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EUROPEAN
POLYGRAPH

Volume 1 • Summer 2007 • Number 1

Dear Readers,

We are pleased to present the first issue of the scholarly journal *European Polygraph*, which henceforth will be published quarterly.

The home of the polygraph is the United States; it was there that the first polygraph was built and first used in practice. A substantial portion of the scientific studies fundamental to polygraph research was also conducted in the United States and the results have been published in American scientific and specialist journals. Finally, the United States host the largest organisation in the world for persons involved in various aspects of polygraph examinations – the American Polygraph Association.

Asia is without a doubt the second continent – after America – in which the polygraph has entered into permanent practise and is the subject of scientific research. Scientific and experimental research on the polygraph, analysis of its practical applications, and the widespread use of polygraph examinations in Israel and Japan are well-known. The polygraph is popular in many other Asian countries, such as Singapore, Malaysia, and Taiwan.

The use of polygraph examinations in Latin America is also known. In Europe, the polygraph has been used relatively the least, or at any rate information on it has been the least well-known. Further, European scientific work on polygraph examinations seems disproportionately meagre compared to European scientific potential.

Traditionally, Western Europe has not been favourably disposed in general toward polygraph examinations. Further, the work on polygraph examinations conducted in Central and Eastern Europe – apart perhaps from Poland and the former Yugoslavia – was also not widely known around the world. After the unification of Europe – made possible with the fall of communism and the end of Soviet domination in the region that took place several years ago – it is possible to speak once again about a single European science. As it turns out, many Central and Eastern European countries have their own – though not widely known – body of scientific work and practical experience with polygraph examinations. The attitude toward polygraph examinations is changing in Western countries as well, as evidenced by the increasingly wider use of the polygraph by the Belgian police or the change in attitudes toward the polygraph noted in Germany.

Our journal was conceived as an international forum upon which to present the achievements and scientific research in polygraph examinations. The forum will also serve as a means by which to exchange practical experience from many countries and publish book reviews of works devoted to the subject.

The issue of polygraph examinations includes basic research in myriad fields such as psychology, psychiatry, psychophysiology, criminology, forensic sciences – and in the near future – certainly also neurophysiology and others. The journal will also deal with approaches and research conducted as part of criminal justice, jurisprudence (criminal procedure), human rights, labour law, and others. It will also contain philosophical and strictly ethical reflections on polygraph examinations. Our objective is to publish works on polygraph examinations from this broad spectrum of sciences.

We will publish both the results of experimental research, as well as analyses of practises, case studies, works on the history of polygraph examinations, legal considerations on polygraph examinations and their admissibility in investigations and court cases, as well as pre-employment and control examinations such as those used in the civil service and in business.

We will also publish training materials based on practical experience, book reviews of works on polygraph examinations, and proceedings from conferences and seminars devoted to the subject.

We invite all of you to co-operate in this endeavour.

Prof. Jan Widacki LL.D.
Editor-in-Chief

Krakow, Summer 2007



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The actual use of investigative physiopsychological examinations in Germany¹

Wilhelm Wundt originated systematic experimental psychological research and in 1878 established the first Psychological Laboratory at the University of Leipzig. It was there that he and his colleagues initiated highly industrious research activities and within a short period of time they produced a host of publications.

Two traditional academic professions closely observed the research findings of the new scientific discipline: psychiatrists, seeking to learn more about the functioning of the normal human mind and legal scholars, looking for psychological methods and techniques to identify the perpetrators of crimes under investigation.

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¹ Paper presented on the European Expert Meeting on Polygraph Testing, March 29-31, 2006, Maastricht, The Netherlands.

At the turn of the 19th century, the Austrian legal scholar Hans Gross taught criminal law at the German University in Prague. He was especially interested in the most recent findings of the new discipline of physiological psychology. From time to time, he presented selections from psychological literature to his students. On one such occasion, he told them about Wilhelm Wundt's experiments with the Word Association Test. One of his students, Max Wertheimer, became interested in the Word Association Test technique and envisaged that it had the potential to be a suitable tool to identify perpetrators of crimes under investigation. Fascinated by the success of his preliminary experiments with the Word Association Test, Wertheimer decided to change disciplines – from jurisprudence to psychology – and wrote his dissertation in Würzburg under Marbe on this topic (Wertheimer, 1906).

At the same time, the German-Swiss psychiatrist Eugen Bleuler demonstrated interest in the Word Association Test, with his main concern being the question as to whether the associations of mentally ill persons differ in any way from the associations of mentally healthy persons. At that time, Carl Gustav Jung served as his senior assistant staff physician. Bleuler, as head of the prestigious psychiatric hospital Burghoelzli (near Zurich), entrusted Jung with the research on this subject and in 1902 Jung performed six experimental studies on the Word Association Test that were published in journals from 1904 to 1910. Later, these works were published in English as volume 2 of Jung's Collected Papers. Jung also developed the idea that this test could possibly be used for criminal investigations and he tested its applicability in two criminal cases. In both cases, the outcome of the Word Association Test was correct (Jung, 1973).

Wertheimer and Jung simultaneously and independently developed the idea that the Word Association Test's validity could be increased by the simultaneous recording of involuntary peripheral physiological reactions. This was another consequence of the impressive research that had been performed in Wilhelm Wundt's laboratory at the end of the 19th century.

After the early years of the 20th century, only occasional research was performed on the use of peripheral physiological reactions in the investigation of crimes. Occasionally, an anecdotal article was published in a minor journal and the interest of police scientists and the legal community was very low. Eventually, this kind of investigative tool fell by the wayside.

The story continues in the United States. How did scientists and police officers learn of an approach that had its origins in Germany and in the German-speaking part of Switzerland?

William James, professor of psychology at Harvard, was an admirer of the German psychologist Hugo Münsterberg, who was Wundt's student from 1882–1885. William James was so profoundly impressed with Münsterberg that he arranged to have him visit Harvard for three years (1892–1895), hoping that the appointment could be made permanent. Once in the United States, Münsterberg's energetic mind moved at once from experimental to still newer psychologies. He broke ground in psychotherapeutics, forensic psychology, and industrial psychology. Edwin Boring praises him with the words: "In a sense he 'founded' applied psychology" (p. 428).

In 1908, Münsterberg published his book *On the Witness Stand*, in which he summarised German research in the field of forensic psychology, especially with regard to eye witness testimony and psychological methods of identifying perpetrators. This book made German research findings known to the interested American public. Münsterberg advocated greater forensic attention to the techniques of experimental psychology.

Among his students was William Marston, J. D., PhD, who developed a technique for use in actual criminal cases. Marston was an avid publicist and he either coined the misleading term "lie detector" himself or else adopted the expression from one of the journalists to whom he described the wonders of his technique.

This term of course was a misnomer, as Martin Orne, born and raised in Germany and later – in order to save his life – emigrated to the United States, pointed out (1975):

Not only are the physiological changes as such unrelated to lying, but it is not even the act of lying *per se* which brings them about. This observation can readily be documented in laboratory experiments (p. 95).

The development of the instrument as well as the question technique rested for several decades in the hands of practitioners.

After World War II, Germany was divided into four occupied zones. The Military Police of the US armed forces had "special agents" working as polygraph examiners. A few of them were German refugees and thus German-speaking. In time, some German defence attorneys established contact with US military defence attorneys. During their conversations, German defence attorneys discovered that the military Criminal Investigation Department, as well as the military defence attorneys, asked suspects who denied charges brought against them to submit themselves to a polygraph test. In this manner the suspects had a chance to prove their innocence; many times the result was that the charges were dismissed. In some

homicide cases, German defence attorneys advised their clients who pleaded not guilty to submit to a polygraph examination in order to disprove the charges brought against them. None of the German lower courts admitted polygraph evidence. At least one German defence attorney appealed a lower court decision and took the case to the German Federal High Court.

In 1954, this Court ruled (BGHSt 5, 332) that basic principles of German constitutional law and criminal procedure prohibit the use of polygraph examinations because they encroach upon the freedom of the defendant to make decisions and act according to his own will. This freedom of the accused is based on the principles of constitutional law and criminal procedure, as well as upon the concept of an individual's self-accountable moral personality. Infringements upon the freedom of personal will are prohibited regardless of the accused person's consent to their violation. It was this right of the accused to decide whether and how to answer every question that the Supreme Court held to be irreconcilable with the application of a polygraph examination. The reasoning behind this decision held that during a polygraph test, a guilty party may voluntarily answer questions.

At the same time, however, his involuntary reactions when attached to the polygraph instrument would reveal the fact of his guilt and this information is actually obtained against his will. This insight into the accused's soul violates his freedom of decision and action. Accordingly, polygraph examinations must be prohibited in criminal proceedings, as each individual has the right to retain an important and inviolate psychic sphere, which is necessary for the maintenance and development of personality.

How did this decision come about? The first Senate of the Federal High Court of Germany had to decide upon the admissibility of an investigative procedure totally unknown to the justices. They had no idea about the details of the administration of a physiopsychological test designed to discover whether a suspect was in any way involved in the crime under investigation or adjudication. The justices felt that they needed information about this technique and its administration. Unfortunately, the Senate justices did not know who in Germany would be able to provide them with the information they needed. Therefore, they decided to ask the US Crime Laboratory for Europe, at that time stationed in Wiesbaden, whether they would delegate a German-speaking special agent to testify before the senate in order to inform the justices about the instrument and the administration of the entire examination. Naturally, the special agent was not and in fact could hardly be familiar with German law; he only knew the American criminal justice system, which is an adversarial system with lay jurors in which it is important for the parties "to impress the jury". Having this in mind, the special agent tried to impress the justices of the Senate. Therefore, he decided to demonstrate the effectiveness of the technique by conducting a silent answer test. He selected a subject from the audience and di-

rected him to write a number from 2 to 6 inclusively on a piece of paper after the examiner averted his gaze. Next, the subject folded the paper and placed it into his pocket. The examiner then stated that he would ask about each of the five numbers several times, each time in a different sequence. The subject's task was to listen to the questions, but to keep silent. Despite these measures, the examiner was able to discover which number the subject had written on the piece of paper. In this manner, the special agent demonstrated to the justices that it was a rather easy task for him to find the number he had written on the piece of paper by inspecting the recorded involuntary reactions of the subject, even though the subject concealed the number he had written. The special agent believed that this demonstration would impress the justices. Instead, the five justices were startled by this demonstration because, in their minds, the special agent proved that this technique made it possible to access knowledge that the subject did not want to reveal. Thus, their lesson from this demonstration was that it was possible to obtain information from an individual against his will.

As a consequence of this misunderstanding, the members of the senate concluded that they had to prohibit the use of this technique in criminal proceedings in order to protect the freedom of the defendant to make independent decisions and to act according to his own free will (BGHSt, 1999, 44, p. 308).

After this decision was handed down, the discussion about the admissibility of results obtained by the administration of this technique ceased. The courts rejected all motions of the defence to admit the results of polygraph examinations.

Matters began to change in 1979, when a law professor (J. Schwabe) published critical comments about the Supreme Court decision of 1954. The Supreme Court's main argument was that the administration of the comparison question test violates human dignity and respect for human rights. This law professor raised the question whether it was not an even stronger violation of the dignity of the individual and of human rights to place an innocent person in jail than the administration of a physical and psychological examination that the defendant himself desperately wanted to undergo in order to prove his innocence (Schwabe, 1979).

Of course, there is only one answer to this question. This article encouraged legal scholars to come forward with objections to the Supreme Court decision. Prior to that, I published a couple of articles in legal journals in which I attacked the Supreme Court decision, pointing out the Supreme Court's misunderstanding of the rationale and the administration of the test under consideration (Undeutsch, 1975, 1979, 1983 a & b).

As a result, some judges and courts dared to admit the results of polygraph examinations into evidence. Of course, these decisions were appealed by prosecutors. In

this manner, these cases came back to the Supreme Court, which decided to issue a new policy decision in 1998 (BGHSt, 1999, 44, p. 308). The Supreme Court ordered a hearing and called four scientists to submit expert testimony on the validity of physiopsychological examinations, especially of the comparison question test. The hearing was scheduled for two days. On the first day, the experts presented their opinions.

The first opinion was that of a professor of physiology. He pointed out that while he did not have detailed knowledge about the method under discussion, he appealed to his common sense: if the technique had an acceptable level of validity, it should be used. He compared it to acupuncture and explained to the Supreme Court: No one knows, why this practice works, but since it works it is used and should be used.

Next it was my turn and the presiding justice gave me half an hour to render my opinion. I pleaded in favour of the admissibility of this technique, at least for those who maintain their innocence and desperately want to prove it (Undeutsch & Klein, 1999).

The next expert was Max Steller, a professor of Forensic Psychology at the Free University of Berlin. Steller wrote in his *Habilitationsschrift* (1987) (a treatise submitted for recognition as a lecturer in psychology at German universities):

As to the methodological aspect we can state, that ... the psychological assessment of the veracity of witness statements is by far not as thoroughly scientifically scrutinised as psychophysiological methods (p. 166).

Then, in court (1999) he testified to the effect that comparison question tests have a very low validity, especially when applied to probable sex offenders. This testimony had very heavy impact on the court, because in court proceedings regarding child sexual abuse, we are frequently presented with a situation in which no physical or circumstantial evidence, nor testimony of a non-involved adult witnesses exist. This means that for innocent persons, the chances of disproving an allegation is extremely low. They therefore resort to a physiopsychological examination.

The last expert was K. Fiedler, a clinical psychologist, who in his introductory remarks stressed the fact that he never had testified in court and that he had no interest in forensic psychology at all. In his testimony he pointed out that the theoretical basis of the comparison question test was extremely weak. As to the validity of this diagnostic tool, he claimed that the results of those examinations were more often wrong than they were correct. In the afternoon of the day of the hearing he presented to the court and his expert colleagues a table with figures about accuracy

rates on both guilty and innocent subjects. This was a real surprise because his written testimony (1999) did not contain anything of the kind.

Later, I discovered that he used figures from the Patrick and Iacono field validity study (1991). The authors evaluated comparison question polygraph tests performed by examiners of the Royal Canadian Mounted Police. The original examiners recorded and scored the subjects' reactions. Later, independent examiners – who were also police examiners – did likewise. The independent police examiners had an exceptionally low hit rate. The fourth expert witness simply cited the hit rates of the independent examiners and based thereon, concluded that comparison question tests produce more false outcomes than correct ones. What he did not tell the court was that the:

- original examiners were 94% correct in their decisions regarding guilty subjects and 100% correct on innocent subjects (1996),
- independent evaluators in all other high quality field studies had very high accuracy rates (Honts, Raskin & Kircher, 2007),
- sample of polygraph examinations suffers from criterion contamination since it included three completely different categories of examinees: suspects, alleged victims, and other witnesses (Honts, 1996).
- The figures used by the fourth expert witness are completely irrelevant for the courts because the court-appointed expert usually is the one who examines the witness or the accused and the one who issues a written report prior to the trial, either to the prosecuting attorney or to the court.
- Patrick and Iacono study has been replicated by Charles Honts, also using material from the polygraph section of the Royal Canadian Mounted Police. In Honts' new study, the original examiners were correct with regard to innocence in 100% of the cases and on the guilty persons in 94% of the cases. The independent examiners were correct on guilty persons in 100% of the cases, and on innocent suspects in 83%. Importantly, however, they were incorrect in 0% of the cases; the remaining 17% were inconclusive (Honts, 1996).

The fourth expert did not reveal any of this to the court – presumably because he did not know better. While there is no reason to assume that he was dishonest to the court, the fact remains that he based his conclusions on the poorest of all high quality field validity studies. Honts, Raskin & Kircher (2007) write:

Given the general performance of independent evaluators across these high quality field studies, it appears that the performance of the blind evaluators in Patrick and Iacono could be viewed as an outlying data point (p. 803).

In 1998, the First Senate of the German Federal High Court handed down a policy decision stating that:

1. All the judicial reasons given in the first decision in 1954 were untenable.
2. The comparison question test had no evidentiary value whatsoever; therefore, it was inadmissible in criminal proceedings.

This has been the state of affairs in Germany since 1998.

Nevertheless, during the investigative phase of criminal proceedings, state attorneys refer their unresolved cases to physiopsychological experts in order to reduce the number of possible suspects or to find out whether the prime suspect is the perpetrator.

More frequently, defence attorneys refer their clients professing innocence to experts in order to undergo a forensic psychophysiological examination. This is simply to know if the client is guilty or innocent, which is important information needed to prepare a proper defence strategy for the case at hand.

If the outcome of the examination is that the client was truthful when denying the charges, we render a written report to the defence attorney, who then forwards the report to the court.

If in custody and visitation cases the suspicion of child sexual abuse is brought, the accused fathers ask for a physiopsychological examination in order to prove their innocence. Family courts are more inclined than criminal courts to accept polygraph evidence because they are more anxious to protect children from giving oral testimony in court.

On occasion, the police ask us to conduct a polygraph examination on suspects.

In conclusion, I dare to predict that the German Federal High Court's latest decision in this matter will not survive as long as the first one did (45 years). The second decision rests on the assumption that physiopsychological examinations have no evidentiary value whatsoever. This assumption is that faced with relevant research findings that strongly contradict the court decision (see the most recent survey by Honts, Raskin, Kircher, 2007), there is a high probability that before long the German Federal High Court will have to decide once again on the admissibility of polygraph examinations.

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EUROPEAN
POLYGRAPH

Volume 1 • Summer 2007 • Number 1

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Legal and practical aspects of using the polygraph in the Republic of Lithuania

Legal aspects

Up until 2000 Lithuania's regulations on the polygraph were contained exclusively in the laws governing defence. In 2000, Lithuania passed a special law adopting the use of the polygraph. Yet, this special law applies more to government officials that deal with classified information. It should be noted, however, that Lithuania is

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one of the few countries that has laws regulating the use of the polygraph. Another country known for such regulations is the United States (under the Employee Polygraph Protection Act, EPPA of 1988).

Several laws in Lithuania deal with the polygraph. These are:

1. Law on State Secrets of 1999;
2. Law on Using the Polygraph of 2000;
3. Regulations on Polygraph Examinations of 2002;
4. Law on Clandestine Activities of 2002;
5. Criminal Procedures Code – which as enacted in 2003 does not directly forbid the use of the polygraph. Yet, polygraph examinations might be admissible in the form of a specialist opinion or expert report.

The Law on Using the Polygraph (“the Law”) regulates the use of the polygraph, institutions with the right to use the polygraph, polygraph examiners, and polygraph examinees’ rights and duties. Additionally, the Law describes the polygraph instrument concepts and who may be subjected to polygraph examinations.

The Law provides that the following government institutions are permitted to use the polygraph: the institution authorised by the Ministry of the Interior, the Second Investigation Department under the Ministry of National Defence, the State Security Department, the institution authorised by the Ministry of Finance, and the Service of Special Investigations. In all other institutions, polygraph examinations are forbidden.

Polygraph examinations can be performed in the following cases:

1. When granting permission to work with state secrets and when grounds exist to suspect that an individual has withheld or provided false biographical information.
2. Investigations of malfeasance, as well as internal or operational investigations.
3. Crimes or other misdemeanours, irregularities in working with classified information.
4. When grounds exist to suspect that a person who deals with classified information is under unlawful pressure.
5. At an examinee’s request to repeat the polygraph examination.

According to the Law, polygraph examinees might be government employees, officials and soldiers, as well as persons applying for positions in the aforementioned governmental institutions.

The Law lays down certain restrictions on the to use of the polygraph:

1. The polygraph examination cannot be administered and should be re-scheduled if:
 - a) The subject is under the influence of or intoxicated by alcohol, narcotics, toxic or psychotropic substances or has used drugs that can influence polygraph examination results;
 - b) The subject has mental difficulties or does not understand the essence of his actions and can control them (*compos mentis* (responsible));
 - c) The subject is on sick-leave;
 - d) It is determined that the subject's mental, psychological, physiological or physical state will influence the quality of the polygraph examination.

It is important to emphasise that a polygraph examination may only be administered upon the examinee's written consent.

2. The Law devotes particular attention to the polygraph examiner. In summary, the polygraph examiner should meet following requirements:
 - a) citizen of the Republic of Lithuania;
 - b) university education and requisite license to administer polygraph examinations;
 - c) permission to handle information classified as "top secret".
3. The polygraph examiner's duties and responsibilities are to:
 - a) be impartial in performance of duties;
 - b) respect the rights, freedoms, and dignity of examinees;
 - c) comply with ethical standards;
 - d) comply with accepted procedure for administering polygraph;
 - e) use observation, audio, and/or video recording techniques;
 - f) protect classified information;
 - g) draw a conclusion on examinee's truthfulness based solely on the data obtained during the polygraph examination;
 - h) inform examinee about how the polygraph examination will be conducted.

4. The polygraph examiner has the right to:
 - a) obtain all necessary information about the examinee in advance;
 - b) refuse to administer the polygraph examination if sufficient grounds exist to surmise that the polygraph examiner will be unable to deliver an impartial opinion or in other circumstances, defined by the Law;
 - c) cancel the polygraph examination if the examinee's psychiatric, psychological or physical state would interfere with the quality of the polygraph examination.

5. The examinee has the right to:
 - a) cancel or to pause the polygraph examination or any stage of the examination;
 - b) be informed about the use observation, audio and/or video recording techniques;
 - c) be shown and have explained the polygraph examination procedure and the equipment used;
 - d) learn the final decision of the polygraph examination.

The Law provides for consequences of polygraph examination and the polygraph examination opinion is used as additional information characterising the examinee and his/her environment. If the polygraph examination decision is positive (Deception Indicated), and in cases in which the examinee has refused examination, depending on all information about the examinee and his/her environment the permission to deal with classified information may not be issued or revoked.

The Regulations on Polygraph Examinations of 2002 describe in detail the administration of the polygraph examination, list polygraph examination phases and compulsory polygraph instrumentation (two Pneumographs, Galvanic Skin Response (GSR), pulse and blood pressure Cardio). It is also permitted to use additional components. The polygraph examination by law must be observed and recorded using audio and/or video recording techniques. Another provision holds that a given polygraph examiner should administer no more than two polygraph examinations in one day.

The Regulations on Polygraph Examinations describe in detail the polygraph examination phases and mandatory actions in each phase, as follows:

1. **Preparing for the polygraph examination.** In this phase, the polygraph examiner has the right to obtain all necessary information about the examinee and to allot time to develop questions.
2. **Pre-test interview.** The polygraph examiner should obtain written consent from the examinee, discuss test questions with the examinee, and explains how answers should be given. The polygraph examiner should ensure that the examinee clearly understands the test questions. The polygraph examiner should evaluate the examinee's suitability for testing (and, if necessary, call a medical doctor);
3. **Testing phase.** All test questions should be asked clearly using the same intonation. The polygraph examiner must obtain sufficient number of polygraph charts and readings, as dictated by the given questioning technique;
4. **Post-test interview.** During the polygraph examination phase, the polygraph examiner discusses the preliminary information obtained from polygraph charts. Every examinee is given the opportunity to explain his physiological responses to test questions;
5. **Chart evaluation.** During this phase, the examiner analyses all of the data obtained during the polygraph examination. The polygraph examiner's remarks regarding the examinee should be clear and precise;
6. **Presentation.** The examiner prepares and presents the conclusions drawn from the polygraph examination.

The conclusion should be based solely on the data obtained during the polygraph examination. The final conclusion of the polygraph examination might be:

- Positive – when the polygraph examination data indicate that the examinee was deceptive in answering relevant questions (Deception Indicated, DI).
- Negative – when the polygraph examination data indicate that the examinee was truthful in answering relevant questions (No Deception Indicated, NDI).
- No conclusion can be provided when the examinee's truthfulness or deception cannot be determined from the data of the polygraph examination (Inconclusive, INC).

In all cases, the polygraph examiner cannot draw up a final conclusion until the after having duly and properly analysed all data obtained from the polygraph examination in accordance with according internal regulations.

Practice and history

The use of the polygraph in Lithuania began in 1992, when the Government Security Department (GSD) at the Ministry of Interior purchased an instrument, trained its officers, and commenced polygraph examinations. In general, polygraph examinations were administered at the request of prosecutors, in GSD pre-employment screening at the GSD, and in internal investigations.

Most polygraph examination results have helped investigators pursue the proper leads in finding perpetrators, thus saving money and valuable time, and enabling charges to be dropped from innocent persons. On some occasions insufficient information prevented a polygraph examination from being conducted and in about 10 cases subjects refused to be tested. In 2005 and 2006, results were admitted as evidence in court, using the Guilty Knowledge Test (GKT). Unfortunately, in order to obtain more detailed information, the permission of the courts or prosecutors is required.

The Second Investigation Department (SID) has used the polygraph since 1999 and has already performed more than 800 examinations. The examinations were mostly administered on persons whose service was related to the usage, protection, or review of classified information. Polygraph examinations also work as a preventive and disciplinary measure and as a personnel confidence-building measure. This is because it serves to deter national defence personnel from engaging in illegal activity or illegal relations, since employees are aware that they will have to undergo periodic polygraph examinations and will thus avoid illegal actions or refuse to advocate certain positions.

One specialised police agency began using the polygraph in 2003. These mostly involved pre-employment and internal investigation polygraph examinations and totalled about ten in four years. Police departments list the main problems with the polygraph as the lack of knowledge about the polygraph, of periodic training, and of co-operation between agencies that use the polygraph.

Acknowledgment

The authors are grateful to Professor Gediminas Žukauskas for co-ordination and useful input in drafting and finalising the article.



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Polygraph examinations in Poland²

It is a curious and interesting detail that one of the discoverers of galvanic skin response, the Russian physiologist Tarchanoff, spent his last years as an emigrant in Poland. Also noteworthy is that his Polish student, collaborator and friend, Napoleon Cybulski, known for his work on catecholamines, was a professor and rector of the Jagiellonian University in Cracow (1).

Before the Second World War, the Institute of Mental Hygiene in Warsaw had a polygraph in its possession (2). It was employed for psychological experiments and research, but not for criminal investigation – at least no mention of such an application has survived.

Nevertheless, as early as in the pre-war period the notion of polygraph examinations and its utility for investigations was already known in Poland. In a study published in 1939, W. K. Zielińska presented the polygraph examination research and described the experiments carried out by Benussi and Larson (3). She also quoted

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² Paper presented on the 51 Annual Seminar of the American Polygraph Association, Las Vegas (Nevada) July 2006.

an eminent European criminologist, Ernst Seelig, who claimed in his commentary to Larson's work that it would be a mistake to neglect the opportunity to use the polygraph for criminal investigation purposes.

In the early 1950s, the communist Ministry of Public Security bought an American polygraph, but without information on its use.

In the early postwar period, the subject of polygraph examination received only passing mention in works on psychology of the time (4). In criminology literature, the comments were mostly critical and revealed the authors' limited knowledge of the subject (5).

The first application of polygraph in a criminal case in Poland took place in 1963 in the course of a murder inquiry (Voivodship Court in Olsztyn, No. IV, 94/63). The examination was carried out by Professor Paweł Horoszowski, at that time Head of the Department of Criminalistics at the Warsaw University, using a Stoeltzing polygraph he had purchased in the United States. Professor Horoszowski coined the term *wariograf*, which has since been used in Polish literature as synonymous with *poligraf*. The examination results were submitted as part of the evidence in the Voivodship Court in Olsztyn. In the court of second instance, the Supreme Court did not rule against the acceptability of the method. The court neither forbade the use of polygraph examinations in criminal proceedings, nor did it preclude treating examination results as evidence (Supreme Court decision of 11 November 1964, No. III, K 177/64).

Since that time, polygraph examination has been used occasionally in criminal investigation. In the meantime, a wide-reaching debate arose in legal and criminology journals on the method's admissibility in criminal proceedings. In the 1960s, most opinions were critical. The method's detractors doubted its effectiveness and compliance with Polish law, as well as questioned it on moral grounds. The debate made it clear that the participants living behind the Iron Curtain were virtually ignorant of the accomplishments of polygraph research (especially in the United States) and had no access to literature on the subject (6).

It was only at that time that the first more or less reliable studies were published in which the authors described polygraph examination and its application in the United States and other countries (7). It is likely that in the late 1960s the first polygraphs were purchased by the intelligence services, both civilian controlled by the Ministry of Internal Affairs, and the military services. The purchase and the purposes the polygraphs served were kept confidential to the highest degree. It is known today that the polygraphs were used to train intelligence agents who were to operate in the United States and Western Europe; they were probably also used to test the loyalty of the services' own agents, and for counterintelligence purposes. It

can be said with certainty that the Communist political police (Security Service, or *Śłużba Bezpieczeństwa* [SB]) never used polygraph examinations to persecute the anti-Communist opposition in Poland.

The Polish army employed polygraphs in intelligence and counterintelligence activities in an analogous manner to the civilian intelligence services. They were also used by the Military Police, which formed part of the Military Internal Service, or *Wojskowa Śłużba Wewnętrzna* [WSW]. The latter institution used polygraphs in investigations into crimes committed by soldiers serving military service (most frequently and with best results in cases where weapons had been lost or stolen). The Military Police experts occasionally provided assistance in criminal investigations, mainly in homicide cases. The same experts participated in conferences organised by universities or scientific societies and published articles about polygraph examinations in the generally available scientific or professional journals.

In the late 1970s and 1980s experimental scientific research was carried out alongside tests in the course of investigations (usually in murder cases) at universities, mainly the Jagiellonian University in Cracow and later at the University of Silesia in Katowice. During this period, many scientific publications on polygraph examinations were published. Their character ranged from experimental to case studies and analysis of field research (8).

At the end of the 1970s, polygraph examinations were carried out in criminal cases at the Department of Criminalistics of the University of Silesia and the courts admitted their results as evidence. During this period, at the University of Silesia about 100 individuals were examined each year at the request of prosecutors, the police or courts. It was also at that time that a polygraph was used to eliminate suspects in a manhunt for a serial killer of women. In the course of these proceedings alone over 500 persons underwent polygraph examinations.

The first polygraph screeners in Poland were self-trained practitioners. A clear example was undoubtedly the aforementioned Professor Horoszowski, who in the early 1960s at his own expense acquired in the United States a Stoelting polygraph in addition to from some professional and scientific literature. It is possible that Professor Horoszowski trained the first examiners in the intelligence services of Communist Poland. Still, it cannot be ruled out that they were also self-trained, although this cannot be established with any certainty (Professor Horoszowski left Poland in 1968 and died abroad probably in the 1970s). It is nevertheless certain that these first (possibly self-trained) practitioners trained their followers, among whom were the experts of the Military Police. As a rule, they used the CQT (*Control Question Test*) method; POT (*Peak of Tension*) tests were also applied. The book *Truth and Deception* by J. Reid and F. Inbau was undoubtedly well-known and was regarded by examiners not as a mere textbook, but almost as a bible.

Similarly, researchers at universities working with the polygraph acquired knowledge on polygraph techniques on their own, using available literature (mostly American), or exploiting their contacts with scientists from the United States, Japan, and Czechoslovakia. This resulted in some joint publications were published (9).

It was also possible for university researchers and Military Police experts to exchange information and experience concerning the application of polygraphs in criminal cases. No contacts, however, existed between the university researchers and the intelligence and counterintelligence agents, who remained anonymous to scientists since their work was absolutely confidential.

To this day, no specialist training exists in Poland for examiners and experts on polygraphs and “forensic psychophysiology”. No schools, formal training programmes, or formal examinations for candidates seeking the status of certified polygraph examiner exist. Prospective examiners practise individually under the supervision of their more experienced colleagues.

According to my knowledge, in Poland there are no more than 25–30 examiners that conduct polygraph examinations. Among this number are university researchers, officers of intelligence services, police officers, and examiners employed in various private security and detective agencies. Three examiners are women, two of whom have degrees in psychology. All of the examiners have a university degree, some of them have experience working in law enforcement. The examiners’ level of professional competence is varied. Unfortunately, it is usually low, especially in criminal cases. This is a consequence of the absence of formal training and licensing procedures, a lack of mutual control among professionals, and non-existent competition.

In the mid-1990s the Polish Polygraph Association was founded. The members include the majority of the people that practise polygraph examinations, conduct experimental research in the field, or are interested in the issue from a legal perspective. Its total membership is about 40.

At the time of its foundation, the Association was intended as an integrating force for the professional community, a forum for sharing experience, a propagator and supporter of experimental research in the field of forensic psychophysiology, as well as an organisation that would establish standards for research and training and administer control. The Association also planned to issue a journal.

To date, very little of the foregoing laudable and necessary plans has been realised. The sole accomplishment has been the adoption of *The Standards for Polygraph Examination in Criminal Cases* (a set of methodological rules for conducting an examination). So far, the Association has been unsuccessful in adopting *The Standard for Pre-Employment and Screening Examinations* and passing a code of ethics for examiners.

As I have demonstrated, the Association has had very limited success in implementing the plans that accompanied its foundation.

Polygraph examinations are used in criminal investigations, pre-employment investigations and control checks (screening). The latter two procedures are also applied in government institutions (intelligence services and law enforcement organs) as well as by private businesses.

No institution in Poland keeps statistics on polygraph examinations and complete data is unavailable. We can go as far as to estimate that less than 100 examinations are conducted annually in criminal cases. Considering the fact that almost 1,000 killings are investigated every year and with the total number of investigations reaching the hundreds of thousands, it becomes clear that polygraph examinations are very rarely used. Their number is outpaced many times over by examinations carried out in other fields, such as pre-employment and screening. In government agencies (Agency of Internal Security or *Agencja Bezpieczeństwa Wewnętrznego* [ABW], the Military Intelligence Service and the Military Counterintelligence Service (*Służba Wywiadu Wojskowego*, *Służba Kontrwywiadu Wojskowego*), the Police [*Policja*], Border Guard [*Straż Graniczna*], Central Anti-corruption Bureau [*Centralne Biuro Antykorupcyjne*]), several hundred examinations are probably conducted every year. No precise data are published.

Private agencies perform examinations ordered mostly by banks and large companies. Some large detective agencies and firms providing business information check their own employees on a polygraph. A portion of the examinations carried out by private agencies and commissioned by private businesses are not pre-employment or screening checks; sometimes they are “internal investigations” undertaken in connection with some minor offence committed within a company, probably by an employee. Similarly, polygraph screenings are used to determine how confidential information has leaked out of the company. Such screenings are in no way different from those carried out in criminal investigations.

The term “polygraph” (in Polish *poligraf*) or “polygraph examination” (in Polish *badanie poligraficzne*) is explicitly used only in one legal act: in article 50 (1) (4)

of the Central Anti-corruption Bureau (of 6 June 2006, Journal of Laws 2006, No. 104, Item 708).

The Code of Penal Procedures (CPP) defines a polygraph examination as “an application of technical means aimed at controlling the unconscious reactions of the body” (CPP, article 171 (5) (2); CPP, article 192a; CPP, article 199).

The Act on the Duties of Officers of the Internal Security Agency and Intelligence Agency (of 9 June 2006, Journal of Laws 2006, No. 104, Item 710) in article 5 (2) and the Internal Security Agency and Intelligence Agency Act (of 24 May 2002, Journal of Laws 2002, No. 74, Item 676) in article 46 (2) define the polygraph examination as a *psychophysiological* examination.

Polygraph examinations are allowed in investigation as a method of finding evidence and eliminating suspects. Article 192a of the Code of Penal Procedures states that “in order to reduce the number of suspects or to determine the evidence value of leads” and with the consent of the person to be examined, an expert witness is allowed to “apply technical means aimed at controlling the unconscious reactions of the body”. Article 199a of the Code of Penal Procedures restates that “the application of technical means aimed at controlling the unconscious reactions of the body is possible only with the affected party’s consent”.

The Supreme Court and the Courts of Appeal admit the results of polygraph examinations as evidence, provided several general conditions are met. First, the examination must be carried out with the person’s consent (CPP, article 192a; CPP, article 199a). Second, the examination must be performed by an expert in the course of expert opinion, the result of which must take the form of a report complying with the provisions of article 200 of the CPP; the examination must not be part of other proceedings, e.g. interrogation (CPP, article 171 (5) (2)). Naturally, in the opinion of the court the expert must possess the necessary professional and moral qualifications (or the prosecutor at the investigation stage; CPP, article 193; CPP, article 195; CPP, article 196) (10).

The provisions regulating the activities of intelligence services in the aforementioned acts state that “in the case of a candidate applying for service in the Internal Security Agency or Intelligence Agency in a position requiring special skills or pre-dispositions, the qualification proceedings may be extended to include procedures aimed at checking the candidate’s suitability for the position, including a psychophysiological examination” (The Internal Security Agency and Intelligence Agency Act, article 46 (2)). The same regulation appears in article 5 (2) of the Act on the Duties of Officers of the Military Counterintelligence and Military Intelligence Service.

No legal act regulates (or prohibits) the use of polygraph examination by private organisations (for pre-employment or screening examinations).

The general public accepts polygraph examinations, especially in criminal cases. The fear of crime is strong in Poland and public opinion is ready to accept all crime-fighting methods presented as effective. To date, no opposition has arisen to employing the polygraph by private organisations in employee-related cases.

The opponents of using polygraph examination in investigation, let alone accepting the results as evidence by courts, can be found in some legal circles, especially among scholars specialising in penal procedure. Their reservations concern the procedural and moral aspects (polygraph examination as an invasion of privacy, the tested person as assisting in finding evidence against themselves, etc.).

The 2003 amendment to the Code of Penal Procedures, which involved added article 192a (2) and article 199a, decidedly tipped the scales in favour of the acceptability of polygraph examination in investigation and put an end to the debate that had been raging in the absence of an explicit legal basis for polygraph examination.

The polygraph examiners techniques include Control Question Test (CQT – according to the procedures devised by Reid or Backster) and the Guilty Knowledge Test (GKT). The latter technique (GKT) is preferred recently by examiners in the Police. But this fact is not the result of their experience, but rather the influence of some American authors.

Unfortunately, during the last two decades not a single work based on experimental research has been published in Poland.

In the 1970s and 1980s, such publications were numerous. They focused on diagnostic value (11), analysis of field research (12), or discovering latent information (13).

After this long interval, the Department of Criminalistics of the Frycz Modrzewski Cracow College has begun an extensive research project on polygraph examinations. The aims of the project include an analysis of the practice of polygraph examination in the years 1989–2006, devising methods of distinguishing between persons “possessing knowledge” of the event(s) and “active participants”, determining the diagnostic value of polygraph screening in cases of personality disorders (especially schizoid and antisocial personalities) and in co-operation with specialists in neuropsychology and neurophysiology, a study into patterns of deception.

The number of polygraphs used in Poland is about 15, all of which were produced in the United States by Stoelting and La Fayette. While some of the devices have been in use since the 1970s, others are new and a few have a computer.

In the 1990s, a psychological stress evaluator was purchased for the Police. So far, the device has never been put to use in criminal investigation (14), nor have any results of experimental research been published.

There are two closely related and basic problems concerning polygraph examinations. The first problem is the decline of scientific experimental research as well as field research and analysis of field practice. The few recently published works on polygraph screening are either legal and focus on the legal aspects of polygraph use (15), or they are popularised scientific article for lawyers and law enforcement officers (16) or chapters in handbooks on criminalistics (17). Second, to date no uniform system has been prepared or implemented of training polygraph examiners or granting licences and no clear requirements for obtaining the licence have been formulated.

As a result of the foregoing problems, the professional community exercises no control over the level of the examiners' work, which in the long-run inevitably leads to the deterioration of standards.

Notes

- (1) See: J. Widacki (1988), *Stulecie krakowskich detektywów*, Warszawa, 114.
- (2) P. V. Trovillo (1938/1939), *A History of Lie-detection*, *The Journal of Criminal Law and Criminology*, 29, 6, 880.
- (3) W. K. Zielińska (1939), *Znaczenie psychologicznej diagnostyki dla celów śledczych*, Bydgoszcz.
- (4) For example: M. Kreuz (1949), *Podstawy psychologii*, Warszawa, 62.

- (5) For example: J. Sehn (1951), *Obecny stan kryminalistyki w Polsce*, in: *Stan kryminalistyki i medycyny sądowej*, Warszawa, 14.
- (6) See: J. Widacki (1981), *Wprowadzenie do problematyki badań poligraficznych*, Warszawa, 182–194.
- (7) See: P. Horoszowski (1965), *Eksperymentalno-testowa metoda wariograficzna w śledczej i sądowej ekspertyzie psychologicznej*, *Przegląd Psychologiczny*, 9, 55–75.
- (8) For example: J. Widacki (1982), *Analiza przestanek diagnozowania w badaniach poligraficznych*, Katowice.
- (9) See: J. Widacki, F. Horvath (1978), *An Experimental Investigation of the Relative Validity and Utility of the Polygraph Technique and Three other Common Methods of Criminal Investigation*, *Journal of Forensic Sciences*, 23, 3; M. Dufek, V. Valkova, J. Widacki (1975), *K nekterym otazkam problematiki poligrackeho vystrovani*, *Ceskoslovenska Kriminalistika*, 8, 4, 284–286.
- (10) Decisions of the Supreme Court: II KR 171/76 (25.09.1976); I KR 136/77 (15.12.1977); III KR 211/80 (8.12.1980); IV KO 101/98 (21.12.1998); Court of Appeals in Cracow II Aka 147/99 (19.08.1999).
- (11) See: J. Widacki (1977), *Wartość diagnostyczna badania poligraficznego i jej znaczenie kryminalistyczne*, Kraków; J. Widacki (1979), *Badania poligraficzne osób z organicznymi uszkodzeniami centralnego układu nerwowego*, *AMSiK*, 29, 2.
- (12) J. Widacki (1980), *Badania poligraficzne w sprawach o zabójstwa w praktyce Zakładu Kryminalistyki Uniwersytetu Śląskiego*, *Sł. MO*, 6; J. Widacki, A. Feluś (1981), *Sprawcy zabójstw badani w Zakładzie Kryminalistyki UŚ*, *AMSiK*, 31, 1; J. Widacki (1982), *Analiza przestanek diagnozowania w badaniach poligraficznych*, Katowice.
- (13) J. Konieczny, M. Fraś, J. Widacki (1984), *The Specificity of So-called Emotional Traces and Certain Features of Personality in Polygraph Examination*, *AMSiK*, 34, 1, 25–30.
- (14) J. Pietruszka (2006), *O przydatności poligrafu głosowego. Wstępne wyniki badań*, *Problemy Kryminalistyki*, 251.
- (15) For example: R. Jaworski (1999), *Opinia z ekspertyzy poligraficznej jako dowód odciążający*, Wrocław; J. Widacki (2004), *Sytuacja prawna badań poligra-*

ficznych po ostatniej nowelizacji kodeksu postępowania karnego, Problemy Kryminalistyki, 243, 24.

(16) A. Krzyścin (1996), *Zarys metodyki psychofizjologicznego badania poligraficznego*, Problemy Kryminalistyki, 212.

(17) For example: *Kryminalistyka*, ed. 2002, ed. J. Widacki, Warszawa, chapter XXIX, 407–421; J. Kasprzak, B. Młodziejowski, W. Brzęk, J. Moszczyński (2006), *Kryminalistyka*, Warszawa, chapter XXIV, 275–280.



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The development of polygraph examinations in Singapore

Government

The polygraph was first introduced in Singapore in 1976. That year, the Ministry of Home Affairs purchased a four-channel Lafayette analogue polygraph. In 1977, on the recommendation of the polygraph manufacturer Lafayette Instrument Company, Koa Fung Chew, the writer of this article, who was then an Inspector in the Singapore Police Service, was sent to attend a nine-week basic polygraph course followed by a six-week practical attachment at the American Institute of Polygraph Technology and Forensic Psychophysiology in Michigan in United States. The training included specific issue testing and pre-employment screening.

Initially, the Ministry of Home Affairs mainly used the polygraph as an investigative tool for specific investigations into criminal and security cases as well as in pre-employment screening. As a result of polygraph's good track record, its usage

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expanded rapidly from 1989 onwards. More government law enforcement agencies began to employ the polygraph. These agencies included the Criminal Investigation Department of the Singapore Police Service, the Corrupt Practices Investigation Bureau under the Prime Minister's Office and the Ministry of Defence. All of the training of examiners were trained by foreign polygraph schools, including the Polygraph School of Israel, the American Institute of Polygraph Technology and Forensic Psychophysiology and later, the Maryland Institute of Criminal Justice and the Academy for Scientific Investigative Training. Currently, there are some 20–30 full-time and many more part-time government examiners. The types of cases handled are varied, including specific issue testing related to criminal and security investigations, internal investigations, and pre-employment and periodic personnel screening. A highly publicised recent case is the use of polygraph testing in curbing soccer match fixing in the S League, where players and referees are required to undergo random polygraph tests carried out by the law enforcement agencies.

Private sector

The government sector is the main user of the polygraph in Singapore. The writer of this article is the only private examiner in Singapore. He opened the only private polygraph firm Polygraph Investigative Services in November 2001 after his retirement from government service. The firm is licensed to carry out polygraph examinations and other forms of private investigations. The main users of private polygraph examinations come mainly from private companies in connection with internal investigations into employee theft, leakage of confidential information, sabotage and corruption.

Over the last few years, Polygraph Investigative Services had helped private firms to solve many crimes committed by internal staff. The most common type of cases is what is termed "multiple subject testing". A typical scenario is the theft of a large amount of money or properties from a company. Internal investigations could not narrow down any specific suspect. Any person in a large group of staff, say 20–30 could be the culprit. Reporting to the police at this stage would result in a 'dead end case'. The company decides to engage the services of a private examiner to help pinpoint the culprit. After the culprit is identified from the polygraph tests, the company makes a police report using the polygraph results and other case facts. The polygraph charts and records are forwarded to the police for confirmation when required.

In a recent case, the client was a large US multinational hard disk manufacturer based in Singapore. It has its own Regional Security Manager and team of investigators, who are all ex-police officers. During an annual stock check done, some 50 pieces of a certain platinum alloy component used in the manufacturing of hard disks costing a total of \$1million (Singapore dollars) were unaccounted for. It was believed that they disappeared after they were drawn from the store. Investigations by in-house investigators drew a blank. In the manufacturing process, some 40 staff handled this particular platinum alloy component in the manufacturing chain. Any one of them could have been the culprit. There were no records of the last person who handled the missing parts. It was felt that reporting the matter to the police at this juncture would not be the best option because there were no suspects or evidence. An in-house reward of \$10,000 was offered to staff for information on the case but none came forward.

Polygraph Investigative Services was engaged to find out the perpetrator. One by one, they sent each possible suspect to our office for testing. Everyone agreed to take the test when approached. The tenth person who came for the polygraph test, a machine operator, failed the test. After the test, the in-house investigators brought this particular person together with our test report to make a police report. During subsequent interrogation by the police, he broke down, confessed and provided the police with information leading to the arrest of 3 other conspirators. It turned out that the General Manager of the US Company in Singapore, which supplied the platinum alloy parts was the mastermind behind this theft. He, together with his "number two" man and his company driver (all Singaporeans), conspired with the machine operator to steal the platinum alloy parts. All 4 were subsequently convicted and given prison sentences. The hard disk company managed to recover the \$1million (Singapore dollars) from the US supplier.

The last case we handled recently was a typical case of pilfering by an employee. The client was the owner of one of the boat restaurants. During the month of March 2007, there were 4 instances of cash shortages at the restaurant cash register. Altogether, the sum came to over a hundred dollars, not a very big amount. Each time, the 5 restaurant staff who had access to the cash register had to fork out money from their own pockets to make up the shortages. Although the amount was small, the owner was very upset because it affected the morale of the staff. He wanted to get to the bottom of the matter. Through the Internet, he came to know about our company. When he came to our office, he told us that it was not the amount of money stolen, it was a matter of principle. He wanted to "get rid of the cancer once and for all". After agreeing on the cost, he went back, called up all the 5 staff and gave them a final chance to own up. None came forward. The first staff he brought for the test, the supervisor who was the most senior of the 5, failed the test. On being confronted with the results of the test, he confessed to the thefts. The

owner subsequently sacked him and decided not to make a police report, as the amount stolen was small.

Besides private organisations, defence attorneys also send their clients for private polygraph examinations to assess their truthfulness. Private individuals also seek our assistance to find out whether their maids had stolen their money during their employment.

Singapore Association of Polygraphers

The Singapore Association of Polygraphers (SAP) was formed in 2004. There are currently about 40 registered members who are all trained Singaporean polygraph examiners. The objectives of the SAP are as follows:

1. Set professional standards and ethics in polygraph testing for members
2. Foster unity among polygraph examiners
3. Establish a common identity for polygraph examiners
4. Coordinate and provide training for polygraph examiners through annual polygraph seminars.

The first SAP seminar lasting 2 days was held in February 7 attended by about 30 members.

Polygraph examiners' training

Most of the polygraph examiners in Singapore received their basic and advanced polygraph training from American Polygraph Schools accredited by the American Polygraph Association. Most of these training courses are conducted in Singapore. After the completion of formal training, the examiners work on real cases in their respective agencies and learn the finer points of polygraph testing from their more experienced colleagues.

Legal status

To date, in Singapore polygraph examinations are mainly used as an investigative tool both in the government and private sectors. The polygraph is not tested in our courts of law. Law enforcement agencies and the Office of the Attorney General use polygraph examinations as an assessment tool to help determine whether to charge a person and what charges to file. All polygraph examinations are voluntary and a person has the right to refuse an examination.



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Selected aspects of uncertainty in polygraph examination

Introduction

The diagnostic process in polygraph testing involves a comparison between the intensity of the response registered to one type of question – so-called relevant questions – with the intensity of response registered to another type of question, such as control questions, probable lie questions, neutral questions, etc., depending of the technique employed.

It may be shown that this situation is typical for scientific evidence construed as an assessment of comparison. To this end, consider the following (Aitken, Taroni, 2004):

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The interpretation of scientific evidence may be thought of as the assessment of a comparison. This comparison is that between evidential material found at the scene of a crime (denote by M_c) and evidential material found on a suspect, a suspect clothing or around his environment (denote this by M_s). Denote the combination by $M = (M_c, M_s)$. (...) Qualities (...) or measurements (...) are taken from M . Comparisons are made of the source form and the receptor form. Denote these by E_c and E_s , respectively, and let $E = (E_c, E_s)$ denote the combined set. Comparison of E_c and E_s is to be made and the assessment of this comparison has to be quantified. The totality of the evidence is denoted by E and is such that $E_v = (M, E)$.

In the case of polygraph examination, material M_c is created within the psyche of the individual who has perpetrated an act, while material M_s exists in the psyche of each individual. "Qualities" are constituted from the aforementioned types of questions and responses to the questions, whereas "measurements" are the intensities of the responses. In the case of relevant questions, we obtain E_c , and other questions E_s . Evidence from polygraph testing E_v , i.e. $E_v = (M, E)$ comprises: the questions used in the examination and the intensity of the responses registered after these questions. To reiterate from Aitken and Taroni: „Comparison of E_c and E_s is to be made and the assessment of this comparison has to be quantified”.

While the foregoing observations seem to be fully in accordance with elementary intuition concerning polygraph testing, they are worth restating, since Aitken and Taroni's comments are relevant to the evaluation of evidence in forensic science in general, while to date the interpretation of polygraph examinations have remained outside the mainstream of forensic science. This does not benefit the discipline.

Problem

Let us consider the following:

$$(1) X_i \in (DI)$$

where DI denotes the quality of deception indicated, (DI) denotes the set of individuals designated by this quality, and X_i denotes a specific individual. Let us assume that (1) was formulated as a result of a polygraph examination. The meaning of (1) is naturally such that the individual X_i was diagnosed as deceptive. Accepting (1) leads to acceptance of further statements, such as: (a) X_i was presented with

the suggestion of undergoing an examination, (b) X_i agreed to undergo the examination, (c) the examiner conducted the test, (d) the examiner interpreted the charts generated during the examination and drew a conclusion, and (e) the examiner is convinced that (1) is true.

Note that analogous comments concern the statement:

(2) $X_j \in \text{(NDI)}$

General, investigative and juridical expertise, as well as elementary knowledge of scientific methods lead to the conclusion that not all statements of the nature of (1) and (2) are true, despite the examiners' conviction. Stated briefly, some conclusions drawn from examinations are false, and the question of what is the proportion of true to false conclusions is as old as polygraph testing itself. A massive body of literature is devoted to this issue and it is not the purpose of this paper to cite or analyse it. Those interested may find it useful to review current literature, such as for example *The Polygraph and Lie Detection* (2003).

Therefore, in a sense, an element of uncertainty is present in the results of any examination. For convenience sake, and at the risk of oversimplifying the matter, let us assume that a statement of the following nature would be more realistic than (1) and (2):

(3) X_i probably $\in \text{(DI)}$

(4) X_j probably $\in \text{(NDI)}$

the sense of which is that X_i was as a result of the examination diagnosed as an individual who is probably deceptive, and X_j as probably truthful.

The aim of this paper then is to analyse selected aspects of uncertainty in polygraph testing.

Selected sources of uncertainty in the diagnostics process

Three methods of interpreting test results are used: the visual method (global, qualitative), the numerical method, and the computer method.

The first method is considered the weakest and most subjective, since it is based on a general impression, the strength and consistency of the responses registered and

on informal evaluations of facts, examinee utterances and his/her attitude during the test. The accuracy of diagnostic decisions made using the global method is significantly lower than those made using the numerical method (Kirchner, Raskin, 2003).

In the global method, practically all of the elements involved in the interpretation may constitute a source of uncertainty, given the ambiguity of the terms employed in their description, such as the aforementioned “general impression,” “strength and consistency,” “evaluation of facts,” “subject’s attitude,” etc.

Numerical methods, although definitely constituting major progress in the diagnostic procedures, are not flawless either, as indicated in the term by which some authors to refer to them: “semi-objective”. Some approaches suggested for use in numerical methods are highly precise. The 7-position scale adopted by the Department of Defence Polygraph Institute (Swinford, 1999) is an instance of such precision. Even such solutions, however, are not – because they cannot be – free from ambiguous expressions, such as: “...the most common physiological response (...) is an increase (...) from the baseline level – **usually** beginning at or **near** stimulus onset and lasting for a **few** seconds ...” (Swinford, 1999; own emphasis). This is not in criticism of Swinford, because in the description of individual and unique psycho-physiological phenomena such expressions are inevitable.

Other ambiguities appear as well in connection with the numerical method, sometimes of a very basic nature. Matte (1996), in presenting a chart of the distribution of points for the examinations of “guilty” and “innocent” individuals, does not include the legend for the vertical axis, inaccurately indicates the mean (which should be marked with a point on the horizontal axis and not a vertical section), calculates for unknown reasons the mean and standard deviation up to 4 decimal places while the scoring chart based on whole integers, and does not indicate whether the chart is asymptotic towards the horizontal axis. Also, the priority assumption of threshold values of +3 and -5 (although probably empirically justified) is another source of uncertainty.

The probabilistic nature of polygraph examination is even more visible when computer methods are employed in diagnostics. In their extensive analysis of this subject matter, Kirchner and Raskin (2003) explicitly use type (3) and (4) sentences. At the same time, it seems unquestionable that automated computer systems of diagnosis have an advantage over other methods; current research shows this even in relation to the relevant-irrelevant test, which is often considered rather outdated (Honts, Amato, 2007). Thus, although it is still admissible to use various methods of diagnostics (for instance, the APA Standards of Practice advice in section 3.10.1: “Examiners’ conclusions and opinions are required to be based on quantitative or numerical scoring...”). Analogously, the Standard Practices for Interpreta-

tion of Psychophysiological Detection of Deception (Polygraph) Data, ASTM International, Designation: E2229 – 02, indicates only “global evaluation” in section 4.1 and “numerical evaluation” in section 4.2). The dominance of automated computer algorithms is imminent.

Naturally, however, it may not be conceded that scoring methods are the only source of uncertainty in polygraph examinations. Yet, the foregoing brief reminder will suffice for the following discussion.

Uncertainty and notions of probability

When the qualitative method of evaluation of the polygraph examination is used, the examiner’s uncertainty is expressed in terms of subjective probability, also known as psychological probability. The premise for using this notion of probability is the high level of difficulty in computing calculations using notions of frequency, and in particular, of combinations thereof; in fact, it is practically impossible to do so. The likelihood contained in the diagnosis (for instance, X_i probably \in (DI), X_j very probably \in (NDI)...) is a measure of the examiner’s conviction, who – using his/her common sense and experience – overcomes (or rather bypasses) the calculation problems. While in many cases there is nothing inappropriate in it, stepping beyond the traditional trio of outcomes (DI, NDI, inconclusive) may be useful. This is so because using an expression of the expert’s conviction on a scale enables an attempt to include a kind of sum of observations resulting from the subject’s behaviour, subject’s attempts to employ countermeasures to affect examination outcomes, and the combination of results of various tests (e.g., control question tests and peak of tension tests), etc. The term “probably” may also mean that the expert, using a specific diagnostic algorithm, did not find in the available material complete grounds that he/she requires, but sufficient information that he/she considers to be important, and states that “ X_i is rather DI than NDI”, or “more arguments exist to consider X_i as DI than otherwise”. It is important to note here that instead of using such expressions, the use of the “examination of X_i jest inconclusive” formula may lead to a loss of important information.

Polygraph examiners in Poland often use this manner of expressing uncertainty. One must bear in mind, however, that using subjective probability necessitates taking into account the fact that the assessment of its value may vary considerably depending on the person who undertakes the assessment, which is a major weakness of this approach.

Kirchner and Raskin (2003) analysed frequency probability using Bayes' Theorem in the context of the numerical method (7-position scale) and using computer techniques. Their comments are worth quoting:

Numerical evaluators use cutoffs of +/-6 to classify polygraph outcomes as truthful, deceptive or inconclusive. A score of +6 or greater is considered a truthful outcome, a score of -6 or less is a deceptive outcome, and scores between the cutoffs are inconclusive. In contrast to the categorical decisions by the polygraph examiner, the probabilities output by the computer are continuous. (...) Our research suggests that the optimal cutoffs are .70 and .30 for truthful and deceptive decisions respectively. They are optimal in the sense that they produce relatively few inconclusive outcomes and relatively high accuracy rates.

It is clear therefore that computer techniques make it possible to attain a scientific standard of uncertainty, i.e. a way of expressing it in terms of frequency probability. It seems, however, that an approach in terms of significance probability is also possible.

Significance probability approach

The basic operation enabling the use of statistical induction in diagnosing the results of a single examination is the automation of ranking of the intensity of responses to test questions. Response ranking surfaced in the research on numerical evaluation of records and have been described in detail (Honts, Driscoll, 1988; Miritello, 1999). Without going into technical details, it is worth noting that producing a ranking using a computer algorithm is very simple and may be performed automatically immediately upon completion of the examination.

Let us assume that the subject X_m was examined using a test including N_c relevant questions and N_s other questions (control questions, probable lie questions, neutral questions), where $N_c, N_s \geq 4$ (if the test included buffer questions, they should be disregarded in the calculation). The diagnosis, i.e. the decision to find the subject X_m among either the (DI) set or the (NDI) set involves a comparison of intensities of responses to N_c and N_s questions. If the distribution of response intensities for responses from both sets appear to be "similar" or if the intensity of responses to N_s questions higher, this constitutes grounds for including X_m in the (NDI) set; if the intensities are higher for the responses to N_c questions, X_m will be placed in the (DI) set. The decision may be taken on either a global or a numerical basis. It is

also possible, however, to assume a null hypothesis that the intensities of responses to questions from both groups come from a population of identical response intensities. Thus, the following null hypothesis:

H_0 : intensities of reactions after N_c and N_s questions may be treated as coming from a joint general population.

Once an automated joint ranking of response intensities for questions from one test is compiled (e.g., RIT, CQT, PLT...) it becomes clear that in order to test the null hypothesis, a non-parametric statistical tool for an ordinal scale must be used. The Wilcoxon rank sum test is a classical tool of this kind and it is considered to be a very good alternative to the t test (Ferguson, Takane, 1989). If these do not produce grounds for rejecting the null hypothesis, the subject may be found (NDI), while rejecting the null hypothesis indicates either an (NDI) or a (DI) result depending on the value of the sum of the ranks in both groups of questions.

By designating the responses to relevant questions as E_c , and to other questions as E_s , we can see that the aforementioned Aitken and Taroni requirement is satisfied, since this procedure makes it possible (in an objective manner, assuming that the ranking algorithm is correct) to achieve a quantitatively comparative assessment of E_c and E_s .

While the procedure outlined above appears formally correct, it nonetheless raises a number of fundamental questions. First, is it permitted to count neutral questions, control questions, probable lie questions, etc., to one sample? Second, should a directional or a non-directional test be employed to test the null hypothesis? Third, what criteria should be used to assume a particular significance level in testing the null hypothesis? Fourth, what rules should be adopted to reach a conclusion on the basis of a number of invariant tests (for instance, mixed question test, silence answer test, yes test) in a single polygraph examination? This is not an exhaustive list of the issues.

One may venture a guess that the answer to the first question is "yes". As for the second and third questions, the answers will depend on the acceptable proportion of type one and type two errors and on the expected restrictiveness of the tests. The fourth and most difficult question might be answered if consideration is given to the possibility of employing a correlation coefficient or an ANOVA-type test for an ordinal scale (such as the Kruskal-Wallis test, which, however, would require a continuous ordering of E_c and E_s during the entire examination), or to other, different statistical tools. There are no doubts that only experimental research will bring answers to these (and other) questions within reach. Such research is currently underway.

The utility of a probable opinion

The ultimate goal of a polygraph examination is to supply a premise (in the form of scientific proof) in a logical argument aimed at reaching a legal decision. In fact, scientific proof is not “independent” in the sense that an expert’s opinion is based not only on the observations from the examination but also on certain theoretical grounds. This theoretical background is referred to in this context as indirectly relevant evidence, ancillary evidence, or auxiliary evidence. Its role in the construction of the framework of proof is outlined below, using David Schum’s concept (Schum, 2000) and adopting his approach to the circumstances of polygraph examination.

Let us assume that subject X_i , is suspected of having perpetrated an act, has undergone a polygraph examination, as has consequently been designated as (DI). Does this statement, i.e. $X_i \in (DI)$ allow us to conclude that X_i is, in careful terms, associated with the act? Schum claims that it does, provided that we are in possession of a generalisation that supports or licenses such reasoning. Such a generalisation might in this case assume the following form: “Whenever something like the opinion “ $X_i \in (DI)$ ” (event A) happens, then something like “ X_i is associated with the offence” (event B) *probably* happens”. It is not surprising that the author immediately adds: “There is never any guarantee that an asserted generalisation does apply in a particular instance. How strongly ancillary evidence supports generalisation (...) also bears upon the strength of the probabilistic linkage between events...” (Schum, 2000).

This “strength of the probabilistic linkage” constitutes at the same time a measure of uncertainty of the examination results. If the global or semi-numerical methods were used to interpret the charts, the estimate of the degree of uncertainty of the generalisation, and consequently of the examination as scientific proof, will remain qualitative.

A qualitative estimate of the level of certainty/uncertainty of the polygraph examination does not of course preclude its usefulness, particularly as a basis for action. The estimate of “very likely” may correspond with the legal standard of “clear and convincing evidence”, “likely” – “clear showing”, “medium likelihood” – “preponderance of the evidence”, etc., as suggested by C. Weiss (2003). Weiss, however, admits that – as any subjective scale – such scales are only capable of expressing the subjective belief as to the degree of uncertainty in a given situation.

The presence of the subjective element in the interpretation of polygraph examination has one more aspect that should be counted among extra-legal factors and

placed in the sphere of cultural context. Namely, one may not disregard the fact that there are individuals and whole communities – and not just in the legal profession – who object to the use of the polygraph, for example on moral grounds. It is worth remembering that in the post-Soviet countries for example public opinion was for decades indoctrinated against “lie-detection”, presented as an abomination of American capitalism; traces of such attitudes are still evident today, despite advances in research. M. Damaška (2003) pointed out such phenomena connected with the changes in fact-finding technology. It appears that the subjectivity present in the interpretation of polygraph examinations is conducive to such attacks against the method.

Conversely, attaining standards for quantitative estimation of uncertainty, which is increasingly common for identification methods in forensic sciences, will work to the advantage of polygraph testing in terms of social attitudes, particularly among practising lawyers.

Finally, let us consider the argument that is perhaps the most important one in favour of reducing subjectivity as the generator of uncertainty in polygraph testing. Namely, this subjectivity factor may become a reason for a generally negative evaluation of polygraph expertise. In the European discussion – which is of such great importance today – of the quality of forensic expertise such a comment was made: “A final notable aspect of forensic science is that many forensic science techniques call for large degrees of subjective judgement. (...) This is not a criticism of those techniques, but we should note that an implication of it is that, where techniques rely on subjective judgement rather than articulable and testable principles, they require careful empirical validation in order to substantiate their proponents’ claims” (Redmayne, 2000).

Conclusions

Bringing the methodology of polygraph examination closer to the quality standards of other areas of forensic science definitely seems useful. Diagnoses of “Deception Indicated”, “No Deception Indicated”, and “Inconclusive” are becoming obsolete, finding declining support in methodology and, more importantly, do not account well for uncertainty. The introduction and spread of computer methods creates myriad new possibilities to use inferential statistics and this direction of research into interpreting the results of polygraph examinations seems to be the most promising.

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Polygraph examination studies at the University of Silesia

The Department of Criminalistics at the Faculty of Law and Administration of the University of Silesia in Katowice has been studying the polygraph examinations for exactly 30 years now. The Department has conducted many scientific studies in this area and the staff have also provided expert opinions for use by law enforcement agencies. The purpose of this article is to present the problems our staff currently encounter in working with the polygraph within Polish criminal procedures and to present practical examples illustrating some selected problems. The article begins with a brief description of the history of the polygraph examinations in the Department.

Studies on polygraph examinations in the Department of Criminalistics at the University of Silesia began in 1977 when Jan Widacki joined the Department and brought with him the first polygraph equipment from the Jagiellonian University in Krakow. The device was first hired and then donated to the Department (today,

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students from the Forensic Science Club frequently use it). In 1978, the Department organised a conference devoted to polygraph examinations (Widła, 1978).

From the very beginning Jan Widacki commenced studies on polygraph examinations for use by Silesian law enforcement agencies. It was noted at the time that Poland was the only country in the East where civilian experts were allowed to conduct examinations on behalf of law enforcement agencies. Obviously, these experts carried out examinations only in criminal cases. In other matters, e.g. political cases, law enforcement agencies did not use the services of civilian experts. Moreover, these experts were unwilling to take part in such cases. Nowadays, Poland is still the exception in Central and Eastern Europe because Polish civilian experts conduct examinations for law enforcement agencies in criminal cases. The results of these examinations may be used as evidence before the court.

Gordon H. Barland's visit and lecture in the late 1970s marked an important event in the Department of Criminalistics at the University of Silesia. Worth recalling is that this visit occurred during a time when the Soviet Union explicitly condemned the polygraph method. Despite the very intense debate about admissibility of the polygraph examination in court, none of the participants in the discussion referenced the opinion of the Soviet decision-makers.

One of the breakthrough moments in the history of polygraph use in Katowice was the case of serial killer Joachim Knychala (Widacki, 2006). His motives were sexual in nature and he committed a series of sexual offences from 1974 to 1982. When in custody, Jan Widacki administered a polygraph examination, which was connected with Knychala's involvement in the killing of his 17-year-old sister-in-law. The characteristic way that he reacted to the relevant questions was interesting. The relevant questions concerned the killing of his sister-in-law. Such a configuration of reactions happened despite the fact that he had committed other crimes; it did not affect the result of this particular research. Later on, the polygrapher asked him an 'open' relevant question whether he had killed anyone else. Knychala reacted very strongly to this question. Subsequently, his home was searched and some objects belonging to his victims were found in the cellar. Another important example was the case code-named "Lizak" ('Lollypop') – this name described the favourite sexual method used by the rapist (Leśniak, 2007a). The potential offender was nominated from a group of the other offenders who had committed similar sex crimes. Unfortunately, some of the victims recognised this person. The polygraph examination pointed to a conclusion that the suspect was not really involved. Later, it turned out that real offender was very similar to the suspect in appearance.

The polygraph examination in cases very similar to the aforementioned in Katowice caused a change in the attitude of law enforcement agencies. What had at first been rejected as useless became widely accepted in the next months. Police officers and prosecutors began to trust this method more. In the following days the method was routinely used in all serious offences. Before “polygraph examination era”, the police forces in Katowice were regarded as the most brutal in Poland. Polygraph examinations led to a change in police officers attitudes towards interrogated suspects because a maltreated person could not be tested using a polygraph (Leśniak, 2007 a).

In the years 1977–1978 polygraph examinations were conducted in 34 criminal cases (Widacki, Feluś, 1979) and were applied to 265 persons (one of these cases included 196 persons and it was excluded from the study). Eighteen of 69 persons (26%) were assigned as responding to relevant questions (11 expert conclusions were confirmed). Forty of 69 persons (58%) were assigned as non-responding to relevant questions (12 expert conclusions were confirmed). None of experts’ diagnoses turned out to be incorrect.

With respect to murder cases, from 1977 to 1978 the Department used the polygraph on 37 subjects (Widacki 1980), eleven of which (29.73%) were assigned as responding to relevant questions, 21 of which (56.76%) were assigned as non-responding to relevant questions, and three were deemed inconclusive (8.1%).

On the basis of the data taken from the Department for 1978–1979, all the criminal cases were chosen in which the polygraph examination result was verified by subsequent legal proceedings (Widacki, 1982). The cases involved 38 persons, 16 of which reacted in the way symptomatic to a perpetrator and this was confirmed before the court. The others (22) did not react in the way symptomatic to a perpetrator and this was confirmed during legal proceedings also.

Apart from Jan Widacki, the polygraph examination was started by Jerzy Konieczny. Both men conducted studies using the polygraph method. In the late 1980s, Jan Widacki left Katowice and began working at the Catholic University in Lublin. Jerzy Konieczny continued his work in the Department of Criminalistics in Katowice, which lasted until 1989 when he began his official duties in the service of the government. The last examination by Jerzy Konieczny in the Department was carried out in 1991 (Leśniak, 2007b). The examination concerned a murder of two children. Then there was a break in the application of the polygraph in the Department because successors had to be trained.

At present, Tadeusz Widła is the head of the Department and currently two experts – Michał Gramatyka i Marek Leśniak – administer polygraph examinations at the

Silesian University of Silesia. The latter is the author of a PhD dissertation about evidentiary value of polygraph examinations. They have three Lafayette polygraphs (one computer polygraph) with supplementary equipment (Lafayette's microphone voice countermeasure, heart rate monitors and others) and a separate voice analyser made by the Israeli firm Nemesysco (system LVA). Both are court experts on the list managed by the chairperson of the court in the Katowice district.

The Department deals with empirical and theoretical research on polygraph examinations. Nowadays, the staff are completing some empirical research on estimating the accuracy of the directed-lie test regarding the population of Poland. A very similar study is being conducted in reference to Nemesysco's system. These studies are financed by the State Committee for Scientific Research. During polygraph examinations, experts use both different variants of the control question test and the 'peak of tension' test. The Department does not deal with personal screening using the polygraph. Its activity focuses on examining subjects in criminal cases only. On average, the experts carry out polygraph examinations in two to four criminal cases per month, usually including two to ten subjects. The Department's polygraph laboratory is among the best-equipped in Poland. The laboratory has a special sound-proof studio with cameras and a projector. It is possible to transmit images and sounds from cameras to the neighbouring lecture room. In this manner, a polygraph examination may be observed from the outside (by students, police officers, barristers, prosecutors and others).

In the years 2003–2006, Department experts administered polygraph examinations in 30 criminal cases. The cases included 61 persons who were examined using a polygraph. Fourteen of 61 persons (23%) were assigned as responding to relevant questions in a manner symptomatic for the perpetrator. Thirty-nine persons (64%) responded in a manner symptomatic for non-involved persons. For eight persons (13%), the results were inconclusive. The police forces used polygraph examinations in 15 cases, prosecutors in 8 cases, and judges applied it in 7 cases.

A typical problem for co-operation between the University of Silesia experts and the Silesian police officers and prosecutors is the fact that many of the law enforcement agencies' workers do not know the fundamental conditions of making polygraph examinations. Much time has passed since Jan Widacki and Jerzy Konieczny left the University of Silesia. A long break ensued before new experts began issuing opinions in this area. In the meantime, new generations of police officers and prosecutors began working in Silesia. They did not have a chance to learn about the principles and advantages of the polygraph examination. At present the polygraph examination does not belong to the current sources of evidence in more serious cases, but it is treated as a last resort. Thus, often much time has passed since the occurrence and until the polygraph test is administered. Indeed, it often happened that suspects had been interrogated many times before the poly-

graph is used. The author was disconcerted when a prosecutor turned to him for such an opinion after having used the services of a clairvoyant. This was a murder case in an old tenement house in Bytom (the murder of Anna Gruszka in 2001).

The clairvoyant said that there was an object connected with this crime inside a rubbish bin at the rear of the building. The police officers searched two large bins full of waste, but it was very difficult to confirm what rubbish was connected with the case.

In different kinds of cases in which the prosecutors and police officers use the Department experts' help, they usually get (often categorical) opinions. The problem is when such evidence is insufficiently supported by different proofs. Despite this, prosecutors bring charges against a suspect and the judges have to make a decision on the validity of the evidence. Then the result of a polygraph examination is insufficient to sentence the accused and it may be very difficult (or even impossible) to check the accuracy of such tests.

In some criminal cases, law enforcement agencies turn to the Department for a polygraph examination when the list of suspects is closed and it is obvious that one of the suspects has committed a specific crime. The reason for using the polygraph examination is that it is impossible to find the offender because the people involved were intoxicated at the time of the examination. The physiological traces recorded by the polygraph are very subtle and are strictly connected to memory traces. In such cases, the polygraph examination may prove inconclusive. The expert may find another impediment because those involved are often mentally handicapped apart from being inebriated during the occurrence. It is often very difficult to have the opportunity to review a psychiatric or psychological opinion before the polygraph examination when such an examination is made prior to the psychiatric (psychological) examination. At that time the evaluation of the mental state of the subject largely depends on the polygraph expert. It also occurs that a psychologist diagnoses the subject as mentally handicapped on the basis of the verbal scales of the Intelligence Tests. This subject, however, can fully understand and respond to the questions of the polygraph test and in the expert's opinion it is possible for the subject to undertake the polygraph examination.

The situations described earlier often make the polygraph test inconclusive. It often happens when the polygraph examination takes place too late or in improper conditions. Mainly, it is caused by the lack of knowledge of law enforcement employees. The employees obtain an inconclusive opinion and become convinced that the method is not useful. This leads to a vicious circle and it is nearly impossible to change this attitude.

The Department staff have often encountered outdated views that a very upset person may react in the same manner as someone involved in the act. A similar cliché is that if the subject is a police officer he can deceive the polygraph expert.

As far as giving opinions for courts is concerned, the Department encounters the following problems. In a typical case, there is a very long period between the time of occurrence and the time of the examination. The examination should be made immediately after the occurrence, but police officers and prosecutors neglect it. They believe that the body of evidence is sufficient. It often happens that their assumption proves to be wrong. In such cases and in many others, the accused and his barrister demand to have access to the results of the examination during the trial. It may also occur that the evidence seems to be strong, but is questioned by the accused and his counsel. According to the principles of such examination, the expert tries to discourage the court from carrying out such an examination. The expert informs the court that the potential for an inconclusive opinion is high. In spite of expert's information, the court usually enforces the polygraph examination because the judges want to avoid the situation in which the accused can file a complaint about it when he makes an appeal against the sentence.

Practice has proven that law enforcement agencies do not treat polygraph examination either as a common source of information, or a standard proof. The underlying reasons behind such attitudes are as follows.

First, law enforcement agency employees often do not know the method well:

- Forensic sciences are not compulsory courses in the majority of the Law faculties in Poland.
- Few law enforcement agency employees are graduates of Law faculties.
- Legal trainees (future prosecutors and judges) are It seldom (if ever) taught about the polygraph examination in a professional manner. While they can become familiar with the legal aspects of using the polygraph, they are unable to get to know the practical possibilities of using it.

Once during a trial in Katowice, when the author was submitting his oral opinion, the accused complained to the court about the prosecutor's attitude. After the accused had petitioned the prosecutor to subject him to a polygraph examination, the prosecutors answered that such examinations are only acceptable in China (XVI K 211/06).

There is still a dispute about different aspects of using the polygraph examination in Poland. One of the bones of contention is the acceptability of the control questions in the polygraph tests. Both parties stick firmly to their opinions. The prob-

lem is that the opponents of control question tests often train police investigators. Many police officers are sceptical about the use of the control question tests because they are taught about the inadmissibility of such tests.

More empirical research on polygraph examinations in Poland is necessary. At present, the number of such examinations in criminal and business cases is rising. At the same time, there are very few empirical Polish reports in which the authors attempt to estimate the accuracy of different variants of this method in reference to Polish population using a proper methodology. Data from foreign studies cannot replace such research. The Department has the task of dealing with empirical research in this area. Additionally, the staff should make the effort to teach students (future police officers, judges, barristers, and prosecutors) on how to use polygraph examinations and under what conditions can conclusive results be achieved. Much work remains to be done in Poland.

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Leśniak M. (1999), *Wartość dowodowa ekspertyzy poligraficznej* (The evidentiary value of polygraph examination results), Unpublished.



Standard for Polygraphic Examinations in Criminal Cases

(passed at the Special Convention
of the Polish Polygraph Association
held on 6 January 2004 in Warsaw)

Introduction

The recent amendments to the Code of Criminal Procedure (CCP), in particular the addition of articles 192a and 199a have settled the issue of the admissibility of polygraph examinations in Polish criminal trials. Therefore, it may be expected that in the near future the number of polygraph examinations performed for use by the court will dramatically increase.

On the one hand, this gives rise to a danger that experts without confirmed qualifications will appear offering polygraph services. On the other hand, the lack of unequivocal criteria for analyzing opinions from polygraph examinations submitted to court authorities renders it essentially impossible for the court to evaluate these opinions.

In this situation, the publication of the *Standard for Polygraphic Examinations in Criminal Cases* by the Association of Polygraphic Examiners of Poland – the only group of persons in Poland dealing with the practical and scientific polygraph examinations – is essential.

The *Standard* constitutes a set of basic requirements that polygraph examinations should meet for use in criminal trials. This facilitates the court and the parties' to the proceedings assessment of the examination; it also enables another expert to control the accuracy of the examination. While it may be that the application of the *Standard* will increase the number of inconclusive examination results, it will certainly minimize the number of erroneous opinions.

Legal regulations on polygraph examinations

Polygraph examinations in criminal trials are admissible only in the form of an expert opinion performed by an expert based on a decision of the court (articles 193, 194, 171 §5(2) of the Code of Criminal Procedure). This type of testing is theoretically possible at any moment during the taking of evidence; it is also possible under the so-called “necessary inquiries” provided for under article 308 of the CCP, in particular – but not exclusively – for the purposes of ruling out suspects (compare article 192 of the CCP). Witnesses, suspects (the accused), and suspected persons in the meaning of article 308 of the CCP can be subjected to polygraphic examination.

Testing is possible with the consent of the examinee.

A written opinion on the conducted examination should be prepared.

Examinees

As a rule, the following persons are considered unfit for polygraphic examination: persons suffering from psychosis (1), persons affected by mental retardation with an intelligence quotient below 79 (2), and children below 12 years of age (3). Per-

sons with profound personality disorders, and mainly those with a high level of anxiety, require a special approach, in particular during the pre-test interview. Interpretation of readings requires care and cannot be conducted without regard to diagnosed disorders. This applies in particular to so-called blind chart analysis conducted by someone other than the examiner.

As a rule, psychopathy (also psychopathy of organic origin, i.e., characteropathy) does not constitute a barrier to the proper conduct of an examination.

In the event of uncertainty as to the health of the person that is to undergo a polygraph examination, a request may be sent to the orderer of the examination to obtain a written opinion from a physician with an appropriate specialty or a psychologist.

It is not permitted to examine intoxicated or drugged persons, those reporting fatigue, or those suffering from upper respiratory tract symptoms (runny nose, cold, cough, shortness of breath, etc.).

Examiners should flatly refuse to examine persons upon which shortly before the examination direct coercion – in the form of physical force – was used.

Place of examination

In principal, an examination should be carried out in a specially prepared room in which the number of auditory and visual stimuli affecting the subject is limited. Examinations should not be conducted in spaces in which the subject was questioned or participated in some other action connected with legal proceedings (such as, e.g., line-up, taking fingerprints, etc.).

During the test, only the examinee and the examiner should be in the room. Third parties – escort, representative of the court, counsel for the defense, and persons accompanying the expert – may observe the examination through a one-way mirror or on a television monitor.

Moment of conducting the examination

The examination should be conducted in the earliest possible phase of the proceedings. In particular, it is recommended to conduct the examination as part of “necessary inquiries” (article 308 of the CCP). Conducting the examination after a trial has started is not recommended; examinations may only be performed at this time as an exception and when conducted, any interpretation should be very carefully formulated.

It is the duty of the orderer of the examination, and in this regard consulting with the expert, to inform the examinee candidate and instruct him or her of the rights to which he or she is entitled.

Polygraph

Examinations may be conducted using a mass-produced polygraph that registers at least: two pneumograph tracings, a cardiac tracing, and a skin potential response tracing.

Examination technique

The examinees are addressed formally, as “Sir/Mr.” and “Madam/Ms.”

Each examination must be preceded by a pre-test interview. Two basic test techniques are accepted: control question techniques and techniques using only POT (GKT) type tests.

The selection of the technique rests with the expert, with the stipulation that he/she must explain the selection of the given technique in his/her opinion.

If control question techniques are used, Reid or Backster's technique is recommended. While it is also permissible to use other standardized control question techniques, their application must be justified.

It is recommended, insofar as it is possible to perform in the given case, to supplement the control question technique with POT-type tests.

Before proceeding to the tests proper, a trial test may be conducted, comprising 5–7 neutral questions that should first be asked of the examinee.

The purpose of this test is to:

- check the polygraph's performance;
- check for proper installation of sensors;
- adjust properly each registration channel;
- establish good co-operation with examinee;
- control, and if necessary, correct improper examinee behavior;
- accustom the examinee to the test atmosphere, the examiner's voice, the manner in which questions are asked, and the manner in which answers are provided;
- collect information on the examinee's reactivity and his/her sensitivity to various stimuli, including visual, associated with operating the polygraph;
- establish the examinee's physiological baselines.

At the end of the trial test, the device sensitivity setting for each registration channel should be noted on the polygram. Each and every change made in device sensitivity during testing should be described.

As part of the Reid technique, it is essential to perform at least 4 test in succession:

- Reid control question test (RCQT)
- Stimulation test
- Reid control question test (RCQT)
- Mixed question test (MQT)

If advisable in the expert's opinion, the examination can be supplemented with other control question tests (e.g., silent answer test (SAT), guilty complex test (GCT)).

Control question tests should consist of 10–12 questions. The test must contain two control questions and 4–5 critical (relevant) questions. Among the latter are the questions: “Do you know who ...” and “Did you ...?”

If possible, the examination should also include POT tests. There should not be more than three of these tests. If in one of these tests a reaction to a critical question occurs, the test should be repeated upon changing the placement of the critical question. There should be 5–7 questions in the POT test, including one critical (relevant) question.

If the material and circumstances permit the conduct of more than 3 POT tests, it should be considered whether or not to abandon control question techniques and confine the examination to POT tests.

If questions or uncertainties should arise, the point of reference is the description of the examination technique in the book by J. E. Reid and F. Inbau: *Truth and deception. The polygraph (“lie-detector”) technique* (4).

If the purpose of the examination is to rule out suspects, in which the expert’s task is to examine a group of persons in reference to persons that did not react in two control test (conducted before and after the tests with number), the examination may be stopped at this point. In the latter case, at least two tests of this type should be conducted.

Under the Backster technique, at least four tests are performed, including three Zone of Comparison (ZOC) tests and a test with a chart.

As a rule, there are fewer critical questions than in Reid control question tests (RCQT).

The construction of Backster tests and its variations are described in the literature: G. H. Barland, D. C. Raskin: *Detection of deception* (5); S. Abrams: *The complete polygraph handbook* (6); J. A. Matte: *Forensic psychophysiology using a polygraph* (7).

Variations of the Backster test described in literature can also be applied (8). If such a test is used, the expert should indicate this fact in his/her opinion and should also describe which test he/she used and where it is described.

Deviations from examination schemes are allowed but require that this fact be described in the opinion and a justification for why a deviation was made from the scheme in this case.

Examinations performed using the Backster technique can and should be supplemented with POT tests, insofar as the possibility to conduct them exists.

Techniques based exclusively on POT (Peak of Tension) or GKT (Guilty Knowledge Test) tests may be used when there actually is much information (obtained over the course of the investigation) known only to the perpetrator(s) and persons handling the case, and not known to incidental persons.

At least four tests should be performed as part of this technique, repeating those in which the examinee reacted to critical questions and changing the sequence of questions in the repeated tests.

POT tests should contain at least 7 questions, of which only one critical question. Each test should be repeated while maintaining the same sequence of questions as in the first run; the examinee should be informed of this. If in one of the tests a reaction to the critical question appears, the test should be repeated and the sequence of questions changed, including the placement of the critical question.

The questions may be supplemented with or replaced by showing pictures or images. At least two tests, however, should be conducted in the classical manner, i.e., asking questions without showing images.

If questions or uncertainties should arise, the descriptions contained in S. Abrams: *The complete polygraph handbook* (9) and D. T. Lykken: *A tremor in the blood. Uses and abuses of the lie-detector* (10) should serve as references.

During the examination, it is not permitted to inform the examinee in an accusatory manner as to which questions produced physiological changes or to show him/her (in this form) the polygram. In particular, it is not permitted to persuade the examinee to confess.

The polygram should be annotated at the beginning with the date and place of the examination, [the examiner's name], the examinee's full name, and the case reference number.

Vertical lines should be used on the polygram to indicate the starting and ending point of each question and the moment the answer is given. Next, the question number should be recorded as well as the symbol: "+", "-", "o" (depending on the response given); another format is permitted in the case of digital registration.

The examinee should personally and legibly write his full name, as well as the date of the examination. If examination readings are found on more than one polygram, this requirement applies to all polygrams.

Before commencing the test, all factors, other than the test questions, should be noted that could disrupt the registration or cause an examinee reaction (e.g., movement by the examinee, adjustment of the device, noise from outside the room, etc.). Other annotations can be made that in the expert's opinion are important (e.g., note the galvanometer sensitivity, changes in this sensitivity, etc.).

The polygram should be kept and stored in one piece (without cutting) such that it can always be produced at the request of the institution ordering the examination.

Technical capabilities permitting, the examination process should be registered using cameras. This registration should begin no later than with the examinee's entrance into the examination room and uninterrupted up to the moment of the examinee's exit from the room. Any interruption in recording (due, for example, to power outage or changing of a cassette) should be discussed (explained) before resuming the examination.

Analysis of readings

The basis for interpretation is an analysis of reactions to questions.

In control question tests, reactions to critical questions are compared to reactions to control questions. The magnitude of the reaction to the questions in the pre-test test is compared to the number after such a test.

The magnitude of the reaction (and the size of the difference between the reaction to a critical question and the reaction to a control question) may be analyzed qualitatively, quantitatively (numerically), or using a computer.

Numerical (quantitative) analyses are recommended. The method for conducting numerical analysis is described in the literature (11) and it is recommended to use one of these methods. The numerical method described by G. H. Barland (12) and S. Abrams (13) and based on the Backster method may be applied to analyze all readings from control question tests.

According to this method, the expert, using a 7-position scale (-3 to +3), analyzes the differences in reactions to critical and control questions separately for each polygram tracing. If the reaction to a control question is greater than the reaction to a critical question, the magnitude of that reaction is estimated at from +1 to +3. If there is no difference in reactions, i.e., the examinee reacts to the control question and the critical question in an identical manner, a value of 0 is assigned. If the reaction to a critical question is greater than to the control question, this difference is estimated on a scale from -1 to -3.

The numerical values are assigned the following meanings:

- 0 – no difference;
- 1 – slight difference;
- 2 – significant difference;
- 3 – very significant difference.

In the Backster technique, in which in each test three pairs of critical-control questions are analyzed and three basic variables registered (pneumograph, cardiograph, and GSR), theoretically +/- 27 points are possible, which would mean that the reactions to critical questions are maximally different than reactions to control questions. Because the technique provides for performing at least three tests, the total number of points that may be achieved in the whole examination is +/- 27 x 3 = +/- 81. Thus, every examinee may theoretically achieve a result of -81 to +81 points. The closer the value is to 81, the more certain the conclusion based thereon. The closer the result is to zero, the less certain the conclusion. According to accepted standards (in Backster polygraph schools and in the Military Police School at Fort McClellan, Alabama), a point value between -5 and +5 for a test is deemed inconclusive. If the sum of points from the three tests is between -15 and +15, the entire examination is deemed inconclusive – i.e., does not provide a basis for interpretation.

Applying this method to the Reid technique, in which in the three tests the reactions in four critical-control question pairs are compared (reaction, for example, to critical question 3 or 5 with the reaction to control question 6; reaction to control question 8 or 9 with the reaction to control question 10), given four polygraph channels (two pneumograph tracings, a cardiograph tracing, and a GSR tracing), the result of each test lies between -48 to +48.

Therefore, a test result between -9 to +9 and a corresponding result of -27 to +27 from three tests should be deemed inconclusive.

If the expert uses another numerical method to analyze the readings, he/she should note this in the opinion and cite the source that describes this method. If this is the expert's own method, the examiner needs to explain and clarify it.

After analyzing the test readings, the following secondary criteria are used:

- comparing the magnitude of the reaction in the first control question test (conducted before the stimulation test) and in the second control question test (conducted after the stimulation test);
- evaluation of intentional and involuntary disruptions of tests;
- other criteria, including behavioral.

The secondary criteria are used to determine results only when the reactions to critical questions preclude the unequivocal assignment of the outcome to one of the categories: DI, NDI, or “inconclusive.”

Opinion from examinations

The opinion must satisfy the requirements set out in article 200 of the CCP.

In the opinion, the following should be noted: when and where the examination took place, what device was used, explanation of examination technique selection, sequence of tests conducted, content of test questions (with designation of question type – critical, neutral, control, etc.).

The reaction found in each test should be discussed and when the magnitude of the reaction is expressed numerically, the numerical value of these reactions and the manner of their calculation should be provided.

Other symptoms of the examinee's behavior should also be discussed, insofar as in the expert's opinion they are significant to the final interpretation (e.g., deliberate attempts to disrupt readings or suspicion that such attempts were made).

It should be remembered to include in opinions the comments and explanations mentioned in paragraphs VI and VII of this standard.

A photocopy of original tape with tracings (polygrams) should be attached to the opinion; the expert should proceed under the assumption that the tape may be shown at any time at the court's request.

In conclusion, the opinion may not use expressions suggesting the examinee's guilt (e.g., "he is the perpetrator") or expressions such as "the examinee is lying" or "is telling the truth."

In conclusion of the opinion, the expert may write that: emotional traces associated with the incident found (not found); these traces make it possible to establish that the examinee participated in this incident (in the case of control question techniques) or has knowledge of the details of the act, although he denies this (in the case of POT and related tests).

Analyzing POT (or GKT) tests, the examiner may also write: "reaction to critical question found, which indicates that, although he denies it, the examinee knows the details of the incident about which he was asked."

All information obtained by the examiner related to the examination or obtained during the examination and not related to the court order, may not be revealed to third parties.

Polygraph examinations in operational proceedings

In conducting such examinations, the expert may share with the operational officer his/her observations gleaned over the course of conducting the examination that go beyond what he/she can share when conducting examinations as part of a trial.

An expert may also use (depending on the purpose of the examination) other techniques and types of tests not described above. In particular, various types and variations of POT tests may be used.

Notes

(1) See: S. Abrams (1974), *The Validity of the Polygraph with Schizophrenics*, *Polygraph*, 3, 3, 328–337; S. Abrams (1989), *The Complete Polygraph Handbook*, Lexington, Mass., Toronto, 154 and after.

(2) See: S. Abrams, E. Weinstein (1975), *The Validity of the Polygraph with Retardates*, *Journal of Political Science and Administration*, 3, 3, 310–311; S. Abrams (1989), *op. cit.*, 165 and after.

(3) *Ibidem.*

(4) J. E. Reid and F. Inbau (1977), *Truth and Deception. The Polygraph ("Lie-detector") Technique*, Baltimore, 38–59.

(5) In: *Electrodermal Activity in Psychological Research*, New York, 430 and after.

(6) S. Abrams (1989), *The Complete Polygraph Handbook*, Lexington, Mass., Toronto, 93–102.

(7) J. A. Matte (1996), *Forensic Psychophysiology Using a Polygraph*, Williams-ville, New York, 363.

(8) *Ibidem.*

(9) S. Abrams (1989), *The Complete Polygraph Handbook*, 55–59.

(10) D. T. Lykken (1981), *A Tremor in the Blood. Uses and Abuses of the Lie-detector*, New York, 277–307.

(11) See: J. Widacki (1982), *Analiza przesłanek diagnozowania w badaniach poli-graficznych* (Analysis of Diagnostic Premises in Polygraph Examinations), Katowice, 35 and after. Primary source literature is also cited therein.

(12) G. H. Barland (1972), *An Experimental Study of Field Techniques in Lie Detection*, University of Utah; (1974), *Detection of Deception in Criminal Suspects: a Field Validation Study*, University of Utah.

(13) S. Abrams (1977), *A Polygraph Handbook for Attorneys*, Lexington, Mass., Toronto, 82–83.

Book review



Wojciech Pasko-Porys:
*Przestuchiwanie i wywiad. Psychologia
kryminalistyczna (Interrogation
and Interview: Investigative Psychology),*

Oficina Naukowa, Warsaw 2007, 553 pages (in Polish,
with English summary)

The book comprises three parts with a total of six chapters. The first part includes the chapters:

- I. Structured interview and interrogation,
- II. Validity assessment in interview and interrogation.

The second part includes the chapters:

- III. Behavioural and facts analysis in polygraph examinations,
- IV. Psychological integrity testing – honesty tests.

The third part includes the chapters:

- V. Structured interview (integrity) in theft cases – reliability and validity, and
- VI. Thief's profile in a survey of probation officers, judges, and students.

In keeping with our journal's profile, this review only covers chapter III from the second part of the book (pages 193–298) devoted to polygraph examinations. In this work, the author uses the term "wariograf," which in Poland is accepted as a synonym for "polygraph."

The reviewed work contains an accurate presentation of the current state of science on the polygraph and its applications in practice and much of the information is presented to Polish readers for the first time. Exhibiting a firm grasp of the literature, the author correctly presents both the techniques of polygraph examinations as well as their application in various countries, in particular the United States and Poland. The author has also devoted much attention to the diagnostic value of these examinations. This is all worthy of recognition and praise and this is a valuable work, in particular for Polish readers, who heretofore have not had the opportunity to review most of the information provided in the chapter.

On the other hand, attention must be drawn to certain weaker points of the work. First, polygraph examination specialists will note that the model example of the Reid technique discussed on page 210 (conducted as part of an expert's opinion in a concrete criminal case from 1992) is not only not a model example, but, on the contrary, has been incorrectly constructed. The test contains a total of 13 questions, including five relevant questions and two control questions. One of the control questions was improperly selected, as neither the topic nor the requisite gravity were selected for the relevant questions. Insofar as the relevant questions pertain to a murder, the control questions refer to deceiving an employer. Further, both control questions are in an older form and the time of occurrence about which they ask has not been made explicit.

Second, legal procedure specialists will note that the discussion (at least in Poland) on whether the polygraph examination is a form of interrogation, interview, or "expert opinion on demonstrated evidence" (p. 193) is first of all aimless, and second the division used here is incomplete. The provisions of the Penal Procedure

Code and court rulings have held unequivocally that such examinations are admissible in Polish criminal cases only as a form of expert opinion, performed by an expert witness. In addition, this expert opinion (as for example psychological or psychiatric opinions) is not an "expert opinion on demonstrated evidence."

A methodologist, on the other hand, will note that research of opinions on polygraph examinations does not apply to the value of such examinations, but only to the state of knowledge and awareness of those surveyed, among which apart from judges (quite justifiably selected for study), court probation officers were selected, which may come as a surprise. As is well-known, court probation officers – neither due to their education (generally psychology or pedagogy), nor due to their profession – do not have anything to do with evaluating evidence and they certainly do not have anything at all to do with evaluating scientific evidence.

The information on the unfortunately very scanty knowledge of judges on evidence and its value as to which they sometimes must rule is certainly a cause for concern.

Based on his research of case files, including criminal cases in which the polygraph was used, the author has formulated several postulates, of which at least some are controversial.

From the first postulate (page 216) it follows that the GKT (Guilty Knowledge Test) is preferred and the CQ technique (Control Question Test) can only be used when it is impossible to use the GKT technique. Yet, both examination techniques are on equal footing and it is at the expert's discretion as to which should be applied in a given situation. Naturally, the expert should justify this choice in his or her opinion.

The second postulate (page 218) holds that the expert should assess in his/her opinion whether the control question has fulfilled its role or not. This postulate is completely incomprehensible. If the expert has conducted a Control Question Test, this means that he or she has determined him or herself capable of formulating control questions appropriate to the relevant questions; otherwise the examination would be pointless.

The third postulate (page 221), which holds that the expert should in his/her opinion clearly state the circumstances that could have an impact on the reliability and interpretation of the results of the examination seems to be a needless safeguard further weakening the categorical nature of the opinion. In essence, the expert has three possibilities for each technique. If the CQ technique was used, the expert can conclude that the examinee was deceptive, non-deceptive, or that the results were inconclusive. If the GKT technique was used, the expert determines that the ex-

aminee has knowledge of the act, does not have knowledge, or the examination is inconclusive.

The concocting of intermediate phases and staging them is at the very most evidence of the expert's lack of certainty and safeguarding posture and yields a result that is completely useless to the court or, even worse, may be misinterpreted to the examinee's detriment.

Clearly, in situations where the examination result is ambiguous and the examination must be deemed inconclusive, the expert must be capable of justifying this interpretation, listing all doubts preventing him from making a categorical conclusion.

The fourth postulate (page 243), according to which an opinion should take into account an assessment of the examinee's outward behaviour, is obvious. In his/her opinion, the expert has the duty to list all circumstances and reasons for his/her conclusions.

With regard to the fifth postulate (page 254), which states that the "expert should express the probability scale used in arriving at the conclusion," all of the reservations listed in the discussion on the third postulate also apply. To this list should be added that this potentially applies to the three categories of results discussed earlier.

The author aptly indicates the likely directions in basic research that will be of significance to polygraph examinations. Particularly interesting is the research in neurobiology on the analysis of brain functions using Magnetic Resonance Imaging (MRI). In the future, this research could enrich the scientific foundations of polygraph examinations that have heretofore been based on achievements in psychophysiology.

In closing, a few details. The work *Wartość diagnostyczna badania poligraficznego i jej znaczenie kryminalistyczne* [The diagnostic value of polygraph examinations and their investigative significance] mentioned on page 222 appeared in print in 1977 and not 1976.

On page 219, it is incorrectly stated that the material for the analysis conducted in the book *Analiza przesłanek diagnozowania w badaniach poligraficznych* by J. Widacki [Analysis of the premises for diagnosis in polygraph examinations] (Katowice 1982) came from two equally numerous groups DI – 22 and NDI – 22. In actuality, the DI group was smaller, with only 16 cases.

The book was dedicated among others to John E. Reid. John E. Reid died in 1982. Books are dedicated to the memory of the deceased and not to the deceased themselves. Therefore, the wording should be "To the memory of John E. Reid," instead of "To John E. Reid."

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The basic information for Authors

To publication will be accepts unpublished research papers as well as review article, case reports, book reviews and reports connected with polygraph examinations.

Submitted manuscripts must be written in English.

All papers are assessed by referees (usually from Editorial Board), and after a positive opinion are published.

Texts for publication should be submitted in the form of normalized printout (1800 characters per page) and in electronic form (diskette, CD), or sent by e-mail to Editorial Office.

The total length of research papers and review article should not exceed 12 pages, case reports – 6 pages, and other texts (book review, report) – 5 pages.

The first page of paper should contain: the title, the full name of the author (authors), the name of institution where the paper was written, the town and country.

Figures should be submitted both in printed form (laser print, the best) and electronic form.

Tables should be numbered in Roman numerals and figures in Arabic ones.

Figures, tables, titles of figures and titles of tables should be included on a separate page. The places in the text where they are to be included should be indicated.

The references should be arranged in the alphabetical order according to the surnames of the authors.

The references should be after the text.

Each reference should include: the surname (surnames) of the author (authors), the first letter of author's first name, the title of the book, year and place of the publication, the name of publisher, or the title of the paper, the full title of the journal, the year, the volume, the number and the first page of the paper.

For example (in references):

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

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

and (Reid, Inbau, 1966), (Abrams, 1973) inside text.

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