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Technological Truth: Evaluating the Efficacy of Lie Detection Methods and Legal Ramifications

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ABSTRACT

This study explores the dynamic landscape of lie detection and traces its historical evolution from ancient beliefs to modern technological advances. The integration of technology compared to the context of artificial intelligence and the sensitivity of the attack is used as a force for change. However, the inclusion of polygraph technology also raises ethical and legal challenges. Privacy issues and potential biases in data analysis must be carefully considered to balance the pursuit of truth with individual rights.

Keywords: *Lie Detection, Polygraph, Historical evolution, Modern technology, Artificial intelligence.*

I. INTRODUCTION

For as long as humans have been lying to each other, they have been trying to develop technologies that can detect deception and reveal the truth. This process almost always involves interviews and interrogations to see through the deception and uncover things the cheater will not admit to (Lie Detection and the Polygraph, n.d.). The polygraph was discovered in the 20th century, when equipment was developed that used the measurement of body response as an indicator of deception. Technology based on body measurements was developed in the early 2000s and has become a priority for many U.S. law enforcement officials and the intelligence community to identify terrorists, spies and saboteurs in the absence of direct evidence. The purpose of the lie detector test is to reveal facts that the person knows but hides from others. Psychophysiological lie detection, or deception, is based on the theory that lying causes certain emotions that produce similar physiological responses. The discovery of psychophysiological lies dates back thousands of years. Modern lie detectors measure blood pressure, respiration and skin conductance. Surrogate markers such as sound stress analysis and functional magnetic resonance imaging have not yet been proven. Hidden and irrelevant questions are used in the crime recognition test. Critics have questioned the theory and practice of polygraphy, mostly

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because measuring emotion as a response may not be the same as cheating. Polygraph tests are generally not admissible in court. Brain fingerprinting directly detects hidden facts, such as criminal records, stored in the brain by measuring the electrical response of the brain.

II. SIGNIFICANCE OF TECHNOLOGY IN LIE DETECTION

The integration of technology into the lie detection process represents a change with far-reaching consequences. Cultural practices, when well established, are not free from limitations. The importance of integrated technology lies in its ability to overcome these challenges and redefine the landscape of deception detection. First, technology brings purpose and reality that are often difficult for humans to judge. When applied to speech analysis, facial expressions, and neurophysiological signals, advanced algorithms and machine learning models can detect subtle signs of deception that may escape traditional analysis. This goal is particularly important in legal environments where the reliability of evidence can be a critical factor in decision-making and litigation. Additionally, the advancement of technology provides a scalable and standardized approach to lie detection. Unlike traditional methods where interpretation can vary from analyst to analyst, the tool provides a consistent analysis process. This design not only increases the reliability of the results but also facilitates comparability and validity across different situations and contexts. Essentially, integrating technology into the lie detection process means breaking away from traditional limitations, leading to a more reliable, objective and equitable process of finding the truth in legal proceedings. This study aims to explore the many effects of technological developments and their impact on the field of law.

III. HISTORICAL PERSPECTIVES ON LIE DETECTION

Early societies often relied on ordeal, in which people were tested physically or supernatural to determine guilt or innocence. The results of these trials are believed to be divine intervention, indicating reliance on mystical powers to reveal the truth (Trial by Ordeal in the Middle Ages , n.d.). Suspects were made to chew on rice grains and spit them out in ancient India. If the grains were dry, the suspect was presumed guilty; wet granules suggested innocence. The method was based on the idea that people who lie generate less saliva as a result of the anxiety and psychological strain they go through (DRAGSTEDT). Saudi Arabian interrogators employed the Bisha'h technique. This entailed placing various metal objects, such as a red-hot spoon, against the suspect's tongue (Hart, n.d.). The person was assumed to be telling the truth if it left a blister; if not, they were assumed to be lying. This tactic also made use of the purported link between saliva and dishonesty. Georg Sticker made the initial discovery in 1897 that one might use the skin's electrical conductivity to identify if someone was telling the truth

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or lying. People who experience powerful emotional emotions sweat more than others, which explains why lying causes changes in electrical activity. Physiognomy, which shows the relationship between the face and personality, gained importance during the Renaissance. Advocates of the body believe that appearance can reveal a person's morality and mental thoughts. The idea of the lie detector emerged in the late 19th century when pioneers such as Cesare Lombroso discovered physical evidence of deception. In the 20th century, contributions by William Moulton Marston laid the foundation for the modern lie detector, which measures physiological variables such as blood pressure and respiration.

IV. TRADITIONAL METHODS OF LIE DETECTION AND THEIR LIMITATIONS

One of the most well-known methods is the polygraph test. Developed in the early 20th century with the assumption that deception leads to change, the polygraph measures physiological responses such as heart rate, blood pressure and respiration. Despite its historical importance, the polygraph has some limitations. A significant difficulty is subjectivity in interpretation. The accuracy of polygraph results often depends on the skill of the examiner, highlighting factors that may affect the reliability of the results. Additionally, people who understand the testing process can countermeasures to control physiological responses, affecting the accuracy of results and making the polygraph vulnerable to fraud.

Observing speech and observing behavior during an interview or interrogation are other methods. This method will carefully examine words and behavior for signs of deception. However, interpreting these concepts is a difficult task due to the influence of cultural and personal differences. Behaviors that may be considered deception in one culture may be normal in another, challenging the generalization of these indicators. Moreover, the efficacy of this methodology relies on the qualifications and expertise of the assessor, hence rendering the outcomes intrinsically subjective and differing throughout various professionals.

The Reed Technique is a method commonly used in law enforcement that emphasizes behavioral analysis and psychological control during interrogation. While it plays an important role in extracting confessions, the technology has been criticized for its ability to extract false confessions. The coercive tactics used in Reed's process raise ethical questions about the treatment of suspects, as psychological distress can cause people to confess to crimes they did not commit.

V. EMERGENCE OF TECHNOLOGY IN LIE DETECTION

The evolution of lie detection has seen a change with the advent of advanced technology. As traditional methods face their limitations, technological advances are emerging to solve these

problems, offering new ways to discover truth.

Narcotic testing involves intravenous injection over three hours of sodium penethol and sodium amytal dissolved in distilled water and mixed with glucose. The psychological effect of this is that the subject loses all inhibitions and does not have the ability to manipulate answers easily. Therefore, people believe that the information presented in these tests is mostly accurate (Bharadwaj). The investigators questioned the subject in the presence of a doctorand recorded them on audio and video tapes. Additionally, the expert will prepare a report for the collection of evidence.

One of the most advanced technologies in this field is voice analysis. Advances in signal processing and machine learning have led to the development of complex algorithms that can identify nuances in sound patterns. The technology goes beyond traditional polygraph by focusing solely on the characteristics of speech (LINK). Conversation analysis claims to be able to identify the level of stress or deception by assessing the tone, volume and pace of speech. Although human speech is the result of complex processes, many different sounds can be identified. According to the developers of Psychological Stress Assessor, the sounds we hear in human speech are simply blending together of at least three sounds: the basic sound, formant sound, and the microtremor. This non-invasive method has attracted attention for its efficiency and ability to analyse large amounts of audio data.

Facial analysis represents another breakthrough in technology-enhanced lie detection. With the advent of high-resolution cameras and computer vision algorithms, scientists can now analyze micro expressions—long facial expressions that occur in a fraction of a second and often involuntarily. Micro expressions aim to reveal hidden emotions and sometimes deception. Facial analysis has the advantage of capturing nonverbal cues that may be overlooked during verbal interactions and provides an additional technique for deception detecting. John Kircher, Doug Hacker, Anne Cook, Dan Woltz and David Raskin developed eye tracking technology at the University of Utah, which they see as an alternative to artificial intelligence. This is a cognitive response, not an emotional response like polygraph testing and other methods (Ishaan Doddamani). This tool measures pupil dilation, review time, reading and rereading, and errors. Data is recorded based on the correct or incorrect answers given by the subject to questions on the computer. Dr. Paul Ekman's research on facial micro expressions, fear, happiness, anger, disgust, repression, and sadness, was considered facial micro expressions. Because facial micro expressions occur in 1/15 to 1/25 of a second, it is important to use a fast camera that captures at least 30 frames per second. The video is divided into small square segments. Use basic analysis techniques to identify facial micro expressions.

Recently developed physical tests thought to be able to detect lying are electroencephalography (EEG) and functional magnetic resonance imaging (fMRI). Both are innovative technologies developed and widely used for psychological testing. The history of electroencephalography dates back to the 1920s, while functional magnetic resonance imaging was first reported for humans in 1992 . These two methods are very different from the polygraph in that they measure central (brain) rather than peripheral (galvanic skin response, heart rate, blood pressure, and respiration) correlations of brain activity (NATIONAL LIBIRARY OF MEDICINE, n.d.). J.P. Rosenfeld , the pioneer of EEG-based lie detection technology. Functional magnetic resonance imaging (fMRI) is superior to electroencephalography (EEG) in its ability to locate signals in the brain. EEG, on the other hand, is cheaper, more mobile and has better time resolution than fMRI. Recent advances in the ability of functional magnetic resonance imaging (fMRI) to reliably measure brain and central nervous system (CNS) activity have raised the possibility that fMRI-based systems will outperform polygraphs and lie detectors at lie detection.

Almost every industry is working to integrate AI into their operations. Artificial intelligence learns by absorbing big data and creating results based on this data. For lie detection, this means recording the liar's small movements, such as hip muscles, voice changes, and eye vibrations. Machine learning algorithms are trained on millions of data to detect signs of deception (Hartwig, n.d.).AI can also adapt and learn as data is updated, so the technology will only become accurate over time. The ability of machine learning models to update and refine their predictions over time is a key advantage in lie detection.

VI. CHALLENGES IN TECHNOLOGIES-BASED LIE DETECTION

Technology-based lie detection often involves the collection and analysis of sensitive biometric data, raising ethical and privacy concerns. The use of technologies such as speech analysis, facial recognition and neuroimaging may affect individuals' personal information. There are concerns regarding participants' consent, the potential for abuse, and the need to establish effective safeguards to protect privacy rights. Striking a balance between the pursuit of truth and the protection of human rights remains an ethical challenge. The reliability and validity of technology-based lie detection is a major issue. Factors such as changes in human behavior, environmental influences, countermeasures ability of human will affect the accuracy of this process. Research shows that the effectiveness of some methods may vary depending on the person and the situation. Establishing legal frameworks, improving algorithms, and addressing the complexities of human behavior are critical to improving the reliability of lie detection. Potential cultural and gender biases in technology-based lie detection raise concerns about fairness and justice. Algorithms and models based on specific data can unintentionally

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perpetuate biases present in the data. Cultural differences and gender differences in verbal and nonverbal communication may affect the accuracy of findings. Behaviors that may be considered deception in one culture may be normal in another, challenging the generalization of these indicators Addressing this bias requires a better understanding of different cultures and ongoing efforts to reduce algorithmic biases. Rapid advances in technology may outpace advances in administrative procedures. As technology develops, the risk of inadequate control and supervision emerges. Striking a balance between encouraging innovation and ensuring responsible use requires efforts to create ethical, legal and regulatory frameworks that keep pace with technological developments. Incorporating investigative technology into legal proceedings presents challenges regarding admissibility, standards of evidence, and interpretation of results. The legal process often attempts to incorporate new technologies, raising questions about the admission and interpretation of information technology as evidence in court. There is a need for clear models, expert testimony, and a deep understanding of the limitations of this technology.

VII. LEGAL VALIDITY OF DECEPTION DETECTION TEST

However, the concept of whether to follow a polygraph test is still unclear, and the legal validity and accuracy of the polygraph are still controversial. At the same time, we have many Supreme Court and High Court decisions where the courts leave the trial to the discretion of the investigating authority. If fundamental rights are violated during testing, the process will be considered invalid (THE LEGAL VALIDITY OF DECEPTION DETECTION TEST IN INDIA, n.d.). We can remember that in most cases, these lie detector devices are managed by controlling thoughts and emotions, and the fraudster eventually makes a decision, detects the change in the body and gives results accordingly (Shridula). The lie detector test is also considered a violation of the fundamental rights of right to life and personal freedoms enshrined in Article 21 of the Constitution of India. This idea is considered cruel, inhuman or cruel within the meaning of Article 21. This is a strategy against the right to self-incrimination as enshrined in Articles 20(3) of the indian constitutuion and 161(2) of the Crpc.

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VIII. References

1. Bharadwaj, A. S. (n.d.). NARCO ANALYSIS AND PROTECTING THE ACCUSED. Retrieved from https://www.nslr.in/wp-content/uploads/2019/03/NSLR-Vol-4-No-12.pdf
2. DRAGSTEDT, C. A. (n.d.). Trial by ordeal. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3802583/pdf/QBullNorthwestUnivMedSch-19-2-137_28.pdf
3. Hart, C. L. (n.d.). A Brief History of Lie Detection. Retrieved from psychologytoday: https://www.psychologytoday.com/intl/blog/the-nature-of-deception/202303/a-brief-history-of-lie-detection
4. Hartwig, B. (n.d.). converus. Retrieved from AI and Lie Detection: What Does The Future Hold: https://converus.com/blog/ai-and-lie-detection-what-does-the-future-hold/
5. Ishaan Doddamani, R. P. (n.d.). Lie Detection Using Facial Expressions. Retrieved from ijcrt: https://ijcrt.org/papers/IJCRT2204164.pdf
6. Lie Detection and the Polygraph. (n.d.). Retrieved from nationalacademies: https://nap.nationalacademies.org/read/10420/chapter/3
7. LINK, F. C. (n.d.). LIE DETECTION THROUGH VOICE ANALYSIS. Retrieved from https://www.cia.gov/readingroom/docs/CIA-RDP96-00788R002000150003-2.pdf
8. NATIONAL LIBIRARY OF MEDICINE. (n.d.). Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3680134/
9. Shridula, S. (n.d.). ADMISSIBILITY OF DECEPTION DETECTION TESTS IN. Retrieved from thelawbrigade: https://thelawbrigade.com/wp-content/uploads/2019/05/S.-Shridula.pdf
10. THE LEGAL VALIDITY OF DECEPTION DETECTION TEST IN INDIA. (n.d.). Retrieved from brainboosterarticles: https://www.brainboosterarticles.com/post/the-legal-validity-of-deception-detection-test-in-india
11. Trial by Ordeal in the Middle Ages . (n.d.). Retrieved from study.com: https://study.com/academy/lesson/medieval-trial-by-ordeal-definition-lesson.html#:~:text=The%20rationale%20for%20the%20Trial,during%20the%20Trial%20by%20Ordeal.

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