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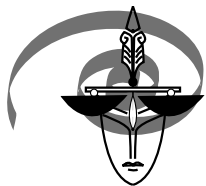
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Guiding Principles and Benchmarks for The Conduct of Validity Studies of Psychophysiological Veracity Examinations Using the Polygraph

Background

There has been much controversy regarding scientifically accurate and persuasive methods of validating psychophysiological veracity (PV) examination techniques using the polygraph in the identification of guilty and innocent examinees (Krapohl 2006, Gordon 2007, Matte 2007a, 2007b, OTA 1984, NRC 2003). This controversy extends to the use of field studies versus laboratory studies, both of which have their usefulness depending on whether the PV examination technique being evaluated is a lie test such as the Zone Comparison Test or a recognition test such as the Concealed Information Test. This Guide is designed to provide researchers who wish to conduct a validity study on

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a PV examination technique with guiding principles and benchmarks that will establish scientifically acceptable validation results.

Field versus Laboratory Studies

Determining whether a person is lying or telling the truth regarding an issue or allegation normally involves the use of a polygraph instrument that records the physiological activity of that person to reviewed questions contained within a psychologically structured test. The emotional involvement of the examinee in such circumstance includes *fear of detection* by the guilty examinee, *fear of error*, also known as the Othello Error (Ekman 1985), by the innocent examinee, and potential *anger* by either type of examinee, all of which can cause an autonomic response indistinguishable from the deception syndrome (Bongard, Pfeiffer, Al'Absi, Hodapp & Linnenkemper, 1997; Ekman, 1985; Matte, 1978; Matte & Reuss, 1989; Matte 2007c; Mangan, Armitage, Adams 2008; Shurany, Stein, Brand 2009; National Research Council, 2003).

Field studies examine PV examinations conducted on persons suspected or accused of committing real-life crimes or incidents with serious consequences that can arouse any of the aforementioned *emotions* and ensuing autonomic responses, also classified as *defensive responses* (Verschuere, et al. 2004; Sokolov & Cacioppo 1997; Graham 1979; Graham & Clifton 1966; Cook & Turpin 1997), which will inhibit or block orienting stimuli (Hernandez-Peon, et al. 1956; Lang, Simons & Balaban, 1997).

The theoretical concept of the Defensive Response (DR) and the Orienting Response (OR) and their autonomic signatures are among the most heavily investigated topics in psychophysiology (Sokolov & Cacioppo in Lang, et al., 1997). According to Lang, Bradley, and Cuthbert in Lang, et al. (1997),

“all emotions are organized around a motivational base. In this sense, we consider valence and arousal to be the strategic dimensions of the emotion world. Emotions are products of a Darwinian development, and can be characterized as motivationally tuned states of readiness. In human beings, the presumed indices of these affects include responses in three reactive systems: (a) expressive and evaluative language; (b) physiologic changes mediated by the somatic and autonomic systems; (c) behavioral sequelae, such as patterns of avoidance or performance deficits. This is the database of emotion.”

Published research conducted by Raul Hernandez-Peon, Harald Scherrer and Michel Jouvet (1956) involved modification of electric activity in cochlear nucleus during *attention* in unanesthetized cats which revealed that “during presentation of visual stimuli (two mice in a closed bottle), the auditory responses in the cochlear nucleus were greatly reduced in comparison with the control responses; they were practically abolished as long as the visual stimuli elicited behavioral evidence of attention. When the mice were removed, the auditory responses returned to the same order of magnitude as the initial controls. An olfactory stimulus that attracted the animal’s attention produced a similar blocking effect.” This research and others (French, Verzeano and Magoun, 1953; Hagbarth and Kerr, 1954; Adrian, 1954) support the theory of *Psychological Set* in PV examinations using the polygraph (Backster, 1974; Matte & Grove, 2001), also known as Selective Attention, which is an adaptive psychophysiological response to fears, anxieties, and apprehensions with a selective focus on the particular issue or situation which presents the greatest threat to the legitimate security of the examinee while filtering out lesser threats (Matte, 1996). This phenomenon explains the reason for the primary dominating stimulus “Fear” of consequences inhibiting secondary stimuli such as guilt¹ and lie avoidance conflict, as well as orienting responses normally found in laboratory studies such as the promise of reward and increased self-esteem.

While studies by Verschuere, et al. 2004; Sokolov & Cacioppo 1997; Graham 1979, Graham & Clifton 1966; Cook & Turpin 1997, identified orienting responses (OR) by a deceleration of heart rate and defensive responses (DR) by an acceleration of heart rate, other researchers (Smith, et al., 1974; Gaunt & Gan, 1969; Rosenmann & Morrison, 1974; Smith & De Carvalho, 1985; Smith & Woodruff, 1980; Causby & Smith, 1981; Adams, Baccelli, Mancina, & Zanchetti, 1971; Espmark & Langvatn, 1979, Gabrielsen, Blix, Ursin, 1985, and Butler & Jones, 1982) have demonstrated that certain species, e.g. alligator, crocodile, deer mouse, turtle, woodchuck, swamp rabbit, cat aggressor, red deer calf, ptarmigan hen, and duck, will experience heart deceleration when confronted with a threatening situation. Smith, Allison & Crowder, 1974, described their recording of a free roaming alligator’s heart rate which ranged between 25 to 35 BPM during diving and surfacing, but when approached by a manned canoe, the alligator submerged and remained inactive and its heart rate decreased from 30 BPM to approximately 2 to 5 BPM. This significant decrease in heart rate was described by Smith, et al., as an example of fear bradycardia. Their research further demonstrated that fear bradycardias are typically much larger than orienting response bradycardias.

However, Byron Campbell, Gwendolyn Wood and Thomas McBride, in Lang, et al. (1997) offer four possible criteria distinguishing between fear bradycardia and orienting response bradycardia. The aforementioned authors noted that many of the listed characteristics are strikingly similar to those used to distinguish defensive responses from orienting responses (Graham 1979), except that the direction of the cardiac response is deceleration rather than acceleration.

“1. Fear bradycardia is typically much larger than orienting response bradycardia.”

“2. Fear bradycardia habituates slowly, if at all, whereas orienting response bradycardia habituates rapidly.”

“3. Fear bradycardia is directly proportional to intensity of the threatening stimulus, whereas orienting response bradycardia is typically maximal at low to moderate stimulus intensities.”

“4. Fear bradycardia should occur primarily in species and in settings where concealment or behavioral immobility is an adaptive predatory avoidance strategy; orienting response bradycardia should be relatively independent of context.”

The above suggests that fear bradycardia can be distinguished from orienting bradycardia by its greater magnitude, slower habituation, greater responsiveness to high than low to moderate stimulus intensity, and the context in which it is elicited. (Campbell, et al. in Lang, et al., 1997).

Lang, Bradley and Cuthbert in Lang, et al. (1997) explain that the Fight/Flight and Freezing responses and its autonomic changes in heart rate and increases in blood pressure “are mediated through different neural centers: The autonomic response is dependent on an intact pathway through lateral hypothalamus (LeDoux, 1990), and the somatic components require an intact midbrain (periaqueductal) central gray area. Furthermore, the ventral central gray is the fear “freezing” path, whereas the dorsal gray is a critical part of the fight/flight action circuit. (See Fanselow, DeCola, De Oca, & Landeira-Fernandez, 1995, and the papers edited by Depaulis Bandler, 1991).”

Smith & Woodruff, 1980, reported that vertebrate species that are purely terrestrial such as woodchucks responded to threat in two distinctive ways: When

approached in the open, their response was fear tachycardia (increased heart rate) and flight. When the woodchuck was threatened near or in its burrow, fear bradycardia (decrease heart rate) was the response.

Lang, et al. (1997) reported that Orienting Response (OR) and the Defensive Response (DR)

“were initially conceptualized as having common and context-specific adjustments and were often treated as artifacts to be avoided in studies of classical conditions. In Perception and the Conditioned Reflex (Sokolov, 1963), both conceptions were changed. The OR and DR were reformulated as behavioral phenomena that subserved perception and learning (e.g. by amplifying or reducing the effects of stimulation), evidenced many common features across evocative contexts, and could be quantified by psychophysiological measures. For instance, a distinction was made between the physiological adjustments that generalized across evocative stimuli and more stimulus-specific associated adaptational reflexes. In contrast to the adaptational responses, the autonomic components or signatures of both the OR and DR were posited to (a) be independent of stimulus quality, and (b) act directly on sense receptors and indirectly by feedback to central mechanisms to control receptor sensitivity. The OR and DR were further differentiated as follows: (a) an OR is elicited by stimuli of low or moderate intensity, whereas the DR is elicited by stimuli of high intensity; (b) an OR is marked by reciprocal peripheral vasoconstriction and cephalic vasodilation, whereas the DR is associated with peripheral and cephalic vasoconstriction; (c) an OR has the same autonomic signature to the onset and offset of a stimulus because both represent changes in stimulation, whereas the autonomic response to stimulus onset is larger than to stimulus offset in the DR; and (d) the OR habituates rapidly to stimulus repetition, whereas the DR is either intensified or diminished much more slowly by stimulus repetition.”

It should be noted that the study findings of Hare, 1972, support Sokolov’s (1963) proposal that cephalic vasoconstriction is a component of the Defensive Response (DR) and cephalic vasodilation is associated with the Orienting Response (OR).

The relationship between vasoconstriction and heart rate decrease and vasodilation and heart rate increase in PV examinations was noted by this author (Matte), who conducted a study that included an analysis of polygraph charts from field cases which was reported in Matte (1980 and 1996). The re-

sults showed that at the onset of a threatening test question and during the 30 seconds that followed prior to the next question in the collection of the physiological data, there was a decrease in heart rate for Alpha Adrenergic Responders (vasoconstriction) followed by a compensatory increase in heart rate (relief), or there was an increase in heart rate for Beta Adrenergic Responders (vasodilation) followed by a compensatory decrease in heart rate (relief) (Matte, 1980. P. 113-114; Guyton & Hall, 2000, P. 701). However, unlike Sokolov's (1963) study, these were non-cephalic recordings of vasomotor activity in the arm. Matte also noted that deceptive subjects of field cases that employed single-issue PV examinations², such as the Quadri-Track Zone Comparison Technique or the Backster Zone Comparison Technique, generally did not habituate to the relevant test questions but did habituate to the neighboring control³ questions, whereas innocent subjects generally did habituate to the relevant questions but showed no habituation to the control questions that elicited their psychological set or selective attention.

Fanselow (1994) described three stages in predator confrontation:

"1. Pre-encounter, in which target specific defense behavior is not yet engaged and appetitive motivation may be simultaneously present. Presumably, this is the realm of transient detection responses (TDR); Graham, 1992), determined by modest differences in the arousal value of stimuli, readily habituated, and not valence relevant."

"2. Post-encounter, For Fanselow (1994) motor responses at this stage include "freezing" – mediated by ventral gray. This is also the stage of focused attention (conceivably conscious appraisal in man, Ohman, Esteves, Flykt, Soares, 1993), associative learning, sustained cardiac deceleration, defensive nonopioid analgesia, and potentiated startle."

"3. Circa-strike, the final stage, involves active defense and is mediated by the dorso-lateral gray in the rat. Like Masterson and Crawford's "alarm" stage, it involves active fight or flight, cardiac rate acceleration, and a shift of blood to the gross muscles – processes that prompt the motor system and thus eliminate reactions to secondary, probe stimuli."

Tuvia T. Amsel (1997) conducted a field study on "Fear of consequences and motivation as influencing factors in the psychophysiological detection of deception" involving 100 subjects who could suffer court and employer sanctions upon failure (IPI Group) versus 100 subjects who would suffer no sanctions

upon failure (SSI Group). The results of this study indicated that “The conclusion of this research is that the extent of psychophysiological detection of deception reaction is a function of the extent of fear of consequences (FOC) in proportion to the extent of motivation (MO), that exist within the subject while being tested. Fear of detection (FOD) is an additional factor existing within the IPI Deceptive Group subjects, that amplifies their psychophysiological reactions.”

It becomes obvious from the above reported research studies that autonomic defensive responses generated by the strong emotion of “fear” which inhibits other potential secondary responses are significantly different in origin and potency of stimuli, and strength, duration and tenacity of response than non-emotional orienting responses. Arne Ohman in Lang, et al., 1997, stated that it is a common theme across the experiments reviewed in his chapter on Preattentive Processing of Threat, that stimulus content counts. “Whereas stimuli implying some evolutionary relevant threat can preattentively activate skin conductance responses both in phobics and conditioned normals, automatically capture spatial attention, and preattentively enter into association with aversive unconditioned stimulus, none of these effects were evident for fear-irrelevant stimuli.”

Laboratory studies, also referred to as analog studies of PV examination techniques, employ mock paradigms that suffer the absence of serious consequences to the deceptive examinee and a total absence of the fear of error by the innocent examinee which in real-life can result in a false positive (an innocent examinee misdiagnosed as deceptive). Furthermore, laboratory studies are based on *non-emotional* responses generated by the offer of a reward such as additional college credits or a small sum of money, usually about twenty dollars, and/or by a desire for increased self-esteem if they can defeat the test. Responses in laboratory studies have thus been classified as *orienting responses*. (Verschuere, et al. 2004; Sokolov & Cacioppo 1997; Graham 1979; Graham & Clifton 1966; Cook & Turpin 1997).

Additionally, the potential for anger is absent due to the fact that the examinee is a volunteer in a mock crime paradigm. Furthermore, programmed guilty examinees are not motivated to employ countermeasures. For the non-truthful examinee in the analog study, the potential for embarrassment or punishment if found deceptive to the relevant questions is nonexistent. However, the control questions for these examinees deals with their actual past behaviors, which could lead to embarrassment or fear if found deceptive, thus the com-

parison of a control question with DR potential against a relevant question of OR value can result in overpowering control questions that could produce a false negative (deceptive examinees misdiagnosed as truthful). Finally, the subject sample is not representative of the diverse population that includes the criminal element present in field cases.

Therefore, laboratory studies which are based on *non-emotional orienting responses* absolutely fail to replicate the field conditions that elicit *emotional defensive responses* wherein both the guilty and innocent examinee's *primary emotion* is "fear" of the consequences if found deceptive, which in criminal cases could result in the horror of imprisonment. As stated by Iacono (2001) "These mock crime studies are too unlike real life to offer any realistic insight to how polygraph tests work in the field." The argument that laboratory studies offer complete control over subjects used in their study, such as the assignment to deceptive and non-deceptive groups and the holding of variables constant in order to study the variable of interest, is useful in supporting the results of examinations involving non-emotional subjects role playing in a mock crime. However its results cannot be applied to field situations, nor can they be used to validate the use of a PV examination technique on real suspects of crimes whose results pose a serious threat to the security of the examinee. It is noteworthy that most published laboratory studies on polygraph contain a caveat at their conclusion that warns against generalizing the results to field applications.

The courts should be especially concerned about polygraph results produced by a polygraph technique that was validated exclusively with laboratory studies, inasmuch as most test results are proffered by defense attorneys as proof of their client's innocence, which often raises the question whether a guilty client successfully defeated the test with the use of physical or mental countermeasures. Studies based on field cases embody the potential and actual use of countermeasures by real-life criminals motivated to learn and employ them. Whereas laboratory studies employ mock paradigms that offer no threat of serious consequences to deceptive examinees, hence no motivation to use countermeasures, and in those laboratory studies that did instruct subjects to use countermeasures (on the control questions) (Stevenson & Barry, 1988; Honts & Hodes, 1983; Honts, Hodes, Raskin, 1985), there was no competing fear of detection and ensuing autonomic response from the neighboring relevant test questions that can dampen potential responses to the control questions and interfere with the mental effort required in the use of mental/physical coun-

termeasures, especially those of mental origin which currently prevail in the anti-polygraph literature as a result of overt advertisement of movement sensors by manufacturers of polygraph instruments.

Nevertheless, laboratory studies are useful in validating PV examination techniques that are designed to identify the examinee who *recognizes* a key item amongst equally plausible alternative items in what is referred to as a Concealed Information Test, Guilty Knowledge Test, or Known-Solution Peak-of-Tension Test. In contrast with the Control Question Test, the Concealed Information Test contains one key item that only the guilty will recognize amongst several incorrect but equally plausible alternative items that provide genuine controls in the scientific sense of the term. It is the *recognition* of the key item that produces an orienting or defensive response in analog and field studies respectively. The examinee need not answer any of the test questions. Hence, the fear of detection and fear of error emotions present in Control Question Techniques are absent in the Concealed Information or Guilty Knowledge Tests. These tests are not considered Lie Tests (Lykken, 1981, 1998), inasmuch as the examinee is not presented with relevant test questions and control test questions that have the potential of eliciting a lie from both truthful and non-truthful examinees with an ensuing autonomic response.

It becomes quite evident from the aforementioned discussion of the differences between field and laboratory studies and the intense emotions present in real-life cases versus the lack of such emotions in the laboratory setting that Control Question Tests must be validated by field studies, and laboratory studies be more appropriately used to validate non-lie tests such as the Concealed Information or Guilty Knowledge test.

Source of Data for Field Study

1. A minimum sample of 50 confirmed PV examinations conducted on examinees suspected or accused of criminal offenses, civil violations or infractions of mores with significant consequences. The greater the number of examinations, the more the sample would be representative of the general population. It is recommended that studies which use less than 100 subjects perform and provide a statistical power analysis of their sample size that must attain a statistical power of .80 or higher, using a .05 significance level.

2. The aforesaid sample of confirmed cases must be acquired from a period of time that includes all confirmed and unconfirmed examinations, i.e. 1 January 2007 thru 31 December 2007. All examinations that employed the PV examination technique being validated during that period must be accounted and reported, which would include all unconfirmed examinations, confirmed examinations, inconclusives, and known errors.

3. All PV examinations used in the field study being validated must have polygraph charts that contain as a minimum the following physiological activity: (a) Thoracic and abdominal breathing patterns recorded separately, using two pneumograph components; (b) Electrodermal activity reflecting relative changes in the resistance or conductance of current by the epidermal tissue; (c) Cardiograph recording of relative changes in pulse rate, pulse amplitude and relative blood volume (APA 2007).

Establishing Ground Truth

An index of validity shows the degree to which a test measures what it purports to measure, when compared with accepted criteria, hence the validity of a PV examination using the polygraph depends on whether it can accurately determine truth and deception.

Selection of satisfactory validation criteria and demonstration of a reasonable degree of validity are fundamental in psychophysiological testing. The first necessary condition of a valid test is that it has an adequate degree of reliability. Reliability is that which can be relied on; dependable; hence the reliability of a PV examination depends on whether the same set of data will consistently produce the same results. This consistency, known as reliability, is usually the degree to which a test yields repeatable results. Therefore, to assess the validity of any type of PV examination, it is necessary to obtain a criterion measure against which to compare the test results (Matte, 1996). This criterion is acquired from any one or a combination of the following:

a. Confession.

b. Judicial conviction confirmed by:

1. A plea of guilty to the charge that formed the basis of the PV examination.
2. A plea of guilty to a lesser offense wherein the allocution supports the original charge.

c. Judicial acquittal through forensic evidence such as DNA, fingerprint, serology, ballistics, etc., rather than insufficient evidence to convict.

Confessions provide *direct* evidence of guilt, and when properly acquired include corroborating information that can produce additional testimonial and physical evidence of the suspect/examinee's guilt. Whereas the results of forensic tests provide *indirect* evidence from which an inference of guilt can be made, usually supported by testimonial and other physical evidence. Even DNA evidence, while most probative, does not necessarily provide all of the necessary elements of proof for conviction or exculpation. The protocol of Control Question Techniques prohibits any type of accusatory or interrogative approach during any portion of the pretest interview and the collection of the physiological data, and the entire examination including the posttest interview must be video-recorded. Hence, resultant confessions acquired from legitimate PV examinations do not suffer the abuses of suspect's rights that may be found in the general police interrogation arena. A confession can be used to confirm a deceptive PV examination result or confirm the truthful result of a PV examination related to the same case, inasmuch as the truthful results are based solely on the analysis and scoring of the physiological data collected from the truthful examinee, subsequently confirmed by confession from the deceptive examinee in that same case.

Published research (Huff, et al. 1986) has established that wrongful convictions in the United States are 0.5 percent, but that is an estimate that may vary greatly within each state. However, a conviction that is confirmed by a plea of guilty to the charge that formed the basis of the PV examination or a plea of guilty to a lesser offense wherein the allocution supports the original charge reduces the wrongful conviction rate to a minimal level that offers compelling confirmation of the results of a PV examination.

Also, a judicial acquittal due to the introduction and admissibility of forensic evidence is compelling confirmation of the results of a PV examination.

Selection of Confirmed PV examinations

The purpose of a validity study is to determine whether a PV examination technique, when applied and administered in strict accordance with the requirements of its protocol, will accurately identify the truthful and deceptive examinee regarding the relevant issue. Therefore, it is imperative that only

those confirmed PV examinations that conformed to the requirements of the technique's protocol be included in the study.

The following are cause for invalidating a PV examination and its exclusion from the sample of confirmed examinations:

- a. Procedural violations committed by the polygraphist during the pretest interview that can adversely impact the physiological data collected from the examinee.
- b. Alteration of the psychological test structure in violation of the technique's protocol.
- c. Modification of a test question contrary to its intended use within the psychological construct of the technique.
- d. Violation of paragraph 3.4.1, APA Standards of Practice, wherein the PV examination should have been aborted due to the mental, physical or medical condition of the examinee. This includes a low intelligence quotient or language obstacle that prevents the examinee from clearly understanding with proper interpretation any of the test question(s) which forms the basis for the construct validity of the test.
- e. Examination based on inadequate case information, case intensity or distinctness of issue.
- f. Inadequate number of valid charts used for a determination of truth or deception.

Establishing Reliability through Blind Scoring of Charts

The blind scoring of polygraph charts acquired from a random sample of the confirmed PV examinations must be conducted by at least two polygraphists formally trained in the PV examination technique being validated, that were not involved in the conduct or administration of the examinations. An in-depth knowledge of all of the physiological features used in the technique being validated and its applicable rules of chart interpretation are essential for the polygraphists selected for the task of blind scoring of the physiological data contained in the polygraph charts of the random sample of confirmed PV ex-

aminations. Blind scoring of charts from confirmed examinations establishes repeatability of the results, hence reliability. A sample of 20 or more examinations (10 in each category) is acceptable for this purpose.

Inconclusive Results Affect Utility, not Accuracy

A psychophysiological veracity (PV) examination cannot have an Inconclusive rate greater than 20% to be utilitarian. Nor can a PV examination be considered valid unless published research indicates that its accuracy in correctly identifying both Guilty and Innocent examinees is at least 90% for evidentiary examinations, and 80% for investigative examinations (APA May/June 2007).

An Inconclusive result occurs when the scores obtained from the analysis and quantification of the physiological data collected from the examinee fails to attain the minimum score (threshold) required to reach a determination of truth or deception. This threshold is established from statistics acquired from empirical data of cases in field studies. This score threshold ensures that charts lacking sufficient physiological data for an accurate determination of truth or deception are not included in the decision-making process. Hence the term “Inconclusive” means that *no decision of truth or deception* was rendered due to inadequate physiological data. This Inconclusive threshold is a safeguard against false positive and false negative conclusions, so that conclusive results will enjoy high validity and reliability.

An analogy can be made of the fingerprint expert who renders an inconclusive opinion when the suspect print fails to meet the “minimum point rules” that require a minimum number of points of identification in order to render a conclusion of a positive match or a negative match to a suspect’s print developed and lifted from a crime scene, which seldom produces a perfect print. The fingerprint expert has no control over the quality of the developed latent print, and when the print fails to meet the minimum point rules, the fingerprint expert must render an Inconclusive result. No rational person would suggest that this fingerprint expert made an error when he rendered an inconclusive finding. Similarly, the expert polygraphist has no control over the quality of the physiological data collected from the examinee and his conclusion is based solely on the scores acquired from the analysis of that physiological data, and unless the scores reach or exceed the established minimum score threshold, an inconclusive result must be rendered. The traditional reporting of PV examination results with and without inconclusive results is still advisable and

required as it reflects the utility as well as the accuracy of the polygraph technique. However, the inconclusives should not be viewed and reported as errors, inasmuch as the quality of the collected data failed to meet the required standard that would allow the forensic psychophysiology expert to render a decision of truth or deception.

Unfortunately, the Office of Technology Assessment in their November 1983 report entitled “Scientific Validity of Polygraph Testing: A Research Review and Evaluation” included inconclusive results of PV examinations as errors in the calculation of data from selected studies. The OTA’s reasoning is stated on page 97, to wit:

“Some researchers exclude inconclusive results in calculating accuracy rates. OTA elected to include the inconclusives on the grounds that an inconclusive is an error in the sense that a guilty or innocent person has not been correctly identified. Exclusion of inconclusives would raise the overall accuracy rates calculated. In practice, inconclusive results may be followed by a re-test or other investigations.” (Portion of text underlined by authors).

The flaw in their stated reasoning is the fact that in an Inconclusive there is no identification of a guilty or innocent person, correctly or incorrectly. Inasmuch as there is no decision regarding the guilt or innocence of the examinee, there can be no error. In fact, inconclusives are a safeguard against making errors. Regrettably, the National Research Council of the National Academies’ 2003 report entitled “The Polygraph and Lie Detection” parroted OTA’s interpretation of inconclusives. Hopefully, the scientific community will recognize inconclusive findings as a positive not a negative component in calculating the accuracy of PV examinations.

Discussion

Some researchers and statisticians would argue that a minimum sample of 20 cases or 10 or more subjects in each condition, deception or truthfulness (Krapohl 2007) in a field study of a PV examination technique provides a valid generalization to the general population and that additional cases do not improve its validity. Such a low sample may be adequate in the evaluation and generalization of a metallurgic study of the bonding of two metals whose individual components are constant; however, in order to generalize the results of a field study of a PV examination technique to the general population, it must

contain a subject sample that covers such variables as gender, race, age, education and whenever possible at least two types of crimes or offenses. This would require a sample of at least 50 field cases supported by a statistical power of .80 or higher, using a .05 significance level. The greater the number of examinations, the more the sample would be representative of the general population.

Two studies (Pollina, et al., 2004; Kircher, et al., 1994) attempted to determine the generalization of data from laboratory mock-crime studies. In the Pollina study, the degree of physiological responses to the control and relevant test questions in a mock-crime paradigm were compared with the responses of criminal suspects from confirmed cases collected at the Department of Defense Polygraph Institute. The results showed that the responses from criminal suspects were significantly greater in both the control and relevant test questions than examinees in the mock-crime paradigm. However, the accuracy of the results of the laboratory study was not significantly different from the field cases. It should be noted that in the laboratory study,

“After each question series, the examiner asked how each participant felt about the questions and whether there was any problem with any of them, focusing specifically on probable-lie control questions.”

This stimulation of the control questions is within the protocol of the Utah Zone Comparison Technique (Honts & Raskin 1988; Honts 1999) which has been severely criticized (Abrams 1991, 1999, 2001; Matte 1998, 2000; Matte, Reuss 1999) for violation of the theoretical concept of the Zone Comparison Technique developed by Cleve Backster in 1962, which holds that once the test questions have been reviewed with the examinee, the collection of the data must not be interrupted with any language that would influence the examinee’s psychological set towards the control or relevant questions (Matte 2007c). The sole exception is when there is no response to both the relevant and control questions. Then the control questions only are reviewed with the examinee, in accordance with Backster’s Eight-Reaction Combination Guide (Backster 1963, 1969, 1983) or Matte’s 23-Reaction Combination Guide (Matte, 1981, 1996)⁴. It could be argued that the Utah method was validated with laboratory studies published in peer-reviewed journals, but this only attests to its efficacy in the realm of mock crimes with all of its intrinsic deficiencies which fail to replicate the fears and emotions experienced by examinees in the field that are threatened with serious consequences for failure. Those flaws articulated in Abrams (1991, 1999, 2001), Matte (1998, 2000), Matte, Reuss (1999) would not

reveal themselves in a non-emotional, non-threatening mock crime paradigm used in laboratory studies that elicit non-emotional orienting responses.

The latter study (Kircher, et al. 1994) admitted that

“any one of a number of possible differences between lab and field settings might affect the generalizability of laboratory models. For instance, differences in subject populations, the number and types of issues under investigation, qualifications of the polygraph examiners, test protocols, instrumentation, and subject’s motivation for passing the test could limit generalizability.”

However, Kircher’s study reflected that

“Statistically, there was no difference between lab and field contexts in terms of the accuracy of classifications on truthful and deceptive subjects. However, as compared with its performance on laboratory subjects, the lab model tended to be less accurate on truthful suspects and more accurate on deceptive suspects.”

This information was acquired from an Abstract in *Psychophysiology*, Journal of the Society for Psychophysiological Research, which did not provide details in the manner this study was conducted.

The Pollina and Kircher studies make an honest attempt to show that the results of laboratory studies of a Zone Comparison Technique can be applied to the general population. However, several important elements present in field studies were lacking in the aforesaid laboratory studies. The Fear of Error, also known as the Othello Error (Ekman 1985), by innocent examinees could mimic deception to the relevant test questions (Matte 1980, 1996; Matte, Reuss 1989; Mangan, Armitage, Adams 2008; Shurany, Stein, Brand 2009; NRC 2003). The Fear of Detection, which would cause a significant *defensive* response to the relevant questions in field studies, as opposed to the lesser *orienting* response in a laboratory study (Verschure, et al. 2004, Sokolov & Cacioppo 1997; Graham 1979; Graham & Clifton 1966; Cook & Turpin 1997), would enable the *defensive* response on the relevant question to compete against a countermeasure response on the control question, thus avoiding a false negative. In the Backster ZCT and Quadri-Track ZCT, that strong response on the relevant question would render a strong response on the neighboring control question defective, resulting in a correct deceptive score (Matte 2007c; Mangan et al. 2008a). The strong emotion of anger which can mimic the deception syndrome

can seriously affect the accuracy of a PV examination, which may be present in field cases but most absent in laboratory studies. None of the aforementioned studies by Pollina and Kircher address those most important factors in the assessment of laboratory studies' generalizability to the population.

Laboratory studies are most convenient to academics, who tend to minimize the significant differences in the emotions elicited from examinees in mock crime paradigms versus real-life field cases. The first author (Matte) while assigned to the U.S. Air Force Office of Special investigations in France, escorted one of five American National Guardsmen accused of murdering a French soldier to the chamber of the French Magistrate to await being formally charged. While standing with Matte in front of the closed door to the Magistrate's chamber, the American airman, overwhelmed with fear, started to vomit and had to be escorted to the bathroom. In another case, a policeman accused by the person he had arrested of forcibly sodomizing him, became estranged from his relatives, lost his job and his friends. In desperation, he attempted suicide. He was administered a PV examination using the Quadri-Track Zone Comparison Technique which cleared him, and all charges were subsequently dropped. These two cases, while anecdotal, offer a microcosm of the extreme fear of the consequences if found guilty that real-life suspects experience. The first author (Matte) has witnessed countless examinees, who, after being found truthful to the target issue, burst uncontrollably into tears of relief that an error was not made on their test, as verified by their physiological response to that question on the test⁵. These fears and strong emotions simply cannot be duplicated in a laboratory setting, and the only way that a PV examination technique can be evaluated regarding its capability to function effectively and accurately in the real world is through the use of field studies of real-life cases.

Academic arguments against the use of confessions as a criterion for ground truth in field examinations have been published (Iacono 1991, 2008) as objections to field studies that used confessions as ground truth (Mangan, et al. 2008a). These latest objections by Iacono (2008) were primarily based on the assumption that the confessions were coerced from the examinees confronted with the test results which were allegedly not acquired independently of the confessions. It was also argued that the errors would most likely be found in the unconfirmed cases of examinees whose responsiveness was somehow different from examinees in the confirmed cases. Furthermore, guilty examinees whose test results showed no deception would not be subjected to an interrogation and subsequent confession thus would fall into the category of unconfirmed cases. These concerns by Iacono would have some merit under the past

testing conditions he erroneously assumed still exist in all current PV examination techniques. Advances in instrumental technology, which include motion sensors, and the evolutionary progress in the psychological structure of test formats and protocol have significantly improved the objectivity, accuracy and standardization of psychophysiological veracity (PV) examinations using the polygraph. In their rebuttal (Mangan, et al. 2008b) to these objections to their use of confessions, they offer compelling arguments including research studies (Light & Schwartz 1999, Mason 1991) that support the use of confessions as a criterion for ground truth. Mangan, et al. point out that Iacono's objections presume that the PV examinations conducted in their field study were conducted in a vacuum.

"Unlike laboratory studies where there is no post-test connection, field studies of real-life cases are connected to post-test investigations and adjudications that can reveal errors or corroborate test results, which is another form of validity confirmation."

Mangan, et al. also pointed out in their rebuttal that they "calculated the average score for the unconfirmed and confirmed cases which revealed no significant difference in the reactivity of the subjects between the confirmed and unconfirmed cases, and there was no significant difference in the inconclusive rate, all of which indicates no significant difference in the examinees whose cases were unconfirmed and the confirmed cases appear to be a representative sample of the total cases."

They further pointed out that the results of all PV examinations conducted in their field study were entirely based on the analysis and numerical scores of the physiological data collected from each examinee in strict accordance with the technique's protocol, thus totally independent of any ensuing confessions. Furthermore, all PV examinations were audio/video-recorded as required by the American Society for Testing and Materials (ASTM) and the American Polygraph Association (APA) standards of practice, which provided a quality control review that would expose any procedural violations that would invalidate the PV examination or the ensuing confession.

Further published research and arguments in support of confessions used as a criterion for ground truth in field research studies of psychophysiological veracity examinations are cited in Krapohl, Shull and Ryan's (2003) article "Does the Confession Criterion in Case Selection Inflate Polygraph Accuracy Estimates?" Krapohl, et al. concluded that

“The goal of this study was to determine whether there were differences in scores and decisions attributable to the confession criterion. Though none were found in this study, the confession criterion remains a potential source of contamination in undercontrolled studies. The present data demonstrate, however, that it is an overstatement to broadly assert that the confession criterion is a contaminant in a study. It is more defensible to state that the confession criterion is suspected when it leads to samples of cases with non-representative data, such as those with scores more extreme than the population as a whole. It should be relatively straightforward for researchers to collect and report such evidence as others have done so that skewed data can be recognized.”

These principles and benchmarks are submitted as a living guide that is subject to change with the evolutionary progress of psychophysiological veracity examination techniques, instrumentation and advanced research.

¹ Raskin, et al. (1978) conducted a field study of PV examinations using the polygraph on convicted felons diagnosed psychopathic who lack a sense of guilt. Not a single guilty subject was able to produce a truthful result. In fact, there were indications that psychopaths may be somewhat easier to detect using PV examinations. However, psychopathic subjects are equally “fearful” of consequences as non-psychopaths.

² Single-Issue PV examinations present two threats to the examinee, namely the relevant questions dealing with the single issue or criminal act, and the neighboring control questions dealing with past behavior related to the same type of offense. The guilty examinee’s psychological set will be focused on the relevant questions which should dampen out potential responses to the neighboring control questions, whereas the innocent examinee’s psychological set will be focused on the control questions, which should dampen out potential responses to the relevant questions.

³ The term “control” question has recently been replaced with the term “comparison” question to conform to the current scientific literature. However, in this thesis we use the term “control” question to insure a clear connection with previous literature in the field of forensic psychophysiology, and avoid duplication of the term comparison in succession that could cause confusion, such as “comparison of comparison versus relevant questions.”

⁴ Implementation of the Backster or Matte Reaction Combination Guides, after commencement of the collection of the physiological data, which may influence or redirect the examinee’s psychological set, necessitates the collection of at least two additional charts scored separately to remedy previous chart defects. The necessity to actually execute any of the remedies in the aforesaid guides has been found to be rare.

⁵ Since 1977, the first author (Matte) has been using the Quadri-Track Zone Comparison Technique, which contains a separate track that includes a Fear-of-Error control question for comparison with a Hope-of-Error relevant question to determine the degree of fear or hope that an error will be made on the test regarding the target issue from the examinee’s responses to those questions. (Mangan, et al. 2008a; Matte & Reuss 1989; Shurany, et al. 2009).

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Attempts at Detecting Deception Through Evaluation of Non-verbal Symptoms

Since the earliest times, humans have undertaken attempts at finding an efficient method that would allow them to detect deception. The earliest attempts at detecting lies can be found in the works of Hippocrates and Avicenna, and in the descriptions of mediaeval ordeals (Bardach 1964:335). In ancient times, attempts were made to detect deception both by testing a single selected symptom (for example Avicenna described how he used the pulse to discover whether the person was lying or telling the truth), while other methods were based on the analysis of the entire behaviour of the person whose truthfulness was examined.

Following the instructions of the ancient Hindu Vedas, if you observe the behaviour of the subject during an interview, you can discover whether he is telling the truth or lying (Widacki 1981:14–15).

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Beginning with the 19th century, psychology has attempted at a description and scientific explanation of these observations and practical experience, while criminal investigation has tried to use it for its purposes. For example, the Polish manual of forensic technique and tactics from between the two world wars instructs that observation of the facial expressions of the subject during a search should help to discover the hiding place of the objects wanted (Chodkiewicz 1931:196–197).

Nineteenth-century psychology attempted to find the direct symptoms of deception (Munsterberg 1908). An attempt to find unique symptoms of the lie at the level of psychophysiology proved impossible. It was only much later research, conducted at the level of neurophysiology, that kindled hope for the opportunity to identify a lie as such (see below).

Early 20th-century studies focused on examining the physiological correlates of emotions accompanying deception, whose discovery entailed consequences for the deceiver.

Starting with the assumption that emotions encompass the entire organism, it could theoretically be assumed that observation of any section of the organism could allow its discovery. Yet, for practical reasons, the focus was on those physiological correlates of emotions that are easiest to detect and record. This entailed the construction of special equipment allowing the detection and recording of such physiological correlates of emotions (Trovillo 1939: 848–852).

Especially the following physiological correlates of emotions proved relatively easy to detect and record:

- changes in the work of the respiratory system
- changes in the work of the blood circulation system
- changes in the volume of the body organs
- changes in body temperature, changes in skin resistance to electric current (galvanic skin response)

and since the 1930s, also:

- changes in the electrical activity of the brain perceptible in the EEG recording (Widacki 2007: 96).

The research aimed at lie detection and, assuming that the lie has no discrete symptoms, unless its detection involves consequences for the deceiver or does not require an additional intellectual effort, on the psychophysiological level was

based on the examination of the emotions accompanying the fear of detection of the deception. In other words, this research focused on detecting emotion understood as an emotional trace accompanying an attempt at withholding possession of a memory trace of the event. Thus the entire instrumental so-called lie detection technique is based on detecting emotions accompanying withholding of possession of memory traces of the event. The technique of polygraph examination, which is based on developing such a situation through test questions, is based on the fact that the examinee – by denying the fact of having memory traces of the criminal event – develops emotional traces that can be discovered and recorded with the use of a polygraph, a device for recording changes in the course of breathing actions, heart rate, and galvanic skin response, as well as other symptoms.

Parallel to the perfection of the technique of polygraph examinations, research on expressive movements, that is mimic and pantomimic movements, was conducted in psychology. They were examined as an independent phenomenon, and also with the objective of finding in them symptoms of deception or emotions accompanying lying.

The research aimed to discover whether this way allows a definition of not only the strength of emotion but also its tendency (sign) or even its content. Can the emotion of anger be differentiated from the emotion of fear or surprise? One of the first researchers to try to develop a scale for interpreting mimic expression was Robert Sessions Woodworth in the 1950s. He divided emotions into six groups, in which he placed: first, love, joy and delight, in the next two fear and suffering, in the fourth anger and determination, in the fifth, disgust, and in the last, contempt. The division proved useful for research as far as the people examined mistook e.g. the emotions of fear for the neighbouring emotions (anger, surprise) yet never with the emotions that were extreme for the one examined (love, disgust) (Woodworth, Schlosberg 1966: 182–184). Another researcher, Harold H. Schlosberg, believed that Woodworth's six groups could be arranged into a circular plane with two axes inscribed on it. In this case, they were "pleasure – displeasure", and "attention – rejection", with neutrality situated at their intersection. This allowed emotions to be placed on the axes according to their intensity (Woodworth, Schlosberg 1966: 195–197).

Another question whose answer was sought was whether mimic patterns are inborn or acquired. Landis and Fulcher, who researched emotional activity in sighted and blind children, noticed that in the youngest seeing and non-seeing children there was no difference in the expression of emotions, while in older

children the sighted showed progress with age, both in the clarity of their facial expressions and in the number of movements. There were, however, no changes in the blind children (Woodworth, Schlosberg 1966: 200–202). These results were a particular confirmation of the research on maturing. Inborn patterns develop until a certain level and then stop. This study and its similarities to the research on maturing provide arguments supporting the fact that facial expression patterns are inborn.

By the end of the 20th century, research on improving the detection of deception methods with instrumental methods at the psychophysiological level (whose precision and accuracy proved no lesser than in other methods used routinely in criminal investigations) (Widacki, Horvat: 596–600) included attempts to single out specific symptoms of the lie at a neurophysiological level on the grounds of functional examination of the brain, which was allowed by the new technologies of examining functional changes in the brain, and especially by the fMRI (Langleben et al. 2002: 727–732).

Parallel to the above, research on detection of deception based on observation of behavioural changes was conducted.

Research on the behavioural symptoms of insincerity needed first to prove the theses put forth much earlier by Charles Darwin in the book *The Expression of the Emotions in Man and Animals* (1872) about the existence of universal supra-cultural patterns of expression of emotions. Thanks to numerous studies by Paula Ekman on facial expressions, it was successfully corroborated that indeed, besides those determined by culture, there are also universal, supra-cultural patterns of facial expression of emotion, with the supra-cultural patterns being primary (Ekman 1973). In the course of the research, Ekman managed to distinguish approximately 50 types of smile.

Further research on facial electromyography (EMG) proved that it differentiates positive emotions from negative ones well, that is it identifies the tendency (sign) of the emotions. Positive emotions are accompanied by increased tension of the zygomaticus major muscle (the muscle responsible for raising the corners of the mouth), rather than the muscle responsible for frowning the brows (Strelau, Doliński 2010: 670). Negative emotions were accompanied by a reverse pattern. In line with Ekman's studies, only approximately 10% of those examined are capable of intentional lowering of the corners of the mouth in a way that does not involve the chin muscle. On the other hand, when subjected to an appropriate emotion, the same people are capable of

moving the corners of their mouths down without any impediment, with no need to use the chin muscle (Ekman 1997: 84). Another discovery of Ekman's accompanying the research on facial expression was the discovery of micro-expressions. This refers to a very short lasting facial expression (usually difficult to notice) that is characteristic of the experienced emotion. It is the expression actually experienced in an emotional state, and appears on the face without the person experiencing the state being aware of it (Ekman 1997: 85). Expressions of emotions are to a great extent universal for all people, which has been proved in a wide array of studies (including Ekman and Friesen's on expression of emotions by members of the Fore tribe) (Strelau, Doliński 2010: 554). It is otherwise in cases when people intentionally want to show their current emotional state.

Researchers also devoted plenty of attention to observation of the movements of the human body, including so-called **emblematic gestures**. The emblematic gestures are the culturally approved signs which express meanings very precisely. Unlike other signs, they can replace words. Good examples of such gestures are moving the head up and down being a sign of acceptance, a thumb lifted up meaning that "everything is all right", and the middle finger, which means "be off". It is to be remembered that these signs may mean something entirely different in a different cultural realm. A good example here is the moving of the head up and down, which in most countries means acceptance and agreement, yet for example in Bulgaria is an expression of opposition. Another example of cultural collision of meanings in case of emblematic signs can be the sign given by a hitchhiker – an outstretched hand with the thumb pointing up, which in Greece is considered offensive, much like showing the middle finger in Poland (Pease 2001: 11–15). It is estimated that there are currently approximately 60 types of emblematic gestures in use in the US. We should, however, remember that these signs undergo continuous modifications and changes, and that they are as much alive as spoken language, which continuously changes, evolves, and borrows certain phrases from other languages. Besides the emblems, Ekman and Friesen (Ekman, Friesen 1969: 49–98) distinguish **regulators** (e.g. the slight nodding of the head to maintain a conversation), **emblems** (expressions including the raising of the brows to show surprise: the only means of expression quoted here that has supra-cultural dimension), **adaptors** (body manipulations connected to the touching of one's own body, e.g. rubbing the eyes), and **illustrators**, that is illustrative gestures. The last group is worth consideration, as their presence in the expression of the human body is nearly as common as that of the emblems. The task of the illustrators is illustration of the words spoken out,

and emphasising them during the speech. The goal of the illustration is to explain to another human notions that may be difficult to explain in words. It was discovered that people are more likely to illustrate when they lack a word or must explain something complicated, e.g. describe a zigzag or explain to a foreigner how to reach the train station; in such situations, illustrators appear more often. These gestures turn up more intensively in situations where the person is highly involved in sharing information, which means that an increase in illustrations denotes an increase in the emotions in the speaker. Illustrators are a good hint in lie detection. The first case of decreased gesticulation may be the fact of the lack of emotional involvement in what is being said, another may be the fact of lack of interest, or the presence of boredom or sadness. It may also be so that the person simulating excitement forgets about the illustrative gestures accompanying speech or performs them with a delay towards what is being said. Moreover, people gesticulate less when they do not know what to say and consider every word. If the lying person has not fine-tuned their “role play”, they will be cautious in gesticulation, to allow a focus on not letting others pick up on their inaccuracies. If the lie is accompanied by a powerful emotion, e.g. fear, then even a well-prepared liar may find it a problem to express his statements in a manner raising no suspicions. This is caused by the fact that the effort connected with hiding away powerful emotions would disturb their process of formulating their verbal expression (Ekman 1997: 96–100).

Researchers examining the usefulness of observation of behavioural changes in the capacity of the method allowing the evaluation of truthfulness of expression encountered the same problem that a few decades ago was faced by Woodworth: namely, which emotions are basic and which are derivative? The list of the former was defined by Ekman, who counted among them fear, anger, sadness, joy, disgust and surprise (originally, instead of surprise, there was the startle reaction, yet this was changed after research (Ekman, Friesen, Simons 1985: 1416–1426), as the startle reaction was considered a specific affective state).

The list of basic emotions defined by Ekman is practically recognised by other researchers, while it is a subject of controversy which emotions are derivative and what they are like. Progress in this matter was achieved by Kemper, who assumes that derivative emotions are the basic emotions, yet turning up in specific situations. Thus, for example, the sense of guilt is the fear that originates when the subject is in danger of punishment for a behaviour remaining at variance with accepted standards of a given society. Shame, in turn, is anger focused on oneself, pride is the joy that a subject feels having proved valuable in society, etc. (Strelau, Doliński 2010: 558)

Another symptom used to detect lying is observation of eye movement and the so-called pupillary reflex while answering questions. Life experience has proved that eyes allow us to diagnose various emotions. It has been defined that the eye contact maintained by a person who lies is more limited than in persons telling the truth (Leathers 2007: 310). More frequent blinking of the eyes and dilation of pupils is identified as a symptom of lying. Frequent turning of the eyes away from the person with whom the liar speaks is also considered a symptom of a lie (Zukerman, DePaulo, Rosenthal 1981: 3–59). A method of interpreting turning the eyes away from the interlocutor was developed in a book by J.N. Gordon and W.L. Fleish, who believe that it is based on neurological findings. The authors claim that turning the eyes to the left top-hand corner (looking from the listener) by the subject interviewed means fabrication. They explain this by the fact that the left hemisphere of the human brain is responsible for imagination, and hence the eyes are directed that way. Eyes directed also up yet to the right mean that the person is recollecting past events. This is caused by the fact that the right hemisphere is responsible for memory. Turning the eyes left (at the level of the ear) makes the author believe that the speaker is either making up or adding information that they have never heard, yet when they turn their eyes to the right at the same level, it means that they recollect the words which they have heard. This is based on the same rule as the previous description, that is the division of tasks between the hemispheres of the human brain. If a person only looks upward, it is to signify that such a person is already very tired with the interview. This position of the eyes is also called “eyes turned to God”. In such a situation it is assumed that the subject senses the fear and hopelessness of their position. In turn, eyes looking down mean that the person is confused and cannot recall any significant information. Eyes turned down and right signify recollection of highly emotional experiences, while those turned down and left mean that the person is speaking to themselves. The last position of the eyes remaining, i.e. looking straight ahead, takes place when the person focuses to visualise memories (Gordon, Fleisher 2002: 113–117).

Evaluation of the movement of eyeballs as a source of information on lying is very strongly criticised in literature. In their joint work, Aldert Vrij and Shara Lochun (Vrij 2000: 36) noticed that there are no scientific grounds to confirm the efficiency of this technique of lie detection or to describe its scientific grounds. Even despite that, the method is recommended in a variety of expert works. Notice, however, that the entire technique of observing the eyes is based on the practical experience of police and persecution officers, and should not be discarded at the outset, but rather thoroughly researched. The result of such

a study would finally solve the controversy over its usefulness and efficiency in lie detection.

Aldert Vrij (Vrij 2000: 209–215) divides lie detection methods according to the symptoms they are based on, namely: **non-verbal** (stammering, facial expressions of emotions, rigidity, slower pace of speech, frequent pauses while speaking, intrusion of sounds (Leathers 2007: 306–307)), **verbal** (e.g. indirect answers, incredible answers, lack of detail) and **physiological** (including increased blood pressure, quickened pulse).

In practical use today are a number of methods for detecting deception on the grounds of evaluation of verbal and non-verbal criteria. The best known of these include BAI (Behavioural Analysis Interview), based on the evaluation of the way of answering the questions asked (McManus 2008), and CBCA (Criteria Based Content Analysis), based on analysis of the contents of the testimonies by testing the logical structure of the expression, number of details quoted, etc. (Vrij 2000: 112–117). Today the most popular technique for measuring the truth of verbal testimonies is SVA (Statement Validity Assessment) (Vrij 2000: 109–128). Used to evaluate the credibility of children's testimonies, this technique is based on analysis of the content of testimony.

Vrij assessed efficiency of lie detection on the grounds of non-verbal methods. He analysed the results of nearly 40 studies by various authors from 1982–1999 concerning the accuracy of lie detection based on extra-verbal symptoms. Even though higher than their statistical probability as a rule, the accuracy is not relatively high, and varied between the studies from 31% to 64% (Vrij 2000: 94–95); it is beyond doubt lower than that achieved in both experimental and practical polygraph examinations.

Therefore, according to Vrij, the method of assessing deception on the grounds of non-verbal symptoms is certainly not as efficient as some authors, and especially Ekman, believe.

Vrij explains this by the fact that people differ from another in personality type, which may be material in non-verbal expression. This may be the reason why it does not make sense to look for universal behavioural symptoms of the lie, but only for symptoms typical of individual personality types (Vrij 2000: 49).

It must be noted that in polygraph examination, such individual differences in the personality of the subjects are usually insignificant, as no influence of

any type of an undisturbed personality on the reactions to test questions in polygraph examinations has been detected, and even people with behaviour disorders of antisocial types (psychopaths) are well suited for polygraphic examinations (Lykken 1957: 6–10; Raskin, Barland, Podlesny 1978).

It is worth mentioning here that the only researcher to recommend the non-verbal method of lie detection is Ekman, who assures that the efficiency of the method is at the level of 86%, yet if one takes into account the inconclusive results, its efficiency drops down to just 61% (Vrij 2000: 213).

There are interesting studies connected to the use of non-verbal lie indicators. They are the results of Polish studies conducted by Joanna Ulatowska. She tested three groups (students, Polish Internal Security Agency (ABW) officers, and prisoners serving short and long sentences) to discover which of these groups detects lies in the non-verbal method best (Ulatowska 2009: 411–428), observing facial expressions and behaviour. The analysis of the results of the research proved that there are significant statistic differences between the results achieved by students and criminals sentenced for the first time – both those who lied: $t(41) = 2.35$; $p < 0.005$, and those who did not: $t(56) = 4.11$; $p < 0.001$. Moreover, the differences between the results achieved by criminals convicted for the first time evaluated as non-lying and the lying repeated offenders proved significant: $t(56) = -2.9$; $p < 0.005$, as did those between the non-lying prisoners sentenced for the first time and the non-lying repeated offenders: $t(59) = 2.7$; $p < 0.05$.

The result of the study proved that prisoners serving short sentences were best at lie detection, and students did worse. The author believes that the reason for the above is most probably the environment in which the given group functions, being to a great extent decisive for the skill. Thus, the prisoners who found themselves in prison for the first time must be more vigilant to lies, as deception in their milieu may result in severe consequences. Ulatowska's studies prove that it is possible to learn certain non-verbal symptoms of the lie even subconsciously.

The ABW officers came second, detecting the lie better than the students, yet worse than prisoners sentenced for the first time. This proves that officers in special services are not sufficiently well prepared to recognise emotions on the grounds of observing non-verbal symptoms. This belief is also corroborated by the fact that the latest publication on recognising deception on the grounds of non-verbal expressions presented in an expert magazine, published by the

Internal Security Agency, is limited to elementary information only, makes no reference to any research or own experience, and is based on just three American works, none of them recent, translated into Polish (Galak 2009: 100–104). Yet also older research by foreign authors (Kohnken 1986: 1–17) proves that police officers detect lies on the grounds of behavioural symptoms at a level not higher than statistical probability.

It seems that it would be appropriate to test whether there are indeed specific non-verbal symptoms of emotions typical of individual personality types. Encouraging in this matter are the results of research obtained by Exline, Thibaut, Hickey, and Gumbert in 1970 showing that people with high results on the Mach scale maintain eye contact longer than those who scored low on the Mach scale. On the other hand, the studies by Knapp, Hart, and Denis of 1974 and by O’Hair, Cody, and McLaughlin of 1981 did not prove behavioural differences between people who achieved high and low scores on the Mach scale (Vrij 2000: 49).

Lie detection based on the evaluation of behavioural (non-verbal) symptoms could be successfully used in a number of situations, if the method could be improved.

First: in investigations, as an independent method that could be applied in situations when the polygraph cannot be used (as is the case with BAI, CBCA, and SVA). It would have no direct significance as evidence, but would facilitate the interrogation by focusing on the weak points in the statements of the subject.

Another application for the method is its auxiliary use in polygraph examination, where some authors consider the evaluation of the behaviour of the subject as an auxiliary premise for diagnosis (Widacki 1982: 81–82). The importance of those additional premises has been considered from the earliest use of polygraph examinations (Reid, Arther 1953; Horvath 1975: 210), when it was believed to be of fairly large importance.

With the improvements in the technique of polygraph examinations, and especially since numerical methods were introduced into general use in the evaluation of polygrams, the evaluation of the behaviour of the subject has lost some of its significance, turning into just an auxiliary, secondary premise for diagnosing (Widacki 1982: 81; *Standard...* 2007: 74).

It will be possible to use efficiently behavioural methods for detecting deception – once a diagnostic value higher than current has successfully been achieved – e.g. in job interviews, and in assessment of partner credibility in business and political negotiations.

The results of the research conducted so far are encouraging, yet still far from the expectations. We may consider that a study in the diagnostic value of individual (verbal and non-verbal) symptoms mentioned above in various groups, divided according to the criterion of personality traits, would be material. What seems especially interesting is the examining of potential behavioural differences in symptoms of lying in extroverts and introverts, and also in emotionally stable and unstable (neurotics). The hypothesis that such differences may exist seems justified from the point of view of theory.

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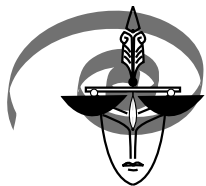
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Field and Laboratory Polygraph Examinations

Since the polygraph was used in criminal investigations for the first time, questions have constantly been asked as to how reliable the obtained results are, and to what extent they can be repeated by other polygraphologists after a certain period of time. These questions are raised mainly by the opponents of the forensic psychophysiology method as well as lawyers and judges.

We will start the discussion with Krzyścin's (1998) ideas about the techniques of the CIT (concealed information test) type, which will be the focus of our attention. Scientific research carried out after 1985 did not bring confirmation

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of the previous enthusiastic opinions about the high accuracy and reliability of this examination technique. It turned out that both in tests conducted as laboratory experiments and in real criminal cases there is never a 100% certainty that the result will comply with reality. In criminal events several different factors may affect the precision of diagnosis.

Over a decade has passed. Today, written sources state (Gamer, 2010) that tests of the CIT type are widely used not only in laboratory research but also in field examinations, mainly in Japan. This view is shared by other authors as well (Suzuki et al., 2004; Carmel et al., 2003; Podlesny, 2003; Iacono, 2008b). This means that scientific and field researchers (polygraphologists) communicate little, i.e. the exchange of information is poor.

To begin with, an entire group of CIT type tests with certain modifications is available today:

- GKT – guilty knowledge test (Abrams, 1989)
- CKT – concealed knowledge test (Seymour et al., 2007, 2009)
- POT – peak of tension test (Abrams, 1989)
- MCT – multiple choice test (Krzyścin, 1998)
- SPOT – searching peak of tension (Nakayama, 2002)
- GAT – guilty actions test (Bradley et al., 1992, Gamer, 2010a, b)
- POT-A – known solution POT (Konieczny, 2009)
- POT-B – searching POT (Konieczny, 2009)
- GCIT – group CIT (Bradley et al., 2010)
- EKT¹ – event knowledge test (Saldžiūnas et al., 2008a, b, c, 2009a)

Thus, are tests of the CIT type used only in Japan? We tried to close this gap at least in part by making use of our personal contacts, and present the collected information in Table 1.

We have already gained considerable experience by investigating complicated criminal offences under field conditions. We are also interested in what is examined by scientists in laboratories. Most laboratory studies are concluded for the purpose of generalising the field (Pollina et al., 2004). Important sources of variability in field studies include the format of the test questions used during the polygraph examination, the personalities of the examinee and examiner, polygraph measures used, and the rules used to render a deception indicated or no deception indicated decision. We will look briefly at the opinions of various authors comparing the results obtained in the laboratory and under field

conditions. All universities (in the USA, Canada, Germany, Holland, Belgium, Finland, Israel, Japan, Scotland) where experiments were conducted prove that tests of the CIT type have a scientific basis and can be used to identify concealed information.

Table 1

Percentage of CIT in field examinations performed by organisations conducting criminal investigations.

Country	Organisation	$\frac{n(\text{CIT})}{n(\text{CIT}) + n(\text{CQT})} \times 100, \%$	Information source
Armenia	Ministry of National Security	60–70	Apojan et al. 2000
Bulgaria	police	0	Nikolova et al. 2000
Belarus	militia	90–100	personal contacts
Estonia	police	0	personal contacts
Japan	police	90	Nakayama 2006
Kazakhstan	police	95–99	personal contacts
Latvia	police	0	Mikelsons 2000
Lithuania	police	100	authors
Poland	police	60	personal contacts
Russia	militia	45–55	personal contacts
Serbia	police	90	personal contacts
USA	FBI	13–18	Podlesny 1994

n(CIT) – number of field examinations performed by using tests of CIT type

n(CQT) – number of field examinations performed by using tests of comparison question test type

M. Nakayama (2002) notes that CIT in the field differs from a memory test in a laboratory experiment.

According to E. Elaad (2003), the main problem with a mock crime situation is that the control questions are real questions, whereas the relevant questions correspond to the mock crime, which is likely to be less threatening than a real crime.

However, according to W. Iacono (2008), in real life it is much more difficult to determine who is in fact guilty or innocent.

R. Suzuki et al. (2004) say that the CIT, especially in the field rather than the laboratory, may also operate through more emotional psychological mechanisms. The danger of generalising from the laboratory to the field is especially great in the case of the psychophysiological detection of guilt.

It is highly likely that the difference between the two situations is not just a matter of degree of attention paid to the questions, but rather a difference in the quality of the emotions involved. Breath-holding (respiratory apnea) is quite rare in laboratory experiments; it occurs quite frequently in field CITs.

According to B. Vershuere et al. (2005 b), our results further demonstrate that antisocial inmates (applicable to women as well) reduced electrodermal responding to concealed information. The electrodermal hyperresponsiveness in antisocial individuals might therefore threaten the validity of the concealed information.

According to J. Furedy (1991), our manipulation of motivation had no main or interactive effects on differential responsibility to the questions (laboratory studies).

According to G. Ben-Shakhar (2002), nonetheless, evidence from laboratory studies must be supplemented by evidence from field studies, because real interrogations differ from simulated GKT experiments in important ways. (1) Simulated GKT experiments have used very simple tasks in which it was ascertained that all subjects learned all the relevant items, and memory for these details was not a concern, because subjects were typically tested immediately after being exposed to the guilty information. In real life, the offender is faced with a complex scene, and may not in fact notice, process, or store all details in his memory. Moreover, because suspects are rarely tested immediately after committing the criminal act, and sometimes only months later, the forgotten details may lose their signal value. (2) The main thing that could jeopardise a GKT test – leakage – was missing in the simulated studies. In real interrogations, critical items may be leaked to innocent suspects, raising false-positive errors – especially if informed innocent suspects are unable to explain how they became aware of the guilty information. See more on this issue below. (3) Though mock-crime experiments give subjects motivation to “pass,” suspects in a real crime are obviously more motivated to use countermeasures.

According to Ben-Shakhar et al. (2003), our meta analysis is limited to experimental studies. The results indicate that the electrodermal measure can

provide an efficient means for detecting relevant information and for differentiating between individuals with guilty knowledge and those who do not have that knowledge.

According to Fiedler et al. (2002), situated somewhere between everyday lying and lying during a real life criminal investigation, laboratory studies on the CQT have their own unique features. We have largely excluded these studies from this consideration because such laboratory studies are qualitatively different from, and hardly comparable to, real-world courtroom procedures. A participant in a mock crime study or temptation study, who is deliberately requested to lie about a predetermined subject, does not experience any moral or affective conflict about lying, because nobody is (or stays) deceived. Lying in a psychological experiment is socially acceptable, the subject does not have to fear the trait label "dishonest." Deception becomes a playful task and a credible lie becomes an achievement not accompanied by shame. Most importantly, the respondent does not have to fear any serious consequences of being caught while lying. Providing positive incentives for successful lying does not represent a substitute for the extreme negative motivation that characterises forensic lie detection in reality.

According to Carmel et al. (2003) (1), in mock-crime studies, it is typically guaranteed that the guilty participants take notice of all the relevant details and remember them when they take the GKT. This is achieved through instructions that specify all these details precisely. Furthermore, in realistic conditions participants were told that they could stay in the office for a limited time (five minutes), after which the room's occupant, a teaching assistant, would return to his office and catch them. In addition, participants in the realistic conditions were not reminded of the relevant details before the GKT (2). Whereas in the standard mock-crime paradigm the GKT is administered immediately after the mock crime, in a realistic setting it is usually administered after a long period.

According to Gamer et al. (2010a), in laboratory studies relying on the mock crime paradigm, it was typically guaranteed that participants took notice of all relevant details and it was assured that they remembered them in the subsequent GKT examination.

M.C. Cullen and M.T. Bradley (2004) are right: laboratory studies do not approach the emotional and tension levels associated with the field situation.

We can see that the question of what the difference is between laboratory and field polygraph examinations is important for both scientists and field specialists. We as practitioners are greatly surprised by the statements emerging about realistic mock crimes (Jokinen et al., 2006). Without seeking to prove that we are absolutely right and to be comprehensive, we offer our thoughts for a discussion.

~ 1. We reviewed the major part of laboratory examinations and prepared Table 2.

Table 2.

Mock crimes participants of laboratory examinations.

authors	participants	age/mean age
Patrick (1991)	prison inmates	25.90
Furedy (1991)	undergraduate students	–
Ben-Shakhar (1999)	undergraduate students	–
Ben-Shakhar (2000)	undergraduate students	22.17
Ben-Shakhar (2002)	undergraduate students	22.3
Elaad (2003)	interrogators	30.5
Carmel (2003)	undergraduate students	23.3
Verschuere (2005a)	students	18.22
Verschuere (2005b)	students	18.63
	male prisoners	39
Gronau (2005)	undergraduate students	–
Elaad (2006)	college students & staff	26.7
Meijer (2007)	undergraduate students	21–33
Verschuere (2007)	undergraduate students	18–20/18–30
Seymour (2009)	undergraduate students	–
Elaad (2009a)	college students	22.9
Elaad (2009b)	undergraduate students	23.06
Gamer (2010a)	students (80%)	26.2
Gamer (2010b)	students (89%)	24.2

Students, i.e. individuals with a fairly good education and quite intellectual, having almost no health disorders, almost no drug addicts among them, their average age is around 22, generally take part in laboratory examinations. The subjects in this category of examination have a labile nervous system and rapid response of answers (short latent time). Individuals in this category are known

to usually exhibit clear GSR responses (Soshnikov et al., 2008). Verschuere et al (2005b, 2006) pointed out that antisocial inmates display reduced electrodermal responding to concealed information. We think that this observation is just right. During field measurements, we do not have the possibility to impartially assess the examinee's level of sociability. We only noticed that individuals with lower intellect, blue-collar workers, and alcohol abusers may display much weaker GSR responses or electrodermal responding may be completely uninformative.

~ 2. During field examinations, after the options for answers provided by the examiner (in the case of EKT), subjects do not always use words YES and NO in their answers. They unintentionally, and sometimes intentionally, answer: I don't remember, I don't know, I don't know this person, I didn't do it. Sometimes there is a pause prior to the answer as the examinee starts thinking (is looking for the right answer). This is applicable only to EKT, where the subjects being examined are not told the options of answers in advance. Sometimes the subject asks to repeat the question or makes a comment on the answer. Due to this psychophysiological response records become more complicated, with a lot of artefacts.

~ 3. After hearing the options of answers, the examinee sometimes comes up with an answer unusually quickly (EKT). If this is a consistent pattern after critical or key answers (knowingly related to the event), it is likely that he wants to deceive in a primitive way that he is telling the truth.

~ 4. The examinee may face very serious consequences after the conclusions of field examinations: suspicions against him may be proved or not. Although during laboratory examinations subjects are motivated or encouraged, their psychological state is not as tense as in the event of a real criminal act. The results of a study by Pollina et al. (2004) suggest that there are significant differences between field and similarly obtained laboratory psychophysiological detection of deception response measures. In the lab, the emotion is likely to be fascination with the process and the desire to "win the game". Furthermore, in real-life tests, guilty suspects might experience fear and, with the increasing threat, the physiological activation to crime relevant information might shift from orienting to defensive responses, which prepare the individual to fight and flight (Verschuere et al., 2004). We noticed that in real examinations a guilty suspect (which becomes clear in court) may experience very strong emotions due to which psychophysiological response records become very complicated and difficult to decipher.

We noticed that even innocent individuals (unrelated to the criminal act) worry a lot at the beginning of the examination. Therefore, at the beginning of the EKT test we ask introductory questions which are unrelated to the criminal event being investigated and after which innocent examinees calm down (Saldžiūnas et al., 2008a, b, c).

~ 5. During field examinations, individuals who committed the criminal act being investigated sometimes use counteractions in order to mislead the polygraphologist (Varlamov et al., 2000). Thus far, we have not had a case where an examinee who did not commit a criminal act impeded the investigation.

~ 6. An experienced qualified polygraphologist makes a reasonable conclusion not only on the basis of individual responses recorded by sensors. He makes a comprehensive analysis of the examinee's non-verbal responses, the general development of psychophysiological responses during the entire examination (Saldžiūnas et al., 2008c), the acoustic timbre of the examinee's answers, latent time of answers, and the examinee's tactics of cooperation. Laboratory polygraph examinations are rather poor in this respect.

~ 7. Subjects in field examination may be drug addicts, individuals using psychotropic medications in large doses, people with impaired hearing, or with disturbed response to external stimuli. The records of aforementioned subjects are also more difficult to decipher.

~ 8. Not everything that is going on during a real criminal act is noticed and memorised by a witness or participant in a criminal act (Saldžiūnas et al., 2009d). The polygraphologist does not know what the examinee remembers; therefore, he can formulate questions and answers to which no symptomatic (significant) responses are recorded.

~ 9. Interference of serial offenses on memory. The repetitive character of offenses, such as theft or burglary, may present difficulties for the examinee to recall details about each crime incident precisely (Nakayama, 2002; Carmel et al., 2003).

~ 10. In laboratory examination, the polygraphologist knows exactly the story of a criminal act. In field examination, the polygraphologist often has to look for the details of a criminal act; therefore, questions and answers formulated during the examination are not precise and may "miss the point".

~ 11. Several laboratory works are aimed at identifying how leakage of relevant information influences innocent examinees in the GKT (Ben-Shakhar et al., 1999; Elaad, 2009b). Yet, it is most unlikely that in laboratories it is possible to check how the results of a psychophysiological polygraph examination are affected by the fact that the perpetrator (this fact is unknown during the psychophysiological examination) explains that he found out one or several details about the criminal act from the interrogator or the media. Thus far, it has been recommended to exclude such questions from tests of the CIT type (Abrams, 1989; Iacono, 2008b; Konieczny, 2009; Nakayama, 2002). Our colleague from Belarus V. Kniazev and we are collecting material from field examinations and hope to discuss this issue after some time.

~ 12. A field examiner usually works under conditions which are far from ideal:

- time – by law, detained suspects are entitled to timely meals and rest
- working conditions – due to material or other tactical circumstances it is impossible to ensure ideal compliance with the requirements imposed on the premises where the examination is carried out and its equipment (Konieczny, 2009)
- lawyers – suspects have the right to legal defence and their lawyers may interfere with a smooth polygraph examination
- medicine – it is impossible to ensure that the individuals being examined have not taken any medication.

~ 13. Nakayama (2002) concluded that the decreased respiration rate during the critical question depended on the expiration period. It was confirmed that expiration period is the most effective index of deception (unopenness) in a field situation. In laboratory examinations, however, Gamer et al. (2010a) did not find significant group differences in the respiration pattern between guilty examinees and informed innocent.

~ 14. An assumption was made (Lewandowski et al., 2008) that polygraphic research is based on revealing mental and emotional traces, independent of the fact whether the person examined tells the truth or is trying to conceal or distort the truth, it is possible to define what actual mental trace is recorded in the person's nervous system during an examination. In our view this assumption is worth serious discussion and verification in field examinations.

~ 15. In field polygraph examinations, due to a high emotional tension felt by the "guilty" examinee, the questions may be divided into emotionally strong and

weak questions. It is obvious that this grouping is subjective, i.e. understood from the polygraphologist's position. When combining strong and weak questions, the polygraphologist may develop the tactics of examination (Saldžiūnas et al., 2008 c). When examining the "innocent" examinee by polygraph, in our view, the tactics of sequencing questions are not important.

~ 16. In field examinations, the examinee is usually more focused on the problem of the examination being performed and potential consequences; therefore, he is less responsive to insignificant external stimuli of the surroundings (low noise, certain movement, etc.). On the other hand, the examinee is very sensitive to each motion or word of the polygraphologist (Saldžiūnas et al., 2009b).

Conclusions

- The use of the polygraph is a scientifically-based application of psychophysiology.
- Although significant differences between field and similarly obtained laboratory polygraph data have been found, laboratory studies using mock-crime scenarios can provide useful information about the field polygraph situation (Pollina et al., 2004). The cost to a particular lab of implementing a new measure is important for progress in the field (Furedy, 2009).
- Only some CIT test options may be modelled in laboratory examinations.
- Most probably scientists should take interest in the tactics employed by field examiners.
- Nonetheless, some generalisations are possible to make only from field works.

¹ EKT is the most universal test of the ones mentioned here. It encompasses the tactics of all CIT type tests. An entire series of special tactics has been developed for the EKT test which greatly extends its possibilities. When performing EKT in cooperation with criminal investigators of the police in Lithuania, the suspect's role in the event can be identified, i.e. whether the individual is a) completely unrelated to the event, b) a witness to the event, c) an accomplice, d) a perpetrator. In the event of several perpetrators, their roles in the criminal act can be identified, i.e. the contribution of each perpetrator to the criminal act. When performing EKT, the instruments of the criminal act, the mode of the criminal act, the technique and the place can be identified, and the instruments of the criminal act and victims' bodies can be found. We are further enhancing EKT tactics. As soon as they are tested in field (practical) examinations, we will provide them in our later articles for your comments.

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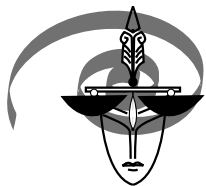
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Book reviews





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Vladimir Kniazev
Detektor lzhy na strazhe istiny
(Lie detector guarding the truth)

Print-Center, Minsk 2009, 360 pp. (book in Russian)

Published in Russian, the book by Vladimir Kniazev, an officer of the Belarusian Ministry of the Interior, who – to quote the publisher’s information – helped to discover over 400 crimes by using polygraph tests, in which he helped to popularise the polygraph and its “mass use” in Belarus.

The book begins with a presentation of the history of lie detection from the earliest times to the instrumental attempts at such detection in the late 19th and early 20th centuries (Lombroso, Mackenzie, Benussi, Marston, Larson, Keeler). The discussion of the activity of Reid and Backster follows. This is generally available knowledge, in a sense akin to course book content. Beyond doubt the most interesting part of this chapter refers to the history of lie detection in Russia (and also in the USSR) that is generally unknown to the Western reader.

Mentioned in the book are works by I. Tarchanoff (1846–1908) on galvanic skin response, Vladimir Bekhterev (1857–1927) on the physiological mechanism of emotion and methods of measuring it, and finally the works of Alexander Luria (1902–1977) in the scope of psychophysiology and psychoneurology that are known in the world. The author describes also the practice of using the polygraph in the USSR. Late in the 1960s, it was used by units of the Main

Headquarters of the Red Army. At the same time first research on polygraph examination began to appear in the USSR. All information, whether on the use of polygraph in practice or on experimental research in the scope, were covered by the clause of highest secrecy. In 1970 the first candidate (i.e. doctoral) dissertation in the field was defended.

In 1975, the then head of KGB, Yuri Andropov, issued the first regulations concerning the use of the polygraph into state security organs of the USSR.

The construction work on the Russian polygraph followed in parallel. The first such machine was constructed by a member of the Academy of Sciences, Dr Valery Alekseevich Varlamov.

Already in 1959, Andrei Sichev and Varlamov, working at a psychiatric hospital in Krasnodarsk, constructed two machines, three- and six-channel polygraphs, to be used for light detection in psychiatry and in forensic diagnosing. In 1962 Varlamov – as the author claims – constructed the world's first non-contact polygraph machine. Varlamov is also the constructor of the “Edelveis-4” and “Eskulap” units produced in short series by Invaset in the 1980s.

In 1991, polygraph was used to the commission of the Office of the General Prosecutor of the USSR in the trial that followed the murder of Russian Orthodox theologian, Fr Aleksandr Men.

Approved in March 1992, the Act of the Russian Federation on operational reconnaissance actions provided the general basis for using polygraph examination in criminal investigations.

The first detailed act of law that regulated the use of polygraph in the work of law enforcement was the Order of the Minister of the Interior of the Russian Federation of 30th July 1992 on legal and normative standards for using the polygraph in the organs of law enforcement of the Russian Federation.

On 1st March 1993, the Office of the General Persecutor and the Ministry of Justice of Russia accepted the use of polygraph for the organs of state security in Russia.

The arrival of the imported state-of-the-art IBM computers and software in Russia in the 1990s as a result of the withdrawal of the embargo made the

construction of computer polygraphs possible. The first local products made it to the Russian market in the mid-1990s; they were the “Aviks” and “Ineks” in three-, four-, five-, and six-channel versions.

The author states that in 1996 the “Aviks” and “Geolig” machines of the KPS-06 and KPS-07 types accounted for over 80% of all the polygraphs used in Russia. Later, new firms producing polygraph devices arrived in the market; they were Epos producing “Epos” machines, and Nova which turned out “Alfa” and “Delta” polygraphs.

Beginning with 2000, the “Diagnoz” unit was produced on the grounds of the experience of the Federal Security Service (FSB) of Russia. Two years later, a new version of device was marketed under the name “Polarg”. In 2004, new polygraph machines made it to the market: “PiK” from Areopag-Centr, “Di-ana”, made by Polikonius-Centr, and APK “Konkord” produced by Konkordia. In 1994, the Forensic Science Institute of Federal Security Service of Russia held the first conference on unconventional methods of combating crime, with one of the three main themes being the use of polygraphs for operational reconnaissance actions. 28th December 1994, the date of publishing appropriate bylaws by the Ministry of the Interior (the Ministry’s Order No. 437) marks the beginning of general use of polygraphs by law enforcement organs reporting to the Minister of Interior. In 1993–1995, the device also began to be used for commercial purposes.

A special unit for polygraph examinations has existed in the Ministry of Interior since 1995. In spring 1998, the Russian Ministry of Defence published an instruction that allowed polygraph examinations of civilians and military in connection to admission to secret information. In 1999–2004, the polygraph was allowed for examining civil officers in different branches/fields. In many regions of Russia, polygraph examinations are made in court cases, and their results are admitted as proofs by courts of various levels, including the Supreme Court.

Further, the author describes the use of polygraphs in the Republic of Belarus (independent since 1991). The use of polygraphs in this form in this former Soviet Republic is regulated by the order of KGB No. 91 of 22nd August 1998. According to the book reviewed, practical polygraph examination was began by an employee of the Personnel Department of the KGB, I.A. Archipov, who had received an appropriate training in Moscow. In Belarus, the polygraph is

used for “multiple purposes” including, as the book states, HR purposes and operational reconnaissance work. The machine used is the “Barrier”.

The first doctoral dissertation on polygraph examination was defended at the Belarusian Academy of Interior in 2000. A year later, on the power of the Order No. 206 of 31st October 2001, the principles of applying polygraphs in the organs reporting to the Minister of the Interior was introduced in Belarus.

The author reviews the clauses of the Belarusian Code of Criminal Procedure from the angle of using the polygraph for providing proofs in criminal procedures.

He believes that since 2000 polygraph has been in general use in Belarus, while polygraph examiners received their training mostly in Russia. Belarus cooperates very deeply with Russia in this scope by exchanging experience and conducting scientific research. Established in 2007 in Moscow was the International Association of Polygraph Examiners that gathers, as can be guessed, polygraph examiners, mostly from the former states of the USSR.

The further section of the book contains the basic information concerning the polygraph, its construction and operation, and presents the essence of polygraph examination. Even though the author does not go here beyond the course book knowledge, he proves his knowledge of American practice in the scope, and familiarity with American literature. He quotes the principles of using the polygraph defined by the American Department of Defence, and describes cases from Belarusian practice, both in criminal investigations and in personal (HR) matters.

Describing in a further part of the book the instrumental and non-instrumental methods of light detection, the author quotes the practice and works by American services and institutions (Defence Security Service, Department of Defence Polygraph Institute, Defence Academy for Credibility Assessment), the latest research and practices from Russia (earlier the USSR), and also, though in a much more modest scope, practices from other countries.

What deserves special attention is the history and description of the operation of the APK Mind Reader device and system, and its latest versions used in Russian airports for examining passengers to eliminate people connected to terrorism from among their stream. What can be quoted as a curiosity is the

fact that the examples of airports furnished with such a system provided by the author include Moscow's Domodedovo Airport, where a recent terrorist attack ended in bloodshed/loss of life. The description of the essence of the "Mind Reader" procedure itself deserves a separate analysis. Enough to say that the use of this procedure in the APK Mind Reader-2 version allows examining approximately 12 people per hour for selection purposes.

The author describes also contemporary attempts at using EEG for lie detection, the use of magnetic resonance (MRI) for the same purpose, and also the latest methods of noncontact polygraph examination (including those by the noncontact "Centurion-2" polygraph device constructed by V.A. Varlamov).

Among the noncontact methods, the author provides a general description of "laser Dopplermetry" that allows remote examination of muscular tension, voice changes, pulse, heart rate, the breathing process, and trembling. There is also a general description of the method for examining the trajectory of the eyeballs.

Quoting British research, the author briefly describes the examination of microexpression, whose analysis also serves lie detection.

What deserves special attention is the description of the so-called "Egoskop" produced by the Russian company Medikom MTD, which is used for parallel observation of all the changes in the human organism registered with all the available methods used in instrumental lie detection.

The book includes photographs and descriptions of contemporary Russian computer polygraph machines, namely MCP-2611.33, "Diagnoz-01", "Polarg", "Pik-01.A", "Alfa", "Delta", "Konkord", "Epos", "Diana-01", "Korsar", "Rif", and "Barrier-14".

Most of the bibliography presented at the end of the book, comprising 89 items, are examples of Soviet, Russian, and Belarusian literature generally unknown in the West. The annexes include Belarusian acts of law and instructions on polygraph examinations.

Disregarding the fact that the book is carelessly edited, the chapters are not numbered, and there is no clear distinction between individual chapters, subchapters and other bodies of text, it has its value. It is a priceless source of

knowledge about polygraph examinations in Russia and in Belarus, presenting for the first time such an extensive scope of literature, mostly unknown in the West.

With this in mind, one cannot but agree that the book is worthy of being recommended to all those who are interested in polygraph examinations for professional reasons.

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For example (in references):

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