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The Polygraph and Lie Detection: A Case Study

جهاز كشف الكذب والكشف عن الكذب: دراسة حالة.

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Abstract

There are many cases in which physical evidence is missing. In such instances, a polygraph is a useful technique to determine the examinee's truthfulness or deception. A polygraph is an instrument that monitors the changes inside the body. The present study was conducted to determine the truthfulness of the victim and suspects in a hand chopping case.

In the present study, integrated zone comparison technique (IZCT) and forensic assessment interview (FAINT) were used to test the suspects and the victim. Computerized ASIT Algorithm and weighted scoring systems were used in IZCT and FAINT, respectively. Two suspects and one victim were referred for polygraph examination. Electro-dermal activity sensors were placed on the victim's forehead as he did not have arms, and a cardio cuff was placed on his left leg.

During the initial interview, the victim alleged that his hands were put forcibly into a machine. All the suspects were also tested, and the victim was found to be deceptive. He later confessed that his hands were not put forcibly into machine. After testing, it was found that all the suspects were truthful.

Keywords: Forensic Sciences, Integrated zone comparison technique (IZCT), Forensic Assessment interview technique (FAINT), ASIT Polysuite Algorithm, Weighted Scoring .

المستخلص

هناك العديد من الحالات التي تكون فيها الأدلة المادية مفقودة. في مثل هذه الحالات، يعد جهاز كشف الكذب طريقة مفيدة لتحديد مصداقية الشخص من عدمها. جهاز كشف الكذب عبارة عن أداة تراقب التغيرات داخل الجسم. أجريت الدراسة الحالية لتحديد صدق الضحية والمشتبه بهم في حادثة قطع يد.

في الدراسة الحالية، تم استخدام تقنية مقارنة المنطقة المتكاملة (IZCT) ومقابلة تقييم الطب الشرعي (FAINT) لاختبار المشتبه بهم والضحية. تم استخدام خوارزمية ASIT المحوسبة وأنظمة التهديد المرجحة في IZCT و FAINT على التوالي. تمت إحالة اثنين من المشتبه بهم وضحية واحدة إلى قسم جهاز كشف الكذب للفحص بجهاز كشف الكذب. تم وضع حساسات النشاط الكهربائي الخاصة بالضحية على الجبين لأنه لم يكن لديه أذرع وتم وضع اللفة الخاصة بالقلب على الساق اليسرى.

خلال المقابلة الأولية، ادعى الضحية أنه أجبر على وضع يديه في الآلة بالقوة. تم اختبار جميع المشتبه بهم أيضاً، وقد تبين أن الضحية كان مخادعا، حيث اعترف في وقت لاحق بأنه لم يجبر على وضع يديه في الآلة بالقوة.

بعد اختبار جميع المشتبه بهم والضحايا، تبين أن جميع المشتبه بهم كانوا صادقين وأن الضحية كان مخادعا فيما يتعلق بتصريحه بأنه أجبر على وضع يديه في الآلة بالقوة.

الكلمات المفتاحية: علوم الأدلة الجنائية، تقنية مقارنة المنطقة المتكاملة (IZCT)، تقنية مقابلة تقييم الطب الشرعي (FAINT)، خوارزمية ASIT Polysuite، التقييم المرجح.



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1. Introduction

Polygraph techniques detect deception based on physiological data. A polygraph instrument records the physiological changes taking place inside the body. It is based on the theory that deceptive individuals experience different emotions and cognitions than truthful ones.

Polygraph techniques have advanced over time. The comparison question technique developed by John E. Reid in the late 1940s remained influential for some time. [1]. Later on, Cleve Backster [2] developed the Backster Zone comparison technique and introduced a numeric scoring system. However, the numeric scoring system was subjective not objective. The Backster Zone Comparison Technique was modified by Gordon & Cochetti [3] and developed into the Integrated Zone Comparison Technique (IZCT). They introduced a horizontal scoring system and ASIT algorithm to eliminate subjectivity in polygraph chart scoring. The integrated zone comparison technique is considered to be a flexible technique which can effectively be used in single and multi-issue polygraph testing. It is being used worldwide for civil, criminal and intelligence testing. IZCT includes three relevant questions, three comparison questions along with irrelevant, weak relevant, symptomatic and countermeasure questions.

The physiological parameters measured during a polygraph examination include respiratory activity, cardiovascular activity and electrodermal activity (GSR). Any anticipated fear, psychological or physical, can alter the heart rate, blood pressure and cardiac activity. These activities can differ subtly or drastically among the individuals and within the same individual in different conditions [4].

During polygraph examination, pneumo assembly (abdominal and thoracic) is used to monitor the respiration of

the examinee. Electrodermal activity is considered to be the most sensitive and critical parameter among three channels used in polygraph examination [5]. It is governed by the eccrine gland, which is a sweat producing gland controlled by the sympathetic nervous system [6].

There are a variety of activity sensors utilized during polygraph examination which include seat pads, foot rest pads, and arm activity sensors. These activity sensors are used to monitor the movements with which an examinee tries to distort the physiological data during a polygraph in a respective area, e.g. seat, foot and arms.

The Forensic Assessment Interview Technique (FAINT) [7] is used as a pre-assessment tool. It was devised by Gordon and Fleisher [7] and has been translated into Urdu by Shujaat and Rizvi [8]. In FAINT, two parallel assessments are developed e.g. verbal and nonverbal assessment. FAINT has two researched and objective scoring systems, namely a three- point scoring system and weighted scoring system, which are employed for more accurate pre-test assessment.

Polygraph examination begins with an acquaintance or number test. The examinee is given one to six numbers and instructed to choose one number by circling the number. He is asked to answer questions by circling the consecutive numbers and also instructed to say “no” on a selected number. The examinee is informed regarding the rationale of the number test.

After the acquaintance test, all the test questions are properly discussed and reviewed with the examinee and he is instructed to answer all the questions with yes or no. It is important that the examinee understands the test questions and their related responses. It is further communicated to the examinee that lying to any test question will lead to



failing the polygraph examination.

The polygraph test is started with a silent answer chart and the examinee is instructed to listen carefully to the test questions and not to respond out loud. After the first chart, the examinee is informed that he will now answer out loud and that questions will be rotated. The examinee responds with 'yes' or 'no' out loud on the second and third chart.

1.1 Literature Review

A study conducted by Gordon et al. [9] concluded that the IZCT showed an overall validity of 90% with ASIT poly suit. When other algorithms (PolyScore and Objective Scoring System) were utilized, 72% accuracy was achieved when inconclusive results were considered as an error. But when inconclusive results were omitted, the accuracy of IZCT with PolyScore and Objective Scoring System and ASIT was 100%.

Another study conducted by Gordon et al. [10] suggested that the overall accuracy of the 3-point scoring system was 93% when inconclusive results were excluded. But when inconclusive results were considered the error accuracy was 56%. The accuracy of the seven-point scoring system was 90% when inconclusive results were excluded and when considered errors accuracy was 69%. The accuracy of the horizontal scoring system when inconclusive results were excluded was 93%, and when counted as errors the accuracy was 83%.

Patton [11] determined the validity of IZCT on a field sample of 151 cases. The results suggested an overall accuracy rate of 95% with inconclusive results and 98 % when inconclusive results were excluded in determination of deception. Moreover, 1% were identified as false positive, and no false negative was found.

This field study tested the validity of the IZCT. Gordon et al. [12] conducted a field study on 309 criminal cases. Their results showed 100 % accuracy of IZCT in identifying innocent examinees and 99.5% in identifying guilty examinees without inconclusive results. When inconclusive results were added, IZCT correctly identified 94.8 % of truthful examinees and 90.5 % of deceptive examinees.

Kraphol et al. [13] investigated the Horizontal Scoring System (HSS) in polygraph chart interpretation. They correctly identified 86% and 68% of deceptive and truthful examinees, respectively. A total of 9% were inconclusive. They further found an accuracy of 84% without inconclusive results. When asymmetrical rules were applied, 82% and 84 % of deceptive and truthful cases, respectively, were correctly identified, with inconclusive results of 4%.

2. Case facts

A case of hand chopping was referred for polygraph examination. According to the investigating officer, the victim alleged that his owner forcibly put his hands into an electric chaff cutter machine. Both hands were chopped off from the wrist. The victim further stated that two suspects were involved. The two suspects and the victim were thus referred for polygraph examination to determine the veracity of their statements.

2.1 Methodology

A case study design was employed. The case was submitted for polygraph examination in which two suspects and one victim were referred to Punjab Forensic Science Agency, Lahore, Pakistan for polygraph examination.

Two suspects and one victim (cases registered at Punjab Forensic Science Agency Lahore) were thus examined to



determine the veracity of the statements of the victim and suspects in a hand chopping case.

All three examinees were tested by three different examiners in order to maintain the objectivity of the process. Suspects were tested by two different examiners and the victim was tested by another examiner.

2.2 Measures

The forensic assessment interview, FAINT, [7] was used as an initial assessment tool. FAINT consists of 28 semi structured questions, demographical information and medical history. Types of questions asked included demographical information, irrelevant questions, relevant questions, comparison questions, and projective questions.

2.3 Scoring

Gorden & Fleisher [7] have developed two scoring systems for interpretation and determination:

a. Three-point scoring system

The scores range from -1, 0, +1, where negative score (-1) is assigned to a negative answer, zero is assigned to inconclusive, and positive score (+1) is assigned to a positive answer. Cut off scores:

0 or higher: no deception indicated (NDI)

-1 to -4: inconclusive

-5 or lower: deception indicated (DI)

b. Weighted Scoring System

Answers are scored as provided values to truthful and deceptive responses.

+7 or higher: NDI

Scores between +7 and +4: considered inconclusive.

+4 or lower: DI

2.3.1 Integrated Zone Comparison Technique (IZCT)

IZCT was used during polygraph examination. The following questions were asked in IZCT:

- 1) Irrelevant questions
- 2) Symptomatic question
- 3) Weak relevant questions
- 4) Relevant questions
- 5) Comparison questions
- 6) Countermeasure question

2.3.2 The Instrument

An LX 4000 polygraph was used to conduct polygraph examination. This consisted of:

- Cardiac cuff

In standard polygraph examinations, a cardiac cuff is placed on the left arm. However, in this case, the victim's hands were chopped off and the cardiac cuff was placed on left leg.

- Electrodermal activity sensor

In a standard polygraph examination, electrodermal activity sensor electrodes are placed on the index and ring fingers of the right hand. As the victim's hands were chopped off, electrodermal activity sensor electrodes were placed on his forehead.

- Pneumograph

- Activity sensor pad

- Food pad activity sensor

Examinees were asked a series of questions and they responded to the questions in yes or no format. A calibrated LX 4000 was used to collect the data. After gathering physiological data, the charts were scored by employing ASIT Polysuite Software.

- Cut off score for determination:

- +13 NDI -13 DI

- Scores between +12 and -12 are inconclusive.



2.4 Procedure

The investigating officer briefed the polygraph scientist about the case facts. After briefing, the consent of the victim and suspects was taken and then forensic assessment interview technique, FAINT, was administered. During the interview, the suspects denied the allegation that they forcibly put the hands of the victim into the electric chaff cutter machine. Furthermore, the victim stated that his hands were forcibly put into the electric chaff cutter machine by the two suspects. The polygraph examinations of the suspects were conducted before that of the victim and after the interview acquaintance test was administered to the suspects and the victim. During the polygraph examination, all the questions were thoroughly discussed and reviewed with the suspects and the victim. The first chart was administered as a silent answer and the two subsequent charts were read out loud. In the first chart, the examinees were instructed not to answer the questions out loud. But in the second and third charts, the examinees were instructed to say the answers out loud, and examinees were informed of the rotation of the questions. Examinees were informed that lying to a single question will lead to failing the complete examination. Three charts of single issue polygraph examination were collected from the suspects and the victim. ASIT Polysuite was used to analyze the data. After completion of the polygraph examination, the FAINT was scored with the provided criteria.

3. Results

The polygraph examination data were collected through the FAINT using an LX-4000 polygraph instrument. Data were analyzed using weighted scoring system and ASIT-Polysuite.

The FAINT data obtained from the two suspects were

analyzed using the weighted scoring system. Both suspects scored were +21 and +27, respectively, which were indicative of truthfulness.

Both suspect's scores on polygraph charts were analyzed using ASIT-Polysuite and the scores were +36.5 and +13, respectively, which were indicative of truthfulness.

The victim was tested after both the suspects were found to be truthful. The victim's FAINT data was analyzed by using the weighted scoring system. The victim's total score was -6, which was indicative of deception. His polygraph data was collected by using an LX-4000 instrument, and data was analyzed by employing ASIT-Polysuite algorithm. The victim's total score on polygraph charts was -13, which was indicative of deception.

After polygraph examination of the suspects and the victim, the suspects were found to be truthful and the victim was deceptive in his allegation that his hands were forcibly put into the electric chaff cutter machine by the suspects.

In the post-test phase, the victim was interrogated and he confessed that his hands were not put forcibly into the electric chaff cutter machine. He admitted that it was an accident.

4. Discussion

A polygraph examination of both suspects and the victim was conducted to determine the veracity of their statements. Both the suspects were truthful in their statement that they did not put the victim's hands into the electric chaff cutter machine. The polygraph examination of the victim was conducted and he was found to be deceptive. During interrogation, he confessed that his hands were not put forcibly into the machine, admitting that it was an accident.



The literature has shown that the IZCT is highly accurate in determining truth and deception.

Some earlier studies conducted [9,11] state the effectiveness of IZCT as 72% to 100%. A previous study [13] showed that 86 % of deceptive examinees and 68 % of truthful examinees were correctly identified, and 9 % were inconclusive. It further showed an accuracy of 84 % without inconclusive results. When asymmetrical rules were applied, 82 % of deceptive cases and 84 % of truthful cases were correctly identified with inconclusive results of 4 %.

Another related study [12] showed similar results regarding the accuracy of IZCT in which 100% and 99.5% of innocent and guilty examinees, respectively, were identified without inconclusive results. When inconclusive results were added, IZCT correctly identified 94.8% of truthful examinees and 90.5% of deceptive examinees.

Limitations

As this was a case study, results cannot be generalized.

Suggestions

Experimental/ field cases may be utilized for determination of validity and reliability. Other psychological measures may be used to determine the personality characteristics of truthful and deceptive individuals.

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Conflict of interest

None.

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