etiologically oriented research, in so far as they relate to concrete situations in their consideration and explanation, and if they complete concrete findings with the conclusions of profound analysis (Selič, 2001). Violent crime investigations are complicated and relatively demanding cognitive processes, which start with the perception of a criminal offence and continue with the collection, protection and verification of personal and material evidence (Selič, 2002). This can be understood as a process of recognizing the truth (the gnoseological aspect) and as a formally arranged phase of collecting and finding the facts. These facts are either accepted by the court and confirmed and taken into account, or rejected as unimportant (the legal aspect).

Of those methods originally related to psychology and used in the field of criminal investigation in its broadest sense, forensic psychophysiology is undoubtedly of the utmost importance (Selič, 2001). There are several reasons for this – research activity is diversified, and the use and applicability of the polygraph method is increasing. Its applicability depends on the development, verification and introduction of new test formats which follow the needs of users, not only in the field of criminal investigation but also in the protection of constitutional regulation, in the public sphere and in the economy. Profiling is not a psychological but a criminal investigation method, although psychological knowledge and conclusions are very often the most important where profiling is concerned. It is based on an elaborate analysis of the occurrences at the scene, investigation of the life and habits of the victim, the manner of the perpetrators’ actions, and the conclusions of forensic experts (Vorpägel, 1998).

Crime investigators are more or less successful at dealing with a shortage of information when trying to investigate criminal offences. The version construction should lead the investigators from possibility to certainty. In reconstruction, verification, and confirmation of versions, the profiling and polygraph method can be used (Selič, Juratovec, 2004).

2. Criminal profiling

The term “profiling”, or “criminal profiling”, was introduced during the last century in expert discussion and practice (Turvey, 1999; Douglas in Olshaker, 1996, 1999), and still denotes the intuitive process of reaching conclusions by investigators (Turco, 1990). Douglas and Burgess (1986) thought the process was similar to psychiatric diagnostics. Turco (1990) emphasized the psychodynamic and analytical groundwork of profile construction; however, forming databases at least appeared to switch attention from the psychodynamic and/or behavioural logic of creating a profile and understanding the dynamics of certain criminal acts to the search for the “typologically appropriate” perpetrators of these offences (Selič, 2001). The possibility of such conclusions seemed much more reliable and safe because it was possible to reach conclusions with a high level of certainty, on the basis of the defined variables of many perpetrators of the same criminal offence; however, this also brought with it some limitations, and it did not abolish the idiosyncrasies of the clinical approach. Experience in the United States has shown that profiling not only has been useful for detecting sexually motivated serial killers, but could also serve as a tool to define the personal characteristics of an unknown perpetrator of a criminal offence involving violence (Turvey, 1999; James, 1991). The quality and use of the profile is limited or defined by the quality of the crime scene investigation, and by those identified features which enable the profiler to reconstruct the perpetrator’s actions at the place where the criminal act occurred.

Slovenian profiling practice (Selič, 1996) was based on case studies, since databases and “homogenous” examples of criminal offence characteristics were not available or established. The concept was the same as the deductive model, which was introduced by Turvey (1999). In individual cases the forensic psycho(physio)logist, as a member of the investigation team, participated in the inquiry by creating the unknown perpetrator’s profile and possible modifications along with the known facts as they were uncovered. The forensic psycho(physio)logist participated in all phases of investigation (Selič, Jura-

tovec, 2004). Studies have shown (Horvath and Meesig, 1996) that one of the possible mistakes of crime investigators was their misinterpretation of discovered traces, and a certain type of (potential) material evidence could be overlooked where there was a lack of sufficient time, knowledge and/or motivation. This was an important argument for including a profiler in the team immediately after the notification of a criminal act.

3. The use of the polygraph method

Forensic psychophysiology is concerned with the use of psychophysical methods to detect deception in the framework of criminal law. Yankee (1990) stressed that an adequately trained polygraph examiner is not simply a technician or routine operator for a polygraph instrument, since the polygraph examination is one of the most demanding and complex psychophysical examinations. The author described psychophysiology as a science which examines the subject's physiological responses to psychological stimuli without expecting any specific emotions that could be recognized on the basis of physiological parameters. The process starts with a pre-test interview and continues with the administration of the polygraph tests, chart analysis, and a post-test interview, finishing with the interpretation and evaluation of the polygraph charts. An evaluation of Slovenian polygraph examination practice during the period 1997-2004 was based on the analysis of the whole procedure, the verbal and non-verbal behaviour of the client, and chart evaluation (Selič, Juratovec, 2004).

The forensic psychophysiological (the polygraph examiner) should disclose truth and true facts, not only misleading facts (Matte, 1996:4). One of the most important conditions for a higher level of quality of polygraph examiners' work is the introduction of new test formats. In Slovenia, during the aforementioned period, we seriously considered combining the clinical and the numerical approach. The use of verified and reliable tests was more important than a change of orientation from clinical/global to numerical. Any modifications or mixing of different types of concepts can cause huge problems and make interpretation more difficult, which was discovered by Horvath (1991), who verified the validity of Backster's control questions in Reid's CQT format. The most important test formats are also based on consistent theoretical concepts and explanations which have been verified many times. The numerical evaluation of the subject's reactions does not come from the subjective impressions of the examiner, but follows clear and defined measures and rules, for example Backster's laws (Backster, 1994; Selič

2009). All users, no matter from which polygraph “school” they come, have for a long time agreed that the correct formulation of questions, within the prescribed test structure, is of the utmost importance for the results of the examination (Thompson, 1998:2). The significance of question formulation was also clearly demonstrated when introducing the computer polygraphs and algorithms used for the evaluation of polygraph charts. Apart from the Concealed Information Test (CIT), in Slovenia the most commonly used test formats were the Zone Comparison Test (ZCT) and the Modified General Question Test (MGQT) (Selič, 2002).

A valid and reliable test is a necessary but not a sufficient condition for a reliable and technical-based result in a polygraph examination. The outcome mostly depends on the level of expert knowledge of the polygraph examiner. However, it must be noted that a simple translation of any verified test format without that knowledge and the consideration of the original concepts and theoretical grounds can lead to erroneous evaluations (Selič, 2009).

The Slovenian practice of psychophysiological veracity examination using a polygraph was successful in the past mainly due to the use of Peak of Tension Tests (POT). This test requires the questions to be equally (un)important and/or (un)threatening for an uninvolved person (Selič, 2002). Some authors called such a test the Concealed Information Test (CIT). It consists of a series of questions, of which one is relevant (related to true information in the criminal offence) and the others are neutral, but, for an uninvolved person, equally likely. A series of up to ten concealed information tests is administered, each set consisting of five questions with the position of the relevant question changing between the second, third and fourth place in the sequence. In Slovenia the use of Control Question Tests (CQT) used to be limited, since the CQT included only one aspect of the criminal offence (usually this is a direct question about the subject’s involvement), whereas a series of CITs highlights the criminal act from different angles and includes particulars which are known only to the perpetrator (Selič, 2009). In this regard special consideration was always paid to the likelihood that the perpetrator had noticed these particulars and remembered them. For possible recidivists and/or serial offenders the tests were composed exclusively for the most recent crime, with the expectation that this event would be most likely to be recalled (Selič, Juratovec, 2004).

North American and Israeli forensic psychophysiology uses the term “guilty knowledge” (of the criminal offence) rather than “concealed information”. Guilty Knowledge Tests (GKT) have an important advantage over Control

Question Tests in the field of psychophysiological diagnostics (Selič, 2002). The critical (relevant) information is related to a criminal offence, and if it is not compromised (in the media or during the investigation process), the format protects the uninvolved person because the questions are balanced, equally possible and logical. The test construction is standardized, and the evaluation of the psychophysiological responses is quantified, therefore discussion of the evidence value of the GKT results seems to be pointless. GKT is based on appropriate psychophysiological theoretical issues and numerous investigative confirmations (Selič, 2009).

The relatively rare use of GKT in criminal offence investigations in the USA is probably due to the frequent compromise of the relevant data in the media. An uninvolved person who read about the crime in a newspaper could actually be evaluated as false positive after a series of GKTs. Israeli authors therefore suggest a solution at two levels – the first level is fewer GKTs (less relevant, only the facts that the perpetrator would know), and at the same time more repetitions, which enable efficient psychophysiological diagnostics; and the second level is a different manner of police work, which reduces the chances of critical information being compromised (Selič, Juratovec, 2004). The first recommendation concerns the process of test implementation itself, but the second exceeds the power and possibilities of polygraph examiners' decision-making – not only in Israel or the USA but also elsewhere in the world.

CIT and GKT are in concept peak-of-tension tests; the difference is just in the name, and not in the construction and manner of operation. In Slovenia peak-of-tension tests were usually called an indirect method. When the crime investigators inform the polygraph examiner and allow him a polygraph inspection of the crime scene prior to the dynamic phase of the criminal investigation, they have already created the necessary conditions for the later use of peak-of-tension tests. If they take advice on which critical information is important for later polygraph examination, the possibility of the use of POT tests is even greater and the disclosing of information to the public limited (Selič, 2009).

4. Combining profiling and polygraph method administration

The process of building a profile of the perpetrator for a certain criminal offence is similar to the process of psychodiagnostics and clinical psychology treatment planning (Selič, 1996).

It is necessary to evaluate the collected data properly, reconstruct the dynamics which led to the situation, and decide on a hypothesis. This is followed by the construction of the profile, the verification of its suitability, and the collection of feedback information. This is a typical problem-solving situation and the basic premise of the described creative synthesis process is in intrapsychic structure (way of thinking, sentiments etc.) directing human action. These are the grounds for the whole profile construction – from the analysis and classification of the collected information (including legally relevant facts) and the reconstruction of the event, to the establishment of the profile. The postulate on the psychological link between personal characteristics (structure) and behavioural manifestations is only true when the behaviour, as a result of an interaction between a personality and the situational circumstances, is understood and explained (Selič, 2001). Many times life situations which could have a huge impact on a person's behaviour are a result of the person's actions; therefore, it is logical to define the interaction between a situation (which, for example, led to a criminal offence) and the personal characteristics of an individual (the perpetrator) by psychological phenomena as wishes, expectations, motives and interests, which all have an impact on the profile construction (Selič, 1996).

4.1. Overcoming information gaps

A necessary basis for the profiling and/or polygraph examination is an adequate amount of information collected during inspection of the crime scene. In Slovenia, during the period 1997-2004, the use of both investigation support methods began with the inspection of the crime scene and continued in successive phases. The collection of information was extensive. For a profile construction several groups of data or materials were provided – for example, photographs and/or video tapes of the crime scene; information about the neighbourhood (placing the crime scene in a socio-cultural and ethical framework); and an integral and exhaustive report on the inspection and notes on all the collected reports (it is important to document conversation immediately, because later recordings are imperfect due to poorer recall, the reorganization and classification of information, and often because of selection and evaluation) (Selič, 1996). All of the above is also important in the polygraph examination. Information about possible real suspects is counterproductive in the profiling and the preparatory phase of the polygraph examination, since they can unconsciously affect attention and decision-making (Selič, Juratovec, 2004).

According to some sources (Turvey, 1999:257), it is possible to classify psychophysiological veracity examination using a polygraph as a profiling method. Geberth (1993:474) believes that the timely inclusion of a technically competent polygraph examiner and the use of the polygraph method can lead the investigation in the right direction, and profiling can show the characteristics of the real perpetrator (Geberth, 1993:492). In the investigation of violent crimes the methods complement each other. They are also both about the evaluation of the behavioural and personal characteristics (of the perpetrator and of the victim), and the use of these evaluations in the context of criminological and criminalist knowledge. Therefore, in Slovenia it was reasonable to combine profiling and the polygraph method in the investigation and prevention of criminal acts, because overlapping of the phases in establishing a profile and polygraph examination occurred (Selič, Juratovec, 2004). The latter leaned on the use of tests for the recognition of circumstances at the crime scene (CIT or GKT). The preparation of the series of CITs (Concealed Information Test) overlapped the establishment of a profile of the unknown perpetrator and in the test all the defined circumstances had to be considered.

Forensic psychophysiology, in combination with profiling, was useful as a method either of eliminating uninvolved people (from the circle of suspects) or of defining those people most likely to be involved in the criminal act. It also served as a means of evaluation of the established profile. In the ideal case, this meant that, on the basis of an established profile of the unknown perpetrator, a group of suspects was defined, the veracity of the statements with a polygraph examination was verified, and the person confessed to the crime in an interview after the polygraph tests had been administered. The confession was later compared to the reconstruction of the event as it was drafted in the profiling process, while the characteristics of the actual suspect were compared to those in the profile (Selič, Juratovec, 2004).

The definition of a motive or motives provides the creative grounds for completing profiling and the psychophysiological veracity examination using a polygraph. In the profiling process we analyze the perpetrator's behaviour in the context of a trace at the crime scene and the characteristics of the victim, and together these compose and represent the issue for defining the perpetrator's motivation (Selič, 1996). In this way a profile is a (psycho)logical component, related exclusively to an investigated crime. A motive for a criminal offence is a factor which can be additionally highlighted or confirmed by the polygraph method. If it is wrongly defined it is possible to modify a profile on the basis of the polygraph test results (Selič, Juratovec, 2004).

The logical combination of psychophysiological veracity examination using a polygraph and (criminal) profiling could also represent an important challenge for researchers. The idea of the complementarities of profiling and polygraphy (Selič, 2001) necessarily raises the issue of the professional competencies of examiners/profilers/investigators. Profiling is not a synonym for psychologising. It requires an extensive knowledge of crime investigation tactics, technique and methodology, an understanding of forensic medicine, and additional and special psychological knowledge. Investigative support (profiling and polygraph examination) in Slovenia efficiently acted as an augmentation to all criminal knowledge with additional psycho(physio)logical knowledge during the period 1997-2004. However, its cognitive and guidance role depended on each criminal investigation. The results of the polygraph examination were objectified through a numerical evaluation of polygraph charts, and the consistent inclusion of a second (expert) opinion; however, the profiling process was evaluated at every moment by the verification of the authenticity of the suspect's statements, within the process of polygraph examination. Any closing of the self-confirmation circle of investigative support would have disabled creative dialogue and cooperation with the criminal investigators, since the investigative support and criminal investigators operated as reflexion and correction to each other (Selič and Juratvec, 2008).

4.2. Case presentation: combining profiling and the polygraph method

CASE *

A middle-aged man was murdered in his room between Saturday night and Sunday morning. The unknown perpetrator(s) used firearms. The medical examiner concluded that two injuries led to death (a shot and a knife wound). The traces at the site showed that the perpetrator and the victim fought and struggled, and the perpetrator(s) won only after they had used firearms. The perpetrator left bloody footprints.

The post-mortem examiner identified two types of injuries on the body – cuts and stabs and bullet wounds. The stabs came from different directions and the cuts were identified as defence injuries. In addition there were some skin abrasions and suffusions.

* This description of the case is based on the data presented to the public via the media.

After both the polygraph inspection of the crime scene and the analysis of the initial collected reports were completed, two activities were performed simultaneously: preparation for the use of the polygraph method, and profile construction. The crime investigation followed versions which did not take into account some indices, so elements of the profile were verified only after a long period of time.

Elements of the profile

After the analysis of the collected information was complete, the profiles of a few criminals previously convicted and imprisoned were constructed. We introduce just one, named the “Slaughterer”:

- a woman or a man, rather short (up to 170 cm)
- body weight does not exceed 65-70 kg
- socio-cultural origins in an environment which gives priority to cold weapons
- possible affiliation to an ethnic minority/special ethnic group (for example, Romany)
- person is unskilled in martial arts
- person is not skilled in handling cold weapons
- person without own (secondary) family, either not intimately attached or only weakly attached
- does not belong to an organized criminal gang
- has average physical strength
- does not know the victim personally
- in a pair relationship is submissive and can be guided
- intellectually inferior
- incapable of planning and anticipating events
- incapable of solving problematic situation efficiently
- attracted to “dirty work”
- expects material benefit from the act
- prone to panic responses
- has poor control over impulses
- great possibility of the person’s decompensation
- traumatised due to the event – possible sleep disturbances, alcohol abuse and/or drugs as a consequence.

Elements used for the Concealed Information Tests (CIT):

The circumstances known to the “Slaughterer” which were used in the series of CIT and unknown to the public:

- shoes were removed
- access to the room
- the victim was asleep on the bed – the location of the bed in the room
- the first stab failed
- the victim resisted
- pushing out of the room
- help of the co-perpetrator with firearms
- the victim falls due to a shot
- stabbing of the lying victim
- place/position of last (deadly) injury.

After a certain period of time, the attention of the criminal investigators was drawn to a young man and his acquaintance. Both agreed to voluntarily participate in the polygraph examination. With the first, the polygraph method was initially used for another criminal offence to which the suspect had also confessed, and then after a pause and consultation with his lawyer he also agreed to take a test related to the murder.

The suspect knew and cleared the circumstances which were unknown to the public; he could not have known them unless he participated in the criminal act. It was possible to use the content of his confession to construct additional tests to recognize the circumstances for other suspects, because his confession substantially filled the lack of information related to the preparations for the act. In the interview after the administration of the polygraph tests he said where he and his collaborator had left the car. The collaborator had told him where to go. He had taken his shoes off because he did not want them to squeak. He had entered the room and stabbed the person sleeping on the bed. He had been surprised because the victim jumped up – the man was big and strong, he screamed, defended himself and pushed the suspect out of the room. The suspect stabbed him several times in the meantime, but without visible or fatal consequences. Everything was bloody and horrible, totally different from how he had imagined it beforehand. Only the shot from an accomplice subdued the victim. The man fell to the floor and the suspect stepped back from him, upset and shocked. In anger he stabbed the man lying on the floor once more.

During the exhaustive investigation it was possible to verify the elements of the profile and the relationship between the perpetrators. The data collected confirmed the profile of the “Slaughterer” and significantly contributed to the further investigation.

Technically the appropriate use of the polygraph method also enabled the additional inflow of information, and subsequently the modification of an existing profile of an unknown perpetrator of a violent criminal offence. In practice, the psychophysiological veracity examination using a polygraph justified and, on a number of few occasions, exceeded the expectations of the crime investigation, although only when considering professional rules and criteria; therefore, it is easy to refute the concerns of all those who doubt the usefulness of the method (Selič and Juratovec, 2004). The use of the polygraph method in the aforementioned case contributed to the investigation of several criminal offences and the identification of several suspects. In the described case the successful use of the polygraph method led to a thorough preparation and exact knowledge of the event. The reconstruction was based on the inclusion of all elements expressed by the forensic experts, and these elements were used as an issue for drawing up the CIT on the recognition of the circumstances of the crime. The reconstruction was created only after a profound discussion with the post-mortem examiner. In this regard the profiling process and/or preparation for the use of the polygraph method should not be limited only to the inspection of documented material. The suspect confessed to the crime after he was indisputably faced with his own psychophysiological responses. The interview after administration of the polygraph tests was adapted to the characteristics of the perpetrator from the "Slaughterer" profile. The event strongly exceeded the estimates in the profile as far as all dimensions are concerned, especially by the intensity of emotions, but the profile was shown to be correct according to the perpetrator's emotions during and after the act, even though the experienced reality cannot be compared to the written one.

5. Conclusion

In Slovenia, after 2004 the Criminal Investigation Support Unit was terminated, and no data has been available on polygraph examination practice in the police. In the private field, the polygraph method is used for different purposes, for example human resources management, fraud detection and insurance fraud investigations.

Any potential systematic research on the complementarities of profiling and polygraph examination would probably strike against the question of whether the distinction between the two methods (polygraph method and profil-

ing) according to the necessary information input, human resources and the principles of functionality, methodology, professionalism and specialization, was logical at all, and also of which method (if used in isolation) was actually superior. The answers at the practical and the academic level are not necessarily the same.

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Alibi Check by Polygraph Examination

Key Words: alibi, polygraph examination, Concealed Information Test (CIT), Event Knowledge Test (EKT)

When we provided the first conception of the Event knowledge test (EKT) (Saldžiūnas & Kovalenko, 2008a,b,c). it was not yet systematized. In later works, we added (Saldžiūnas & Kovalenko, 2012) that one of the main features of the difference between the EKT and CIT (Concealed Information Test) was that the questions-answers for tests were formed not according to the circumstances known about the criminal incident, but according to the versions. Criminologists (investigators) investigating a crime bring at least

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one working version of the crime. When a suspect is questioned, he/she usually provides his/her own version, which is totally or partially different from the versions of the investigators. Sometimes, in the course of investigation, the suspect changes his/her original version. We had many conversations with the polygraph examiners from Belarus, Latvia, Poland and Russia and realized that to date our interpretation of the use of versions for the EKT questions-answers was not sufficiently clear and comprehensible to others. In this article we will try to explain, what it means: *to make the EKT questions-answers according to the versions*.

When a crime is committed, the investigators carry out all necessary procedural steps. Sometimes, there are a lot of first versions of the crime. In the course of investigation a part of the versions is eliminated, and sometimes there appear some new versions. Table 1 provides a general scheme of the question forming according to the versions. This scheme can be applied to most crimes. For the crimes to which this scheme is not suitable, a specific scheme can be developed under the similar principle.

Table 1. Question forming according to versions.

Questions	Version of investigators	Versions of examinee
1. How did you learn about the crime?	The person under examination is a participant of the crime, thus he/she is aware about the circumstances of the crime.	a. the police officers told, when detained b. learned from the procedural documentation c. learned from other participants of the procedure d. learned from mass media e. other sources
2. In what place was the crime committed?	Place A	a. I do not know b. versions listed in 1a-1e
3. How many people were in the place of crime? (or – How many persons committed the crime?)	n number of persons	a. I do not know b. versions listed in 1a-1e
4. Where was the examinee when the crime was committed?	Place A	a. place C b. I do not know c. place A

5.	Who performed one or another action of the criminal incident?	suspect N	a. I do not know b. Person M
6.	How was the crime committed (this question can be divided into several more detailed questions)?	a. it is known from the conclusions of court experts or specialists; b. it is known from the evidences of other participants of the procedure; c. it is not known, there may be only assumptions or versions	a. I do not know b. versions listed in 1a-1e
7.	Where are the evidences hidden?	It is not known, there may be only assumptions or versions	a. I do not know b. versions listed in 1a-1e

We should remind that in the EKT tests, for each question no less than five options of answers are given. We have already provided a partial analysis how the options of answers can be construed to the questions 5 and 6 (Saldžiūnas & Kovalenko, 2009). Then, we called these ways of the answer construction as the tactics of EKT. We shall probably return to this subject and investigate it further in our future articles. The scope of one article does not allow making a thorough review of all the methods of construction of the question-answer versions provided in the Table 1. In this article, we shall limit ourselves to the examination of how, in our opinion, the versions of answers to the question N4 need to be construed – *Where was examinee when the crime was committed?* In criminology and criminalistics, it is known as an alibi check.

Polish polygraph specialists (Lewandowski & Lewandowski, 2005; 2008; 2009) have already discussed this subject. After examining the examples provided in these articles, we have gained the opinion that the other findings can be done as well from the charts provided there. (Saldžiūnas & Kovalenko, 2011).

Where was the examinee when the crime was committed?

What may be the answers to this question according to the versions of the investigators and the person under examination? Of course, if the investigators believe that this citizen must be examined by a polygraph, then they have a suspicion or reconnaissance information that the examinee could have been at the crime scene A when the crime was committed. In this article, we will not amplify on the role which could be performed by the examinee in this

crime, as we have already written about it before (Kovalenka & Saldžiūnas, 2011).

The simplest version of the person under examination can be 'c' – the examinee was in the place A at the moment of the crime, but he/she asserts that he/she has not committed the crime. In such a case, there is no reason to include question 4 in the EKT.

Another version of the examinee may be 'a' – the examinee was not in place A, but was in place B when the crime was committed. In our opinion, it is the most appropriate situation for the polygraph examination.

We shall start from how this test can seem in the CIT version (Konieczny, 2009; Krapohl, McCloughan & Senter, 2006; Nakayama, 2002; Osugi, 2011). Table 2 shows a generalized example of the CIT.

Table 2. The CIT report.

5. Where were you, when the crime was committed?			
1.	Were you at the place W?	NO	
2.	Were you at the place T?	NO	
3.	Were you at the place V?	NO	
4.	Were you at the place A?	NO	Reaction responses
5.	Were you at the place C?	NO	
6.	Were you at the place D?	NO	

Column 3 of the table 2 records the answers of the examinee, who denies his presence at the crime scene. The column 4 marks the reactions of responses in the polygraph chart recorded after each answer.

Possible results of the CIT examination:

1. No one sufficiently clear reaction was recorded after any of the items. It can be assumed that the examinee was not in the place A at the moment of the crime.
2. A reaction was recorded after the item N4 – *Were you at the place A?* (Table 2) It can be assumed that:
 - The examinee was in the place A during the crime;
 - The examinee has been in the place A formerly, but for some reason he does not want to admit it to the examiner (this is quite unlikely – we have encountered no such case in our practical investigations).

- The examinee understands that he/she is a suspect. He/she knows that the crime is committed in the place A. Thus, he/she is afraid of consequences after the polygraph examination. These reasons have been listed by P. Ekman (1992).

We believe that, when the reaction is recorded after the item N4 under the CIT methodology, it is basically impossible to take an objective decision. We fully agree that more additional questions are required to make the decision regarding participation of the examinee in the crime (Saldžiūnas & Kovalenko, 2008b). On the other hand, the question arises whether it is appropriate to include such the low informative question into the CIT questionnaire. Firstly, this question does not help the examiner to deal with the problem; secondly, a lawyer of the examinee can use the weakness of this question during the court proceedings in support of the insecurity of the CIT method.

Since 2004, we have worked with the EKT methodology (Kovalenka & Saldžiūnas, 2011). We have transformed that weakness of the CIT in to one of the advantages of the EKT methodology. We recall that the EKT questions and answers are construed not according to the established circumstances of a criminal incident as in the CIT, but according to the versions of an examiner and an examinee (Table 1). Under the EKT methodology, the question N5 with its versions of answers can be construed as shown in the Table 3.

Table 3. The EKT report (1)

5. Where were you, when the crime was committed?			
0.	You were at the place W	NO	
1.	You were at the place T	NO	
2.	You were at the place V	NO	
3.	You were at the place B	YES	Reaction responses
4.	You were at the place C	NO	
5.	You were at the place A	NO	Reaction responses
6.	You were in some other place	NO	
7.	You really remember where you were.	YES	Reaction responses

According to the EKT methodology, the potential versions of answers rather than the alternative items are given after the question. During the examination, the examinee, upon hearing each version of answer read by the examiner, confirms or denies it (the second column of the Table 3). In the EKT

methodology, it is impossible to do a silent examination (when the examinee does not respond), because the assessment of the examinee is very important. Before the polygraph examination, the examiner does not indicate to the examinee how he/she has to respond after all the versions of answers. The examinee chooses the version of answer him/herself.

The question N5 in the EKT methodology (Table 3) differs from the CIT (Table 2) by the following:

- The offered answer N 0 is placed into the first position. It is usually unused for the assessment of reactions. Therefore, it is necessary to choose the least credible place of the crime – W.
- The answer N 3 is added – *You were at the place B*. This is the examinee's version.
- The answer N 6 is added – *You were at another place*. Whereas there can be just an optimal number of the answer versions after the question, thus the answer including all unmentioned places is introduced there.
- The answer N 7 is added – *You really remember, where you were*. This answer can be relatively called a control answer. When such the control version is included among the answers, the examination procedure shortens, because there is no need to repeat the same question (as in the test according to the CIT) 3–5 times as the polygraph specialists usually do in Japan and USA. Such answers as: *a) You have told the truth about the place, in which you were at the moment of the crime; b) You have answered correctly after all of the listed versions* may be included instead of this controlling answer. Theoretically, all these three controlling answers may be included after the question N5. But we believe that it would be not an optimal solution as they would not provide any new information and the examination would become longer.

Possible results of the examination according to the EKT:

- No sufficiently clear reaction was recorded in the polygrams following the answers. Then, it can be assumed that the examinee was sincere and he/she wasn't at the crime scene. Of course, the final conclusions must be done upon the analysis of reactions following the other questions of the EKT.
- Reactions were recorded after the answers N3, 5, 7 (Table 3). Then, it can be assumed that the examinee was not sincere after the answers N3 and N5. Additionally, it is confirmed by the reaction after the answer N7. This reaction can be caused by the examinee's fear that the examiner can detect that he/she was in place A rather than in place B at the moment of the crime.

When the reactions are recorded following the answers N3, 5, 7, it can be assumed that the examinee was in the crime scene A at the moment of the crime.

- In rare cases, other causes of the examinee's reactions can be recorded. Then, in each such case, it is necessary to perform a separate analysis of the reasons that could cause these reactions.

Here, we have described the case, when the examinee has the particular version of where he/she was at the moment of the crime. In the course of the polygraph examination, it is possible to say, that such a case is the most ideal one. Unfortunately, in most cases, the examinee does not provide a clear version of where he/she was at the moment of the crime. This usually happens, when the polygraph examination is done after several years following the crime. In such cases, the examinee states that he/she wasn't in the scene of crime and does not know where he/she was at the moment of the crime. In that case, the alibi check by means of the polygraph examination is more complicated.

There are two categories of such cases:

1. The examinee states that he/she does not know where he/she was at the moment of the crime and he/she also does not know where the crime scene is (says so).
2. The examinee states that he/she does not know where he/she was at the moment of the crime and he/she knows where the crime was committed.

Table 4. The EKT report (2)

5. Where were you, when the crime was committed?			
0.	You were at the place W	I DON'T KNOW	
1.	You were at the place T	I DON'T KNOW	
2.	You were at the place V	I DON'T KNOW	
3.	You were at the place A	I DON'T KNOW	Reaction responses
4.	You were at the place C	I DON'T KNOW	
5.	You were at the place D	I DON'T KNOW	
6.	You were in some other place	I DON'T KNOW	
7.	You really remember where you were.	I DO NOT REMEMBER	Reaction responses

When the examinee does not know (such is his/her statement) the crime scene, the versions of answers to the question N5 of the EKT are shown in the Table 4. In comparison with the version in the Table 3, here an alternative place D is included instead of the particular place B stated by the person under examination.

Possible results of examination according to the EKT:

- None sufficiently clear reaction was recorded in the charts following the answers. Then, it can be assumed that the examinee was sincere, he/she does not know the crime scene and probably wasn't there. Of course, the final conclusions must be done upon the analysis of reactions following the other questions of the EKT.
- Reactions were recorded after the answers N3 and 7 (Table 4). Then, it can be assumed that the examinee was not sincere after the answers N3 and N7. It can be assumed that the examinee may know the crime scene and for some reasons hides it from the examiner. The examination of the other questions can help in establishing whether he/she was at the crime scene A at the moment of the crime.

The situation changes, when the examinee does not remember where he/she was at the moment of the crime, but he/she knows where the crime was committed. We suggest the version of the answers provided in the table 5.

Table 5. The EKT report (3)

5. Where were you, when the crime was committed?			
0.	You were at the place W	I DON'T KNOW	
1.	You were at the place T	I DON'T KNOW	
2.	You were at the place V	I DON'T KNOW	
3.	You were at the place C	I DON'T KNOW	
4.	You were at the place D	I DON'T KNOW	
5.	You were in some other place	MAYBE	Reaction responses
6.	You don't know, where you were	I DON'T KNOW	Reaction responses
7.	All your answers to that question were correct	YES	Reaction responses

It should be noted that (Table 5):

1. The crime scene A is not mentioned. We believe that including the crime scene A among the answers is beside the purpose. There is a high possibility that a reaction will be recorded in the polygraph chart after that answer and the reason for it, as we have already mentioned, would be difficult to determine.
2. Here, the answer N 5 is very important. We are of the opinion that the „innocent” examinee should not feel increased stress after this answer, i.e. he/she should not see any danger in this answer. The „guilty” examinee should identify „another place” with the crime scene A, therefore the reaction due to increased stress may be recorded.
3. There are two answers among the versions of answers, which we may loosely call controls. It should be noted that they are formulated in a passive form. Bradley and Rettinger (2009) has noted about the effectiveness of the usage of active forms. In the active form, the answer N 7 would be formulated as follows: *You lied after some answers when answering*. Using of the passive forms will not cause stress to the „innocent” examinee.

In the field polygraph examinations, only the polygraph charts of „innocent” examinee are usually analysed easily. The polygraph charts of „guilty” examinee are usually full of artefacts; the curves are usually unstable due to the effect of danger expectation (Bradley, Silakowski & Lang, 2008):

- Uneven breathing;
- Labile EDR;
- Constantly changing heart rate;
- Decreased amplitude of plethysmogram.

The field examinations are often done on examinee with a low level of education, sometimes, degraded persons (drug addicts, alcoholics). Therefore, their perception of the answers N 6–7 (Table 5) is more aggravated. For this reason, we have noticed, that their reactions can start a bit later. The EDR may start at the interval from 0 to 10 seconds rather than at the interval from 0 to 5 seconds (Fig. 1).

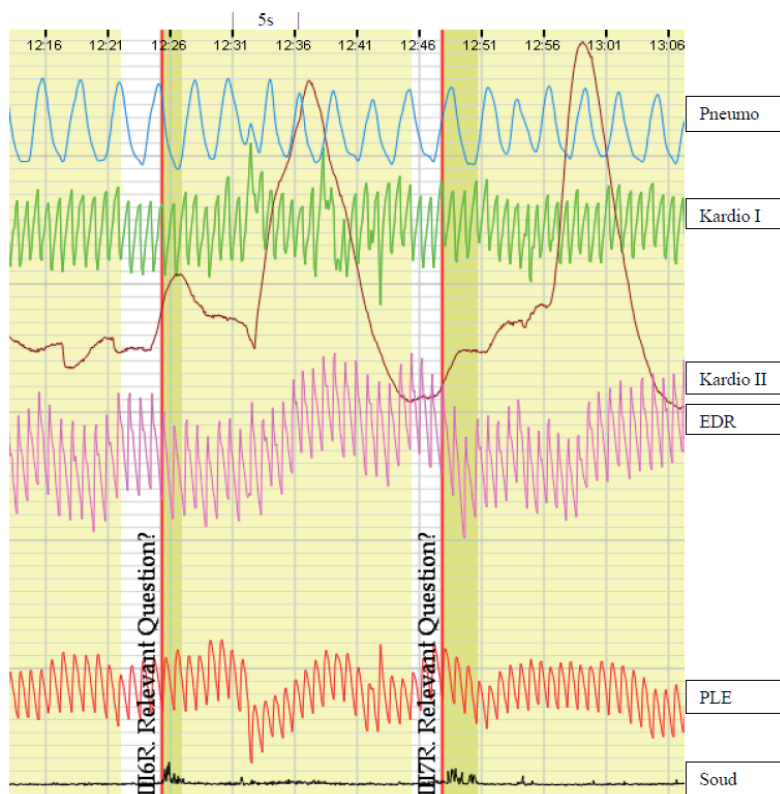


Figure 1. Polygraph chart of the answers N6 and N7

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The European Roots of Instrumental Lie Detection

Key Words: history of lie-detection, Munsterberg, Mosso, Lombroso, lie-detection in Europe

It is generally assumed that polygraphy originated in America. Yet the first attempts at instrumental lie detection were performed in Europe earlier than in America, still in the 19th century.

Positivism sought experimental pursuits for establishing methods of examining spiritual life. Subjects formerly described by poets and considered by philosophers were now to be measured, described in scientific language, and explained in the same language.

The pioneer of empirical – including experimental – methods intended to permit investigation of spiritual life, simultaneously rejecting metaphysics

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and embracing physiology, was the German scientist Wilhelm Wundt (1834–1920).

In 1885, Hugo Munsterberg (1863–1916), who arrived at the University of Leipzig from Danzig (now Gdańsk – a German city at the time), defended his doctoral thesis in philosophy (actually: psychology) under the supervision of Wundt. Two years later, the same scientist was conferred another doctorate, this time in medicine at the University of Heidelberg (D.P. Schulz, S.E. Schulz 2008, p. 241). With two doctorates in hand, and even more importantly, a meticulous grounding in psychology and physiology, Munsterberg began working at Freiburg University, where he established his own laboratory for psychophysical examinations (Schulz & Schulz, 2008). Encouraged by William James (today remembered primarily as a philosopher, as his authorship of the fundamental *Principles of Psychology*, published in 1890, is generally forgotten), Munsterberg moved from Freiburg to the United States, where he headed the laboratory of psychology at Harvard University. In America, he skilfully combined his experience in experimental and applied psychology. The fruit of his labours in combining these two fields of psychology was the fundamental work in investigation psychology, pioneering in all its aspects, namely *On the Witness Stand*. Published originally in 1908, it has many editions, with the last (a reprint) being dated 1978!



Fig. 1. Hugo Munsterberg (1863–1916)

In his work, Munsterberg presented a court trial from the point of view of psychology. He described psychological processes that may influence the course and result of court procedures. Most important among these factors, according to Munsterberg, were false, or simply erroneous, testimonies of the witnesses. He believed that the latter were significantly influenced by suggestion. Most important for our considerations was the chapter entitled “The Traces of Emotion”. Munsterberg rightly remarked that lies must be accompanied by emotions. They can be discerned by observing physiological changes as they are symptomatic for emotions; here he rightly observed that an uttered lie is accompanied by emotions. Among the three physiological correlates of emotions he listed, and whose assessment he believed to be sufficient to decide whether the subject was lying, were: an increase in blood pressure, quickened heartbeat, changes in breathing, and changes in the skin galvanic reflex.

A few years after Munsterberg’s death, the American William Moulton Marston (1893–1947) conducted his first experiments with lie detection based on assessment of changes in blood pressure in his students at the psychological laboratory of Harvard University (Marston 1917).

Marston did not value the diagnostic significance of the GSR and changes in breathing. He did not make full use of the theoretical grounds that Munsterberg left for him, yet in his experiments he went a step further, verifying Munsterberg’s empirical hypothesis. In experimental studies, his method allowed correct indication of approximately 96% cases of lying (Marston 1917).

Marston’s method was modified and used for the first time in actual police practice in Berkeley, California, by John A. Larson in 1921.

Two facts must be realised here. First, as Udo Undeutsch (2007) rightly remarked, forensic sciences owe the claim that a lie is accompanied by emotional changes and the idea of using observation (and registration) of the physiological correlates of emotions (including blood pressure changes, heart rate, changes in GSR, and breathing patterns) to Hugo Munsterberg, a German who went to America. Secondly, the first application of the instrumental method of lie detection did not take place in America until 1921 (Larson 1989). This is how the practice of using a polygraph for investigation that continues to this day began.

In Europe, the first use of instrument-enabled measuring of physiological correlates of emotions in lie detection in a criminal case recorded in literature took place many years earlier. There, attempts at lie detection by observation (and registration) of physiological correlates of emotions were preceded by studies on the physiological mechanism of emotions.

The most notable studies we can mention were those conducted by the Italian physiologist Angelo Mosso (1846–1910).



Fig. 2. Angelo Mosso (1846–1910)

Studying patients with cranium bone losses resulting from neurosurgical procedures, Mosso discovered pulsations of the human cortex. He believed the pulsations to be linked to mental activity and blood flow surges in various parts of the brain. He also conducted experimental studies investigating the flows of blood in the human organism during sleep, mental activity, and experiencing of emotions. For that purpose, he constructed special scales, sometimes also in today's literature referred to as "Mosso scales" (see: Fig. 3). It corroborated his hypothesis that "even with the weakest emotion, blood flows into the head" (Mosso 1891, p. 106). Moreover, Mosso observed another phenomenon, a change in the heart rate, to accompany blood flows.

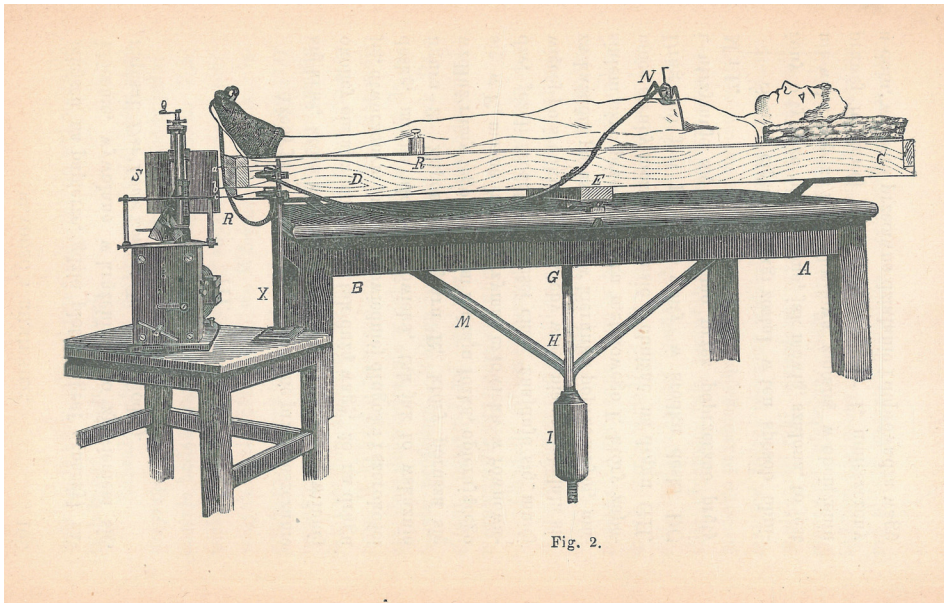


Fig. 3. Mosso's scale (according: A. Mosso, *Strach*, Polish edition, Warszawa 1891, 104)

This is how Mosso explained the phenomena: “the more lively the life processes, the greater the speed of blood circulation in the body. Yet for the movement of blood to become faster, necessary is constriction of vessels. Our blood circulation works much like a river: the current becomes quicker where the riverbed is narrower. When a danger approaches, when we feel anxiety or emotion, the organism must provide plenty of resources. For that reason, if it comes to such a state, vessels automatically narrow, due to which the movement of blood in nerve centres becomes augmented. That is why, in anxiety and strong emotions, the vessels on the surface of the body shrink, and our face becomes pale” (Mosso 1891, p. 108).

Mosso also constructed the first plethysmograph (hydroplethysmograph). As he himself admitted (Mosso 1891, p. 101), the idea of constructing such a device was suggested to him by Carl Ludwig, professor of physiology in Leipzig.

This is how Mosso described it himself: “I took a long and narrow bottle and cut off the bottom. Then I put into it my hand and a good section of my forearm, and sealed the bottle off around the elbow with quality glazer's putty.

I closed the neck off with a cork through which a long and narrow glass tube went, and subsequently filled the bottle and the tube with lukewarm water. My reasoning was: when there is a more profuse inflow of blood into the hand, when the arteries, veins, and capillary vessels fill up, a corresponding amount of water will have to leave the bottle. And vice versa: whenever vessels shrink and the hand decreases in this volume, the water in the cannula going through the cork should flow down into the bottle" (Mosso 1891, pp. 100–101).

Mosso believed all the physiological changes accompanying emotions to have their source in the operation of the heart and the circulatory system. The remaining ones (the pattern of breathing and plethysmographic action) were secondary.

Using the cardiograph of his own construction, Mosso obtained recordings of the operation of a dog's heart (Fig. 4).

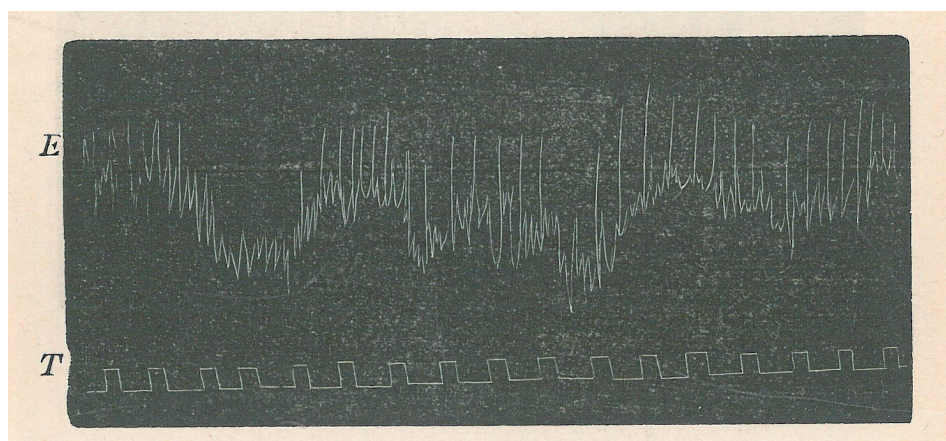


Fig. 4. Sphygmogram by Mosso (according: A. Mosso, *op. cit.*, 120)

In one of his experiments, Mosso showed a hunting rifle to a dog, and operated it. In a hunting dog, this resulted in acceleration of the heart rate. A dog that had never seen a hunting rifle did not react (Mosso 1891, p. 122).

The chemical mechanism of psychophysical changes observed by Mosso and his contemporary physiologists became explainable. This was thanks to the discoveries of, among others, a Polish physiologist, professor of the Jagiellonian University in Kraków, Napoleon Cybulski (1854–1919), who in 1895

acquired an extract from the adrenal cortex known as “*nadnerczyna*, which contained catecholamines, adrenaline included” (Szymonowicz, Cybulski: *O funkcji nadnercza*, Kraków 1895). It is worth mentioning in passing that Cybulski was one of the world’s first researchers to obtain an EEG of the cortex.



Fig. 5. Napoleon Cybulski (1854–1919)

Napoleon Cybulski was a student of, and in his youth also an assistant to, Ivan Tarchanoff (Tarkhanov 1846–1908), professor at the Imperial Medico-Surgical Academy in St Petersburg. In 1890, Tarchanoff discovered the phenomenon that skin changes its electrical properties as a reaction to stress or anxiety (Tarchanoff phenomenon). The mechanism of the Tarchanoff phenomenon is identical to that of Fere’s phenomenon (Jeffers 1928).



Fig. 6. Ivan Tarchanoff (1846–1908)

The only difference was in the methods of measurement. Tarchanoff applied an endosomatic method, based on using a psychogalvanometer to measure the difference between the potentials on any two points on the skin. The volume of the difference changed with the stimuli. The French psychiatrist and neurologist Charles Fere (1852–1907) discovered two years earlier that, having attached two electrodes connected in a series to a weak source of electricity and a galvanometer to the body of the patient, the pointer of the galvanometer moves when the patient is exposed to various stimuli (Woodworth, Schlosberg p. 209, Fere 1888). The phenomenon proved by Fere and Tarchanoff is known today as the galvanic skin response (GSR).



Fig. 7. Charles Fere (1852–1907)

It can therefore be stated categorically that towards the end of the 19th century, European science prepared the grounds for instrumental lie detection, laying down the foundations for future polygraph examinations. For form's sake, one must add that the first device that simultaneously recorded heart rate and breathing functions, that is actually the first "polygraph", was constructed by the British cardiologist James Mackenzie, who demonstrated his machine at the Cardiology Congress in Toronto in 1906 (Mackenzie 1908, Inbau 1953). The device not only registered in parallel two functions of the organism, but did it with the use of ink pens. Previously, such recordings were made on blackened paper, on which dry pens rubbed out the light lines of the curves.

There are also many reasons to believe that the first attempts at instrumental lie detection performed for forensic reasons in Europe preceded what Larson did in America by over a decade.

While Angelo Mosso was a professor of physiology in Turin, the father of contemporary criminology, Cesare Lombroso (1835–1909) was a professor of forensic medicine and hygiene at the same university. Both the academics assumed their university positions in 1878. (Lombroso had not received his chair of psychiatry until 1896 and his chair of criminal anthropology, i.e. criminology, until 1906).



Fig. 8. Cesare Lombroso (1835–1909)

Searching for the anthropological and physiological identity of criminals, Lombroso not only performed anthropological measurements of such, but also studied emotional qualities, sensitivity to pain, etc. In these studies, Lombroso used the devices constructed by Mosso, including the plethysmograph (hydroplethysmograph) and sphygmomanometer (which he called “the heartbeat gauge”). Moreover, he consulted his experiments with Mosso (Lombroso 1891, vol. III, p. 6).

One of Lombroso’s experiments entailed his assistant pulling away a curtain to show the subject various objects, whose sight was meant to stimulate the subject emotionally. The objects were wine, cigars, delicacies, money, photographs of women, and a gun (Lombroso 1891, vol. III, p. 6). The reactions

of the subjects were measured with a plethysmograph and sphygmomanometer and registered on a revolving drum of blackened paper, on which a pen rubbed out a line (Fig. 3).

In the course of these experiments, Lombroso made extremely valuable remarks on the possibility of using this method to discover deception. Moreover, he noticed that the reactions accompanying deception are stronger when the subject's attitude to such a deception is not indifferent, that is when he judges it negatively or approves. In other words, reactions are clearer the more the subject does not want the deception to be discovered. Lombroso believed the plethysmograph to be more useful in detection of deception than the sphygmomanometer (Lombroso, 1891, p. 16).

What was to serve the corroboration of psychophysical identity of criminals, whom Lombroso believed to account for a separate type of human being, backward in moral and physical evolution, was the study of heart rate and breath rate. To record breathing, Lombroso used the pneumograph, which charted the course of breathing functions on blackened paper (Fig. 9).

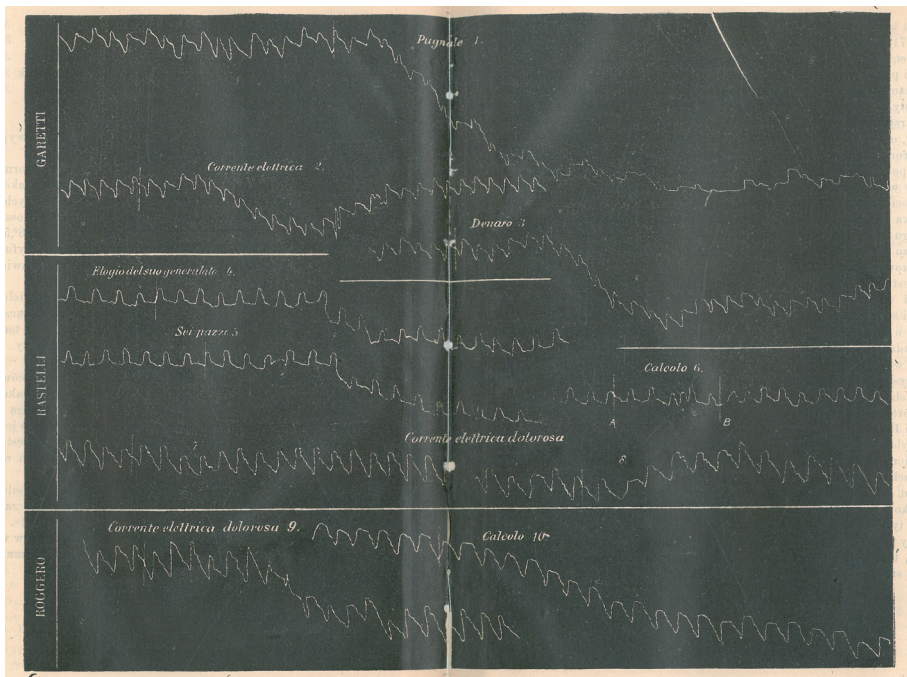


Fig. 9. Sphygmographs by Lombroso (according: C. Lombroso, *Człowiek zbrodniarz*, Polish edition, Warszawa 1892, 134)

In fact, the attempt to seek the untroubled logical, physiological, and psychological idiosyncrasy of the criminal ended in failure, and the whole theory put forth by Lombroso was finally disproved by Charles Goring, who in his work entitled *The English Convict* proved that from the anthropological (and also any other, physiological included) point of view, a British criminal is simply a reflection of the British population (Vold 1986).

Nevertheless, in the course of these pursuits, the ways of observing and recording the activity of the heart, respiratory activity, and plethysmographic reaction were improved, and an array of valuable conclusions were obtained, not least the fact that deceit or “insincerity” is accompanied by changes in the observed activity of the organism, and even that these changes are clearer when combined with motivation stimulated by the attitude of the subject, his praise or reprimand.

The experiments mentioned above were later described by Lombroso in his fundamental *L'uomo delinquente*, a work published in Turin in 1878.* [In this paper I followed the Polish translation of the book, published in Warsaw in 1891–1892. The first English translation of the book was published in 1900.] Lombroso must have been the first to realise that the method of observing physiological changes accompanying emotions allows efficient lie detection in an actual criminal case.

As Lombroso's daughter, Gina Ferrero, stated in the introduction to the English version of *The Criminal Men* in 1911, i.e. already after his death, he used the plethysmograph as soon as 1902 to detect lies in an investigation into the murder of a six-year-old girl (Ferrero 1911). In a book entitled *Crime, its Causes and Remedies* Lombroso himself mentioned that he had used the plethysmograph to detect lies in the investigation into a robbery of 20,000 francs (Trovillo 1938/1939). Even though detailed descriptions of these studies and the results are missing, nevertheless, the very fact of Lombroso conducting them raises no doubts. It remains unknown when the investigation into the case of robbery took place, yet there are grounds to believe that it was chronologically the first. Nevertheless, the second of Lombroso's known examinations, conducted in 1902, preceded the one performed by Larson in America by 19 years.

Similarly, later experimental examinations and attempts at lie detection based on the analysis of pneumograph recordings conducted in Graz by the Italian scientist Vittorio Benussi even before the first world war helped to deepen

the knowledge on which contemporary polygraph examinations are based, and paid attention to the application of recording breathing functions in assessing deception (Benussi 1914) .

What is significant, however, is that Larson's studies were continued and improved. As such, they ushered in the regular practice of polygraph examinations. Lombroso's experiments were not continued in Europe. They returned to Europe from America only after the second world war, and in many European countries are still treated with distrust.

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Book reviews



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Jarosław Świątek
Wszyscy kłamią. Nie daj się oszukać
(Everyone Lies, Don't Get Fooled),
Gdańskie Wydawnictwo Psychologiczne,
Gdańsk 2012, pp. 136 (text in Polish)

A new book has been published in Poland regarding detecting deception by using non-instrumental methods. The publishers are Gdańskie Wydawnictwo Psychologiczne, a house which is praised among psychologist circles, and the book's author is Jarosław Świątek – a psychologist, graduate of Szkoła Wyższa Psychologii Społecznej (the University of Social Sciences and Humanities), and editor-in-chief of many psychological websites who specializes in “techniques of social influences”. He is also the founder of a company responsible for “innovatory advertisement research”. The book's cover presents the contents as a guide to lies, containing exact instructions on how to recognize when we are being lied to.

The book is a relatively short read, adding up to a total of 136 pages with the bibliography and the list of quoted names. It consists of five chapters (I – Truth of emotions, II – Political correctness, III – In relationship with , IV – Crime, lies, guilt and punishment, V – Lying doesn't pay)

In the first pages, Świątek states a few obvious facts, such as that everyone lies and that lies are not homogeneous. Citing statistics only known to himself

– as he does not mention their source – he states that a human will lie three times in a 10-minute conversation. The author writes of himself as a man who is hard to fool and a true expert in detecting dishonesty. He does not reveal what tests he has used to hone these skills, nor what tests are available, nor even a way to prove his skills.

In the first chapter, the author decides to introduce us to some basic knowledge on emotions. The larger part of this chapter is a history of Paul Ekman's research. Except for a few extracts, the whole presentation is based upon the outcome of Ekman's works.

With the help of a very detailed description of photography, in which Świątek presents different emotions, he instructs the reader with basic knowledge of detecting dishonesty. He also uses codes, which can be used to translate gestures to describe emotions, although the reader is not acquainted to these methods. Moreover, the author utterly neglects matters of personality, race, psychological diseases or organic brain damage, which the subject of the test might not be aware of. Readers are also not informed that the modern medicine of beauty might influence the outcome of microexpressions, or rather cause the lack of outcome.

In this chapter, the reader can find information about polygraph testing. The author writes that the polygraph (not even polygraph testing) searches for fear. He also mentions that during polygraph testing the "Othello Error" might occur, which might be a reason to consider that someone is guilty (Świątek uses the word "guilty"). Polygraph testing is described in a way that might give the reader an incorrect image, because the author neglects to mention the expert's role in the whole testing process. He presents polygraph testing as if it was based entirely on the polygraph as a machine – as if there was no expert needed. He also mentions that the polygraph cannot distinguish fear from sexual excitement. Świątek points out in addition that non-instrumental methods of detecting deception are better and more successful because there is no need to take agreement. Except for Ekman's books, the reader will not find any other names connected with polygraph testing in the bibliography attached to this chapter.

In the second chapter, an interview with Richard Nixon after the Watergate scandal serves to illustrate verbal and nonverbal cues of dishonesty in a political reality. The extracts from the interview presented are used to support the thesis of a scheme: if A thus B, meaning if the interlocutor raises his voice, then he is surely lying; if he scratches his nose, then he is

surely lying; if he takes time to answer a quickly formed question, than he is surely lying. It is entirely clear that the tiniest linguistic mistake can be used by political opponents, which might have negative consequences not only for a single politician but also for his entire political group. The author relies deeply upon single symptoms, only once mentioning that they should be taken into account with the understanding of the wider situational and behavioural context.

The third chapter is about interpersonal relations and has the objective of unmasking treachery or dishonesty. The advice and methods are still very simple and schematic. Many tips and techniques are unclear, e.g. when describing the actions of a person that we are accusing of lying or treachery, according to the author “an innocent suspect will not heed our aggravation, because he will be angry about being accused. He will try to attack, use counterarguments. With the use of this method we reach an approval on what we suspected”. The quotation makes sense only if the suspect is being accused of innocence. Thus, if a wrongly accused individual is outraged by the existing situation and tries to explain himself, then according to the author he is guilty, because “only the guilty need to explain themselves”.

The fourth chapter contains information about lying during legal proceedings. After a much too extensive description of the OJ Simpson case, Świątek proceeds to describe the hearing and the symptoms that occurred during it. He correctly claims that a wrongly accused person might become stressed. However, the author believes that this certain stress does not appear within a guilty suspect, and without it, it is impossible to intercept the cues of dishonesty, because only under a sufficient amount of stress do they surface enough to become noticeable. Therefore, Świątek suggests that “to instil it (fear), one must properly arrange the interrogation space, for example through manipulating light sources, temperature and sound”. The idea is reminiscent of torturing methods, and testifies to the author’s lack of knowledge in the field of interrogatory tactics and the rights of an accused individual. Even in this chapter he does not shy away from handing out simple advice for lie detection: “if someone looks to the left, it means that he recalls something, then if he looks to the right, he is imagining something that did not took place”. When forming such a thesis, Świątek does not take into account situations such as when a interrogated person is looking to one of the sides quite simply because he is looking at an object which helps him recall the incident in his memory. When describing this chapter, a certain aspect cannot be taken into account. Upon the suggestion that the book was presented by a respected

publisher, that the reviews posted on the internet by psychological portals, such as psychospace.pl, testify to its quality – under these impressions one should not assume that the author is substantially prepared to write about the matter. Unfortunately, this chapter raises great doubts in the subject, which can undermine the substantive value of the entire work. A multitude of works have been presented handling the subject of psychology of law which contain chapters of detection of deception. Setting aside nuances that would not trouble a psychologist, such as the lack of distinction between the testimony of a witness and a defendant or suspect, one cannot turn a blind idea to a huge mistake about the duration of punishment for murder. Reading about the “increasing blame” technique, we learn that “at the very beginning a suspect is threatened with twenty-five years penalty of deprivation of liberty, up to a life sentence, according to the Polish Code of Penal Proceedings” . With all due respect for the author’s work, Article 148 of the Polish Penal Code – rather than the mentioned Polish Code of Penal Proceedings – is knowledge not reserved only for lawyers.

The last chapter, titled “Lying doesn’t pay”, is concentrated around working in a corporate environment. The author again serves simple tips on how to spot a “mole” that is spoiling the efforts of many departments. He advises that in such a situation we should ask the suspected individual for help on how to surface corporate espionage – if he refuses involvement, then he is clearly guilty and has something on his conscience. If he helps then he is clean. I personally believe that a “mole” would be very willing to help, helping only himself by deluding his superiors.

In the epilogue Świątek writes that he has presented tools that, when used in a proper manner, “will always yield the expected results”; the question, however, is what results one should expect when pointing out single correlative dishonesties which in a certain situation do not have to proclaim a lie. On the cover we can see the statement “it’s a great guide on lying” – the problem is that this very statement is a lie. The book avoids many important factors that influence the exhibition of symptoms that indicate lying, such as personality, mental illness, race or cultural differences; despite the emotions being the same, the author remains silent about the differences on how they might be displayed in special cases. In the bibliography, aside from the works of Paul Ekman, we can find academic textbooks, popular scientific papers and references to short movies located on the YouTube portal. Is Jarosław Świątek’s book *Everyone Lies. Don’t Get Fooled* a scientific work? Definitely it is not. Is it popular scientific? It could be, if it did not omit a broad part of

the subject at hand and did not mislead the reader. Instead of reading this book I would recommend the source of the author's inspirations – the work of Paul Ekman, from which the author created a compilation, publishing it as if it were a new item.

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