HISTORICAL DEVELOPMENT OF THE POLYGRAPH - APPLICATION OF THE POLYGRAPH IN HUNGARY, STATE AND PERSPECTIVE

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INTRODUCTION

The best known and most widely used method of instrumental confession testing is the polygraph.The polygraph, a widely used tool in the field of law enforcement, is frequently touted as being able to detect truthfulness and/or deception of suspects, victims, witnesses, and informants (Lewis & Cuppari, 2009). The modern polygraph is 100 years old, born in 1921 in the United States of America. Polygraph is a Greek word meaning "more writing". The name also refers to a multichannel instrument that simultaneously measures several physiological changes in the human body and records them on a computer hard disk. In the past, the curves were drawn on paper with a pencil, but now computer recording is commonplace. In order to be used as a polygraph, a device must have at least three units capable of measuring biological parameters: a pneumograph (a unit measuring respiratory variation), a sphygmograph (a unit measuring blood pressure variation) and a GBR (a unit measuring the electrical resistance or conductivity of the skin).

Today's modern devices have at least four channels, i.e. they are capable of recording four physiological parameters. They measure:

1. changes in respiration (deflections of the chest wall and the flow characteristics of inhaled and exhaled air);

2. changes in respiration (abdominal wall deflections and the characteristics of the flow of expired and inhaled air);

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3. changes in the electrical resistance or conductivity of the skin (with electrodes placed on the fingers or palms);

4. changes in blood pressure/pulse rate (using a blood pressure cuff on the upper arm).

It is also possible to measure other parameters:

5. the volume of blood flow through the periphery (plethysmogram) is recorded with a photoelectric sensor attached to the fingers;

6. the subject's motion activity is detected by sensors placed under the legs, on the armrests or on the cushion of the test chair. (Budaházi et al., 2021)

The polygraph examiner uses the various sensors and the software available to draw conclusions about whether the examinee is honestly answering in the negative (no) to the closed questions asked.

PURPOSE

This paper aims to show the role of the polygraph in detection and evidence. The paper focuses on applying the polygraph in Hungary and takes into account foreign practices. The paper will show the advantages and limitations of the method and how it has evolved over the last 100 years.

DESIGN/METHODS/APPROACH

The paper will primarily review domestic and foreign literature and analyze domestic legal norms. It also illustrates the experience of using polygraphs through case studies.

FINDINGS

John Larson (USA) first used the modern three-channel polygraph in 1921 in the United States of America. Over the last 100 years, the instrument and the testing methodology have undergone significant changes. The instrument was first used in Hungarian criminal cases in 1978. Initially, the polygraph oriented the investigation, and the test results were not included in the investigation file. Later on, the polygraph test results became part of the investigation file, and there were also court judgments that referred to the polygraph test results as evidence. Nowadays, polygraph examinations are not used as evidence in Hungarian court practice.

The paper wants to demonstrate that it is sufficient for the polygraph to orient the investigation.

ORIGINALITY/VALUE

The paper may contribute to changing the way polygraphs are used and perceived. Monitoring changes could be the subject of other papers.

HISTORY OF THE MODERN POLYGRAPH

The need to test the sincerity of a confession using an instrument was formulated in the 19th century. This century saw the disappearance of lie detection methods with mystical or torturing elements. The void left was filled by the precursors of the polygraph. One of the first to attempt to create a lie detector was the French cardiovascular physiologist Étienne-Jules Marey (Silverman, 1996), who studied blood circulation and then created an instrument that measured pulse. He connected the pressure measuring capsule (the rubber tube) to a writing device in his instrument, called the sphygmograph. The instrument detected the arterial pressure over time and transformed it into a curve written on paper. The test result was recorded in a register showing the measured pulse changes. The instrument could also be used to test respiration variations. (Silverman, 1996) In 1882, Charles Verdin's lie detector was invented, which also measured pulse (Bunn, 2012). In 1893, Rudolf Rothe also made an instrument to test blood pressure, pulse, and respiration. (Rothe, 1893)

Lombroso, a forensic physician in Turin, concluded the falsity of a confession from changes in blood pressure, body part volume, and physiological changes (Agárdi & Kármán, 1999). Initially, Lombroso used the hydrosphygmograph to try to detect crimes. His instrument was a blood pressure monitor, but in 1893 he adapted Marey's sphygmograph; in 1895 he produced his lie detector. In one of his examinations, he used the instrument to determine that the suspect had not committed the 20,000 franc train robbery but had stolen passports and documents. When the suspect heard the latter question, his blood pressure started to drop. That was a sign that the suspect might have committed the crime (Matte, 1996). Lombroso's instrument, the hydrosphygmograph, can be considered the forerunner of the plethysmograph used in modern polygraphs (Ash, 1991). The Italian physiologist Mosso concluded from his research that fear of being found out increases the heart rate (Matte, 1996). He created an instrument which he called a "scientific cradle". It used a large bowl resting on a transverse axis. That offered the possibility to study the state of equilibrium of a person. The subject was placed

on the cradle and stimulated with a fear word discovered during the study of his history, causing the cradle to swing in the direction of the head (Szijártó, 1990).

The Italian psychologist Benussi studied breathing (Krapohl & Shaw, 2015). He believed that fear of exposure would cause a change in breathing when lying (Galianos, 2022). In 1914, Benussi's experiment was based on the idea that the duration of inhalation and exhalation could be used to detect lying. It had been known before that a given emotional state affected breathing cycles, but serious experiments were not carried out until 1914. Benussi created a fictitious testimony situation: the experimenter had to play the role of a witness in an imaginary court. He was given a card on which letters and numbers were written. The subject had to make a false or true statement about the contents of the cards. Whoever played the role of the judge asked whether the card contained letters or numbers, and finally the witness had to read out what the card said. If his task was to lie, he had to give false answers, but he had to make his lie appear authentic. The judge involved in the experiment could only tell whether the witness was telling the truth or lying by his or her behavior. However, the experimenter gave his or her opinion by graphing the breathing. He showed that the discrepancy between the cycles of inhalation and exhalation was mainly after the false statement. This experiment was repeated several times by Harold Burt, Landis, and Gulette, obtaining the same result as Benussi had done earlier (Szíjártó, 1990). The American psychiatrist Münsterberg was also involved in the development of the instrument. He realized that certain physiological changes accompanying lie (deception) are symptoms of the emotions accompanying lie.

He believed that the examination of measurable physiological changes in the body, such as pulse, blood flow, skin resistance, and respiration, could answer the question of whether the suspect had committed the crime (Andreassi, 2007). In 1908, English cardiologist James Mackenzie created the ink polygraph (Inbau, 1953), which he used to test the reactions of cardiovascular patients, their pulse, and blood pressure (Kerekes, 2022).

THE BIRTH OF THE MODERN POLYGRAPH

In 1921, the instrument that can indeed be called the polygraph was born. John Larson, a California police officer and medical student at the University of California, developed the first polygraph that could be considered modern, simultaneously measuring blood pressure, heart rate, and respiration (International League of Polygraph Examiners, 2022). Larson is also known as the father of the polygraph who developed the test of relevant-irrelevant questions (Newton, 2008). The polygraph test involved asking the subject relevant and irrelevant ques-

tions. These questions required a yes or no response from the subject. The relevant question was the question about the commission of the crime. The expert asked whether the subject had committed the crime. The irrelevant question was a question that was not related to the crime. Larson inferred guilt if the subject's body responded to the relevant question in a manner detectable by the polygraph. Larson tested the polygraph on Vollmer, the head of the Berkeley police force, and on the staff in the spring of 1921. The results of the experiments convinced Vollmer that Larson's instrument had great potential. Soon after, he put the invention to practical use: he was able to identify the perpetrator of a series of thefts on the campus of the University of California (Fisher, 2018), and he was able to select the thief from among 38 college girls (Grubin & Madsen, 2005). The priest was suspected of having been murdered. A few days later, a local baker found a body on the beach, which turned out to be that of the priest. The discovering witness was keen to know if he was entitled to a reward for his work as a tracker. However, the authorities used the polygraph to determine whether the witness could be involved in the homicide. The polygraph indicated a lie. The results were communicated to the baker, who confessed (Slavikovic, 2006).

The use of the fourth channel, measuring the skin electrical resistance, was a novelty of the modern Keeler polygraph. In 1939, Keeler attached a galvanograph to blood pressure, pulse, and respiration measuring device. With this instrument, it was possible to measure the psychogalvanic response systematically. The research on the electrical resistance of the skin began in the 19th century.

In 1888, Féré led the investigation of bioelectric phenomena, which led to the conclusion that the skin has electrical resistance. A weak current was passed through the forearm of an experimental subject and a galvanometer was connected to the circuit, allowing the skin resistance to be measured. With Jackues-Arséne d'Arson, Tarchanoff hypothesized that the skin resistance was caused by the stimulation of certain glands (Widacki, 2015). In such small circuits, stimulation of the sensory organs or activation of brain activity induces detectable changes (Szíjártó, 1990). In 1897, Sticker discovered galvanometric responses to stimulation of the brain. He believed that galvanic skin resistance changes occur when the subject is asked questions or shown images that evoke an emotional response (Gordon, 2017). Veragouth linked this to Jung's association vocabulary in 1907 (Green, 2018). Ten years later, Marston used this method in lie detection. In 1915, while still a psychology student, Marston began to study the periodic changes in blood pressure that occurred when lying (Greely & Illes, 2007). Marston's instrument was completed in 1914 and was used during the interrogation of spies during World War I (Granhag & Strömwall, 2009). Keeler polygraph was widely used by the US counterintelligence community during World War II and was a significant factor in the spread of the Keeler polygraph (Larin, 1982). In 1948, Keeler established the world's first polygraph school in

Chicago, where many later prominent polygraph examiners learned the test skills (Volyk 2018). Keeler is also credited with having developed the polygraph questioning technique, which at that time consisted solely of alternating relevant and irrelevant questions, further in the 1920s. He invented the card test in which the subject had to choose a card and used the polygraph to determine which card the subject had drawn (Alder, 2022). The card test was intended to convince the subject that he could be exposed (Alder, 2007). Keeler used the polygraph successfully in several cases, e.g. he investigated Virgil Kirkland, whose polygraph test results also proved that he had murdered his girlfriend, Arlene Draves (The Pittsburgh Press, 1981). He also used the instrument on Joseph Walker, the murderer of an 18-year-old woman (Kerekes, 2022). In addition to solving cases, Keeler is known for his work on the investigation of the US military personnel accused of crimes after World War II (Fisher, 2018), and his investigations contributed to the acquittal of dozens of defendants. (Budaházi, 2014)

IMPROVEMENTS TO THE MODERN POLYGRAPH

In 1945, Reid added another channel to the Keeler four-channel polygraph, and the instrument became capable of measuring muscle activity. Reid created a particular photoluminescent device to detect and measure the arm and leg movements of the subject. He discovered that voluntary muscle movement could influence the measured values (Agárdi & Kármán, 1999).

Reid also improved Keeler's questioning technique, developing the Control Question Test (Furedy & Heslegrave, 1998) in 1947, a major advancement in the polygraph testing methodology (Galianos, 2022). Whereas previously relevant and irrelevant questions had been asked, Reid wedged between these questions the so-called 'control' question, which is a question about the subject's history that would be unpleasant for the subject if not denied. He denies having committed the offense in question (Did you ever steal anything at your previous job?). If his/her body reacts more strongly to the control question than to the relevant one, it can be concluded that he/she has not committed the crime for which the polygraph test is being carried out. In its early usage, this question was often referred to as a 'control' question; today, it is simply called a 'comparison' question (Horvath, 2020).

First among these technical issues is the development by John E. Reid (1947) of what he referred to as the 'comparative response question'. In 1959, David Lykken created the Concealed Information Test (Lykken, 1959). A key question and irrelevant questions are used, e.g. suppose the authorities know that the victim was poisoned. In that case, a question on the method of killing by poisoning is asked as a key question, and irrelevant questions on different methods of killing are also

asked - does the person know that the victim was strangled, shot, stabbed, etc. The test can be used if the person denies that he or she is the perpetrator of the crime or knows anything about how the victim was killed. If the subject responds to the question with strangulation as the method of killing, it can be concluded that the subject is being tested as a person who, despite his/her denial, knows the method of killing. This finding may be reinforced by the results of the Comparison Question Test when the subject responds to the question by being asked whether he or she has committed the crime. Both the Comparison Question Test and the Concealed Information Test are still used today as polygraph examination.

A further advance was the introduction in the 1960s by Cleve Backster of the numerical assessment (Matté, 1996), which is still used today (Grubin & Madsen, 2005). Numerical assessments determine whether the respondent honestly denies having committed the crime or has any information about the case. The numerical assessment further objectifies the polygraph methodology by providing elaborate scoring criteria. In the late 1970s, Joseph F. Kubis, a researcher at Fordham University in New York, pioneered computer applications in the paper on the polygraph curve. Kubis expected computerized polygraph testing to bring additional objectivity (Matté, 1996).

These years marked the beginning of the era of the analog polygraph on the road to the digital instrument. In the early 1980s, John C. Kircher and David C. Raskin at the University of Utah researched the computerized polygraph. In 1988, the Computer Assisted Polygraph System was developed, which included the first algorithm used to evaluate psychophysiological data collected for diagnostic purposes. In 1992, the polygraph officially entered a new era, the computer age, meaning that modern digital technology replaced analog (Alder, 2022). In the beginning, the Stoelting and Lafayette polygraph systems were the market leaders (Kerekes, 2022) and are also used in our country. Nowadays, Axiton and Limeston have also caught up with them competitively. In the last decades, polygraph testing has made significant strides in human development, transparency, and recognition worldwide (Gárdonyi, 2020). The polygraph should not be used as a tactical bluff or psychological pressure because while there were examples of this in the past, it is now outdated.

THE PLACE OF THE POLYGRAPH EXAMINATION IN THE PREPARATORY PROCEDURE AND THE INVESTIGATION

In Hungary, the preparatory procedure precedes the investigation. The purpose of the preparatory procedure is to examine whether there is a suspicion of a criminal offense. If the authority concludes that there is a suspicion at the end of the prepa-

ratory procedure, an investigation is opened. In the preparatory procedure, concealed means may give rise to the polygraph examination. A confidential person may be subject to the polygraph test, who free of charge or in return for a fee, provides information to the authorities concerning a criminal offense. However, it is questionable whether it is worthwhile to the polygraph the information provided by a person of trust, as this could also entail the risk that the person providing the information does not feel the relationship of trust between him and the authority and therefore does not provide the authority with the information at other times.

Th polygraph test has its place both in an investigation detection and investigation phases (Budaházi, 2013). In the detection phase, it can assist in identifying the perpetrator, where the polygraph examines the witness to determine whether the perpetrator may have committed the crime. In Hungary, the detection phase ends with the questioning of the suspect. Therefore, the investigation phase may include the polygraph examination of the suspect to check whether he or she is the perpetrator of the crime. The investigation phase may also include the polygraph examination of the witness when there is doubt as to whether the witness knows what he or she has told the authorities about the case or whether he or she was not the perpetrator of the crime. The authority may order the polygraph examination ex officio and on request (Horgos, 2021), but the consent of the person to be examined is required for the examination to be carried out. Without consent, the examination is prohibited. The polygraph may examine adult witnesses and adult suspects. The counselor shall note the examination, which shall form part of the investigation file.

Both at the discovery stage and during the investigation, the polygraph examination result alone is insufficient to either suspect or terminate the investigation; other data are needed to make these decisions.

THE POLYGRAPH EXAMINATION AND THE COURT PHASE

In Hungary, the polygraph examinations cannot take place in court proceedings. That does not mean that a note containing the polygraph examination results cannot be made part of the trial material. The court may refer to the result of the polygraph examination in the reasoning part of its judgment. According to the opinion of the Budapest Regional Court of Appeal (Fővárosi Ítélőtábla) No. 5/2014 (IX.29.), the result of the polygraph examination does not constitute an evidentiary instrument. “Its role in advancing the investigation is indisputable. However, precisely the result of the polygraph examination may lead to the discovery of material evidence or document or the interrogation of another witness.

The polygraph examination is not an 'evidence gathering' exercise but a verification of the credibility of the evidence from the evidence" (Belegi, 2018).

In Hungary, in the early 2010s, there were court decisions that considered the results of the polygraph examinations as evidence corroborating a confession. Since 2014, however, it has been observed that the courts have repeatedly referred to the fact that the polygraph examinations are not listed as an evidentiary tool and therefore cannot be considered as evidence. The result of the polygraph examination can be used to confirm or weaken the sincerity of a confession. The answer to whether direct evidence is derived from the instrumental test is no since the expert cannot comment on the facts to be proved, so what he or she says is not evidence of the act of guilt (Bejczi, 2013). In the case of the polygraphs, the expert can comment on whether the physiological changes in the subject's reactions indicate deception in denying the relevant questions, e.g. whether he or she deceptively denied having committed the crime or whether his or her body reacted to the questions that would lead to the conclusion that he or she knew about the crime, e.g. the polygraph test will show that the subject gave a deceptive answer when denying knowledge that he or she had been stabbed in the abdomen), (Gálig, 2011). The relevant questions used in the polygraph test also include the facts to be proved since questions about the facts to be proved are also asked (e.g. the body was embedded by the subject), i.e. physiological response changes reveal knowledge of the facts. In one disappearance case, e.g. the Comparison Question Test yielded the result that "the lover killed the missing woman and knows where she is at the time of the investigation", (Krispán & Pusztai, 2016). Furthermore, the Concealed Information Test revealed the homicide (the woman was strangled) and the way the body was hidden (the "buried in concrete" question elicited the most substantial effect from the respondent but also attracted the attention of the buried and hidden in a building option), (Krispán & Pusztai, 2016). Such expert findings are of great importance because the investigator often only suspects that a homicide may have occurred when the place where the body was hidden may be questionable. In the case shown as an example, the polygraph examination also resulted in the exact location of the body's concealment being determined and, as in many cases, the body was recovered and a confession was obtained as a result of the polygraph examination, meaning that the polygraph method gained more evidence for the criminal case.

POLYGRAPH LIMITATIONS

The inherent limitations of the polygraph subjects can make it difficult for the polygraph examination to be effective. If the investigating authority using polygraphs is being investigated, it may be problematic if the investigator has little experience

with polygraphs (Budaházi, 2015). This inexperience and incompetence are because the number of the polygraph cases in Hungary is less than 1% of all criminal cases, so the investigator rarely comes into contact with the polygraph. Inexperience may result in the investigator not timing the use of the polygraphs correctly. The investigator needs to find the ideal time to carry out the test depending on the purpose for which he is using the instrument. Sometimes the polygraph is used too soon - if the investigation had been conducted for two or three more days, the consultant could have asked better questions during the polygraph examination. It is also a problem if the exhausted subject is examined after a lengthy interrogation. Concentration may not be sustainable, so the use of the polygraph is not recommended. Insufficient knowledge of the subject may also be a limitation. The investigator should assess beforehand whether the subject is fit to be tested and whether he or she is in a suitable mental or health condition. The investigator should also know whether the subject will agree to undergo the polygraph examination. Inadequate investigation can also make the polygraph examination difficult. On the other hand, insufficient thoroughness may lead to inaccuracies, which may result in the wrong questions being asked by the investigator to the subject because of inadequate investigative data. Providing more investigative information than necessary to the subject will not help the polygraph examination.

The polygraph examiner is an essential subject in the polygraph examination. The more investigative numbers the consultant has behind him/her, the more likely he/she is to conduct a good quality and effective examination. That also depends on the subject, but generally, a counselor with more experience is very likely not to make mistakes in the assessment and ask the right questions. There is also a problem of inexperience if the counsellor does not notice if the subject tries to manipulate the test. Unpreparedness is also a barrier. The counselor is unprepared if he or she does not spend sufficient time studying the investigation file and formulating the right questions. It is a problem if the counselor is overworked and has to wait a long time to complete the polygraph examination. The requirement for appropriate timing may be compromised.

As humans are being tested by the polygraph, this fact alone may be a limitation. There are times when the subject is unfit for the polygraph examination. The subject's unfitness may be due to his or her medical condition (e.g. asthma attacks, circulatory problems), intellectual (e.g. inability to interpret the questions asked), and self-awareness (e.g. psychopathy). Anyone who has used drugs, taken sedatives, or is sleep deprived before the test is unsuitable. They will also not be tested if, e.g. a pregnant woman is to be tested so as not to endanger the health of herself or her unborn child. Lack of fear of exposure may also render the subject unfit to be examined, as may a confession. This is a problem because the test methodology is based on the exposure of the person in denial by the instrument. The subject

denies having committed the crime and denies having certain information about the circumstances in which the crime was committed (Budaházi et al., 2020).

Non-cooperation with the investigation is a barrier to the use of the polygraph. Refusal to consent can be made before the investigating authority or the polygraph examiner. Wherever the subject does not consent to the examination, the polygraph examination cannot be carried out.

The most commonly used test in the polygraph examinations is the Comparison Question Test (CQT). Whether the polygraph subject is a witness or a suspect, this test can be used. A limitation of the CQT is that the polygraph examiner must properly construct the questions. The examinee should be afraid of being exposed to the relevant or the comparison question. It is also a problem if the examinee answers yes to the relevant question. That is, he or she admits to having committed the offence. In this case, the polygraph examination cannot be continued. If the person answers yes to the comparison question, another comparison question must be asked. The other limitation of the Concealed Information Test (CIT), which is often used, is that it is mostly used with witnesses. The use of CIT on a suspect is infrequent. When the authority communicates the text of the suspect's statement to the suspect, it shares information with the suspect that relates to the circumstances of the commission of the crime. What information is given should not be included in the CIT questions. The suspect may know information from the case file, the media, or the authorities should not be part of the CIT. His body can only recognize the concealed information because he is the perpetrator. If the person conceals the source of information under investigation, the polygraph examination may even produce erroneous results. The subject is not responding to the question because he committed the crime but because he has obtained the information from another source. CIT is more common in the case of a witness, but the abovementioned problems also need to be considered. In his case, it is advantageous that he may have little information about the case from the authorities from case files because his rights of access to the case are considerably more limited than those of the suspect.

A limitation of the polygraph method is that it is not 100% accurate, it is costly to use, and it can never be excluded that the subject will not manipulate the polygraph examination.

SOME EXAMPLES FROM ABROAD

In the birthplace of the polygraph, the United States of America, a Supreme Court decision was handed down in 1923 in Frye v. the United States. The court ruled that the results of the polygraph test could not be used as evidence in court be-

cause they had not yet reached a scientific level of sophistication among psychologists (Frye v. United States, 293 F. 1013 (D.C. Cir. 1923)). The polygraph used at the time was rudimentary, William Martson did not use Larson's polygraph, and he only tested blood pressure. He measured Frye's blood pressure after the questions were asked. For nearly 70 years, the US courts have relied on this ruling in refusing to admit the polygraph test results into evidence (Kelly, 2022). Although the court in the Frye case did not consider Marston's test as evidence, it did not sentence the defendant to death, meaning the polygraph impacted the case. It was not until the late 1970s that references to the Frye case began to disappear. The first step in this process was the 1976 Supreme Court ruling that the polygraph results could be circumstantial evidence. Subsequently, on 20 July 1977 (V KZ 54/77) and 6 May 1983 (IV KR 74/83), the Supreme Court obliged the authorities to evaluate the expert's opinion in criminal proceedings in the light of modern science. California, the Supreme Court classified polygraph tests as communicative or confirmatory evidence because the measurement of changes in bodily functions can be designed to elicit essentially confirmatory responses (Kertész, 1991). Finally, in its decision of 5 November 1999 (V KKN 440/99), the Supreme Court ruled that the method itself must have sufficient reliability about the reliability of the polygraph test (Zubanska, 2009).

The polygraph examinations have been part of the everyday work of the criminal police in Serbia for the last four decades. During that time, polygraphy has found its place and earned the trust of detectives working in the field. Investigation lead and support of polygraphists are of great value for solving severe crimes of all kinds (Kolarević, Matejić, Koljić & Kojić, 2011). As for the Republic of Serbia, the polygraph is often used in police investigations to verify and check the suspects' statements to eliminate the possibility of the implication of innocent people as suspects (Baić, Ivanović & Oljača, 2018).

The first polygraph - a six-channel Stoelting - arrived in Bulgaria in 1968. This instrument was for the needs of Bulgarian intelligence to develop a system for training in deceiving the polygraph. In 1972, Bulgaria bought another Stoelting Ultrascribe. After creating a laboratory (and later institute) of psychology at the Ministry of the Interior, all polygraph experiments were conducted there. After 1997, the use of the polygraph increased considerably. In the following years, the polygraph examination became decisive in resolving many criminal cases - murder, serial assaults, robbery, and burglary. In 1999, the first results from polygraph examinations were presented before the court. They were presented as "psychological expertise for the investigation of truthfulness". This is the only legal way to introduce the polygraph examination in the court system since Bulgaria, until this day, has no law on the usage of the polygraphs (Vladimirova & Todorov, 2020).

In the 1970s, the polygraphs began to be used in Poland to examine people suspected of committing ordinary crimes, mostly homicide. As much as in the 1970s and 1980s the polygraph examinations were used in Poland mostly in criminal cases, today such examinations are but a few percent of all the procedures. A great majority of examinations are performed for pre-employment and screening purposes (Widacki, 2020). Since the breakdown of the USSR, more polygraph examinations have been conducted in Russia, Ukraine, Belarus, Kazakhstan, other Asian republics of the former USSR, and China than in the US, Latin America, and Europe. These examinations are performed both for the organs of the states, and in private business for pre-employment and screening purposes. There is much to suggest that such examinations are abused, and their quality raises doubts (Widacki, 2020). The Polish Supreme Court made it clear that the polygraph is not a test of truthfulness or a lie detector. Evidence from an opinion of an expert witness in the field of the polygraph examinations is indirect evidence, i.e. evidence that leads only to findings based on which conclusions about the main fact can be drawn by way of reductive reasoning (Kury & Redo, 2021).

The use of the polygraph test results in court was initially considered "unconstitutional" by the German Federal Court of Justice in a famous ruling in 1954. However, it was later seen as merely "not suitable" in 1998. While the broader public still perceives the polygraph testing as being prohibited for court use, there is in fact a small group of practitioners who conduct the lie detection tests as part of court proceedings. However, this practice is little known and hardly ever talked about in public. Unlike other countries where polygraph testing is a practice used by the police or in probation services, it is pretty much limited to the field of legal psychology in Germany. It is essential to highlight that the legal situation prohibits using the polygraph for a confessional motivation (as it is used in e.g. the United States), and it may not be used to someone's disadvantage. Today, the polygraph testing in the German court system lives a niche existence, but one that is seen to be of great potential by those involved (Paul, Fischer & Voigt, 2020). The polygraph test in Germany although producing material and visual results is classified as part of expert testimony and cannot be treated as independent evidence. (Paul, Fischer & Voigt, 2020)

The polygraphs are used in many countries around the world to orientate investigations. Typically, a court may take note of the results of the polygraph examination. We believe the place to carry out the polygraph examination is in the investigation.

CONCLUSION

The modern polygraph has undergone many changes over the past 100 years. The 3-channel polygraph has become capable of measuring new channels, and the test methodology has changed. The test structures have changed, the digital polygraph has replaced the analog polygraph, and numerical evaluation has been introduced. The polygraph is generally a good orientation for the investigation, but the polygraph is not a panacea, and there are potential errors. Despite its limitations, the polygraph has proven over the past decades that it is worthwhile to proceed with it rather than without it in criminal cases if the case is suitable for the polygraph use. In our view, the polygraph examination has its place in the investigative phase and is most useful for detection. The aim is to assist in the identification of the perpetrator. It is crucial that the use of the polygraphs is voluntary and should not be used anywhere in the world without consent. There is no reason for the results of the polygraph examination to become evidence; it is sufficient to serve as an orientation for the investigation.

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