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Case Report

Forensic Polygraph in Crime Investigation: A Case Study

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Abstract

A polygraph is an instrument that measures and records physiological changes inside the body. In the absence of a valid physical evidence, polygraphy may be a useful technique to verify truthfulness or detect deception. The present study was conducted to determine the truthfulness of a suspect in a murder case that was referred to PFSA for a polygraph examination. The stomach contents of the examinee and the hyoid bone of the vicvtim were submitted to the department of toxicology and forensic pathology at the PFSA, respectively.

In the present study, integrated zone comparison technique (IZCT) and forensic assessment interview technique (FAINT) designed for specific and multi issue testing were used to examine the suspect. Computerized Academy for Scientific Investigative training (ASIT) Algorithm and weighted scoring were applied in IZCT and FAINT scoring, respectively. The suspect of this murder case was brought to PFSA for polygraph examination. During the initial interview, the suspect denied any involvement in the said case. However, after complete polygraph examination, the suspect was proven to have been deceptive and later on confessed to police officials. The polygraph examination of the suspect proved him deceptive which was later confirmed by his confession. His stomach did not contain any toxic/sedative material.

Keywords: Integrated Zone Comparison Technique (IZCT), Forensic Assessment Interview Technique (FAINT), ASIT Polysuite Algorithm, Weighted Scoring.

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استخدام جهاز كشف الكذب الجنائي Forensic Polygraph في التحقيق في الجرائم: تقرير حالة

المستخلص

يُعَد جهاز كشف الكذب Polygraph أداة لقياس وتسجيل التغيرات النفسية والفسيولوجية داخل الجسم. وعند عدم توفر أدلة مادية كافية فإن جهاز كشف الكذب يعد تقنية مفيدة للتحقق من الصدق أو كشف الخداع. أجريت هذه الدراسة للتحقق من صدق أحد المشتبه بهم في قضية قتل أحيلت لإجراء الفحص بجهاز كشف الكذب. وفي هذه الحالة تم أخذ عينات محتويات المعدة من الضحية وتحويلها للفحص في مختبرات علم السموم الجنائي وكذلك أرسلت عينة العظم اللامي للضحية إلى قسم الطب الشرعي.

ولفحص المشتبه فيه تم الاعتماد على تقنية مقارنة المنطقة المتكاملة (AZCT) وتقنية تقييم المقابلات الجنائي (FAINT) والتي صممت لاختبار القضية بشكل محدد ومتعدد. وطبقت

خوارزمية (ASIT) المحوسبة والتهديف المرجح weighted scoring في كل (AZCT) و (FAINT) على التوالي.

وبينت النتائج من خلال مقابلة المشتبه الأولية نفي التورط في القضية المذكورة. وبعد فحص جهاز كشف الكذب تبين خداعه، واعترف بجرمه في وقت لاحق أمام المحققين. ولم تكن تحوي المعدة أي مواد سامة أو المهدئة.

وكخلاصة فإن جهاز كشف الكذب يعتبر مفيداً في حالات الخداع عند المشتبه بهم ويعد أداة تقود للاعتراف.

الكلمات المفتاحية: تقنية مقارنة المنطقة المتكاملة (AZCT)، تقنية تقييم المقابلات الجنائي (FAINT)، خوارزمية (ASIT) المحوسبة، التهديف المرجح Weighted Scoring.

1. Introduction

A polygraph is an instrument which measures and records physiological changes inside the body. This technique is used to determine the truthfulness of an individual. It is also known as a lie detector in layman terms. It measures and records physiological changes, such as cardiac activity, respiration and electrodermal activity. These physiological changes are involuntary in nature. It is based on the fight or flight concept. An individual is asked a series of questions and he responds "yes" or "no" and the physiological responses are recorded and later on interpreted.

The polygraphy has evolved over the years and many new techniques of its application has been validated by scientific research. Integrated Zone Comparison Technique (IZCT) developed by Gordon, Waid and Cochetti in 1987 [5] was a modification of the Backster's Zone Comparison Technique [1-3]. It is a flexible format which can be utilized for single, multi-faceted and multi-issue testing in polygraphy. IZCT was first taught at the Academy for Scientific Investigative Training (ASIT), Philadelphia (USA) in 1987. It is currently being used in law enforcement, intelligence and private sector around the world. The IZCT format includes three comparison and three relevant questions along with different irrelevant, weak relevant, countermeasure and symptomatic questions.

Original Forensic Assessment Interview Technique (FAINT) was developed by Gordon and Fleisher in 2000 [7] and is regularly administered at the PFSA before the polygraph examination. FAINT consists of two parallel assessments during the interview: Verbal assessment and Non-verbal assessment. There are two scoring systems that are commonly used: a three point scoring system and weighted scoring system. Weighted scoring system is used for final decision making.

Normally, a polygraph examination is started with the consent of the examinee and the administration of an acquaintance or number test. Examinees are given one to six numbers and asked to circle one of them. The examinee is instructed to say "no" on all the numbers. The examinees are told the purpose of number test.

Before the polygraph examination, all test questions are properly explained to the examinee and the examinee gives a answer for each of the questions discussed. the examinee's psychological questions set is prepared for examination. The examinee is instructed that lying to any of the questions will cause them to fail the test.

After reviewing the test questions, the polygraph examination is started with a Silent Answer Test chart. The examinee is instructed to listen carefully to all the questions, make sure he understands them, feels comfortable with them and has answered them all truthfully. He does not give answers out loud.

The second and third charts are out loud and the examinee is instructed to give answers in a "yes" or "no" mode.

1.1 The Case

This murder case was referred to PFSA for a polygraph examination. According to the investigating officer, a couple returned from Glasgow (UK) to Pakistan. They landed at Lahore airport. The husband hired a private taxi to go home. On their way to home, the driver offered them tea which they drank and became unconscious. After three to four hours, the husband became conscious and found his wife lying nearby unconscious. Some individuals who were standing nearby took them to the nearest hospital. After reaching the hospital, the wife was pronounced dead and the husband was admitted and was later on discharged. An autopsy was conducted on the wife and stomach contents of both the husband and the wife were sent to PFSA (Lahore, Pakistan) to detect the possible drug that could have caused them to fall unconcious. The hyoid bone of the wife was also submitted for determining a fracture. During

the course of the investigation, police suspected the husband and brought him in for a polygraph examination.

2. Review of literature

Gordon and Fleisher (2002) conducted a study to find out the accuracy of the Integrated Zone Comparison Technique (IZCT) using computerized polygraph equipment. Three interpretation systems, namely ASIT Poly Suite, PolyScore 5.5, and the Objective Scoring System (OSS) were applied in the interpretation of collected data. Results indicated 100% precisions for IZCT when "inconclusive results" were not included with all three interpretation systems. When inconclusive results were taken as errors, overall precision for the IZCT with ASIT Poly Suite was 90%, and precision with PolyScore and the Objective Scoring System was 72% [4].

Another study was conducted by Gordon (2004) to find out the accuracy of the Integrated Zone Comparison Technique (IZCT). The methodology used in this study was designed for specific criminal single issue examinations and was applied by examiners working for the Egyptian Government during 1998 to 1999. According to the results obtained, IZCT properly identified 100% of the innocent individuals and 99.5% of the guilty individuals, without inconclusive results being included, or 94.8% of innocent individuals and 90.5% of the deceptive individuals, including inconclusive results [8].

Shaujaat and Baqir (2010) conducted another study to verify the accuracy of the Integrated Zone Comparison Technique (IZCT) aimed for particular issue testing in law enforcement from July 2004 to December 2009. Horizontal Scoring System (HSS) and Algorithm for interpretation of results were used on selected cases. Results indicated an overall precision rate of 95%, including inconclusive results and 98% without them in the recognition of deceptive subjects. Of the 8 unresolved cases, 6 were inconclusive and 2 were false positive. There were no false negatives [11].

Another study conducted to establish the accuracy of IZCT and ASIT polysuite scoring algorithm, reported an overall precision of IZCT through ASIT polysuite 92.9% with inconclusive results and 98.73% without inconclusive results. Their results further indicated an overall precision of a traditional 3-point scoring system at 91.7% with inconclusive results and 98.7% without them [12].

3. Methods

3.1 Design

A single case study design was used. There was only one suspect who was referred to Punjab Forensic Science Agency Lahore, Pakistan for polygraph examination.

3.2 Sample

A convenient sample of one suspect (cases registered in Punjab Forensic Science Agency Lahore) was taken for polygraph examination to determine his possible involvement in the case of murder. The stomach contents of deceased wife and the suspected husband (examinee) along with the hyoid bone of the wife were submitted to forensic pathology and forensic toxicology departments of the PFSA.

3.3 Measures

3.3.1 Forensic Assessment Interview Technique (FAINT)

FAINT consists of 28 semi-structured questions without demographics. There are diverse sorts of question comprising:

- Irrelevant questions
- Relevant questions
- Comparison questions
- Projective questions

Scoring:

Gordon & Fleisher (2002) established two scoring systems to score the answers and make analysis.

Three point scoring system: Answers are scored from -1, 0, and +1 where negative answer is scored -1, inconclusive 0, and positive answer is assigned +1 score individually [5]. Cut off scores:

- 0 or higher, NDI (no deception indicated)
- -1 to -4, inconclusive
- -5 or lower, DI (deception indicated)

Weighted Scoring System:

Answers are scored as given values subject to truthfulness and deception.

- +7 or higher NDI
- Scores between +7 and +4 are considered inconclusive.
- +4 or lower DI

3.3.2 Integrated Zone Comparison Technique (IZCT)

IZCT was used during polygraph examination. Following questions format was used in IZCT:

1) Irrelevant questions
2) Outside issue questions
3) Weak relevant questions
4) Relevant questions
5) Comparison questions
6) Countermeasure questions

3.3.3 LX 4000 polygraph instrument

Polygraph equipment measures and records physiological variations in blood pressure, pulse, respiration and skin conductivity. There are a series of questions asked to the examinee, who gives answers in "yes" or "no". Calibrated LX 4000 was used to get physiological data.

The following physiological parameters were recorded and analyzed in the polygraph examination:

1). Respiration: Respiratory activity was measured and recorded through two pneumo chest assemblies.

2). Electrodermal Activity: Skin conductance and resistance was measured and recorded through Electrodermal electrodes.

3). Cardio Activity: Blood pressure was measured and recorded through a cardiac hand-cuff.

4). Bodily Movements: Body movements while sitting on the polygraph chair were recorded through an Activity Sensor Pad.

After gathering physiological data through the LX 4000, charts are scored through ASIT polysuite software [9].

Cut off score for determination:

– +13 NDI and -13 DI
– Scores between +12 and -12 are inconclusive

3.4 Procedure

After the case briefing from the investigation officer, consent was taken from the examinee and a Forensic Assessment Interview Technique (FAINT) was administered. During the interview, the examinee denied any involvement in the said case of the murder. FAINT was scored as per the given criteria and the examinee was proven deceptive. After the interview, the polygraph questions were discussed in detail with the examinee and he gave responses. During the polygraph examination respiration, EDA and cardiac activity were measured and recorded. The activity sensor pad was used to monitor body movement. The first acquaintance test was administered in which the examinee was given a set of one to six numbers and was asked to encircle one of the numbers. After the acquaintance test, a silent answer chart was run in which the examinee was instructed to listen to all the questions carefully and not answer questions out loud. Second and third charts were administered as out loud and the examinee was instructed to answer all the questions truthfully. He was instructed that lying to any questions would result in failing the entire test. Three charts of single issue were collected and later on scored using ASIT Polysuite.

4. Results

After collecting data through Forensic Assessment Interview Technique (FAINT) and LX 4000 equipment, data was analyzed. Scoring was done using the FAINT Weighted Scoring System and ASIT Polysuite.

FAINT Scoring and Interpretation:

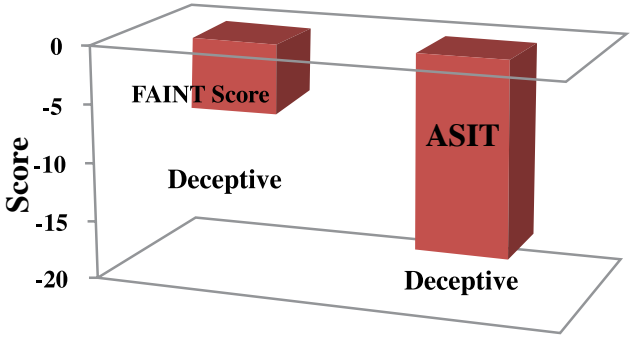

Figure 1- *FAINT and ASIT scores*

This examinee's total weighted score on FAINT was -6 which was indicative of deception (Figure-1).

Polygraph data was analyzed by using ASIT polysuite. This examinee's polygraph charts produced total score of – 16.5 which was also indicative of deception (Figure-1).

As mentioned earlier, stomach contents of the deceased wife and suspected husband were also analyzed in the fo-

rensic toxicology department. Results confirmed that only the wife's stomach contents contained the sedative material. If it was assumed that had it been a case of intoxication, then both the husband and wife's stomach would have contained sedative material. Moreover, the forensic pathology department confirmed that she was suffocated, as her hyoid bone was also fractured. The suspect (husband) was later interrogated by a police officer and he confessed that he killed his wife.

5. Discussion

Polygraph examination was conducted to determine the truthfulness of the said suspect. After conducting Forensic Assessment Interview Technique (FAINT) and polygraph examination using IZCT, the suspect was found to have deceptive. His total score on FAINT was -6, indicative of deception. This total score on ASIT Polysuite was -16.5, also indicative of deception. The results were consistent with forensic toxicology and forensic pathology investigations. Stomach contents and the wife's hyoid bone were submitted to forensic toxicology and forensic pathology. Sedative material (lorazepam) was only found in the wife's stomach. Secondly, the hyoid bone was also fractured, as found in forensic pathology. Later on, the suspect confessed to the police.

Previous studies have shown polygraph examination to be 90-100% accurate when determining truth or deception [3-8]. Gordon and Fleisher conducted a study to reveal deception. They used computerized polygraph equipment along with Integrated Zone Comparison Technique (IZCT) [10]. Three scoring systems were used for data interpretation: ASIT Poly Suite, PolyScore 5.5 and the Objective Scoring System (OSS). Results of the study showed 100% precisions for IZCT when inconclusive results were excluded with all three scoring algorithms. When inconclusive results were took as errors, overall precision for the IZCT with ASIT Poly Suite was 90% and precision with PolyScore and the Objective Scoring System was 72% [4].

In another study, Gordon showed that IZCT correctly identified 100% of the innocent individuals and 99.5% of the guilty individuals, without inconclusive results, or 94.8% of innocent individuals and 90.5% of the deceptive individuals, including inconclusive results [8].

6. Conclusion

Polygraph examination was conducted on the suspect to determine truthfulness. After conducting examination, the suspect was found to have been deceptive. The stomach contents of the wife were also analyzed and only the wife's stomach contained sedative material (lorazepam). The hyoid bone was also fractured. After getting all the results from forensic examinations, the suspect was confronted by police and he confessed that he commited the murder.

7. Limitations

The present study was conducted on single suspect. The number of suspects should be increased for generalization of these findings.

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