

Science and Technology in Judicial System Using the Brain Mapping Test

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Abstract

The rapid advancement of scientific technology has brought significant changes to various fields, including the legal system, particularly in criminal justice. Innovative scientific techniques, such as brain mapping for crime detection and investigation, have become part of established laws. However, amidst these technological advancements, it is crucial to remember our human nature, as creations of a higher power, rather than merely becoming robotic in our approach. One essential aspect to consider is the sanctity of human memory, which is a divine gift. Science should not intrude upon this personal property. When evaluating the validity of these tests, it is vital to ensure they align with constitutional rights, long-standing criminal jurisprudence, and the rights of the accused. Striking the right balance becomes a challenge. On one hand, such advancements provide authentic evidence, making it easier for judges to convict and impose severe penalties, ensuring guilt is established beyond reasonable doubt. On the other hand, we must be cautious not to overlook fundamental rights and individual liberties in our pursuit of progress. As society evolves, laws may need to adapt, but it must be done while upholding the core principles that protect the dignity and rights of all individuals.

Keywords: Legal system, criminal justice, brain mapping, crime detection, authentic evidence

INTRODUCTION

The use of science and technology in administration of justice helps a lot, by the development of science and technology. The scientific way of investigation brings 90–95% success in investigating the grave offences of organized crimes and terrorism and act of danger to the national security.

The changing trend of human nature has become undependable and the way of advanced commissioning of organized crimes and suspected crime, criminal conspiracy to commit the grave offence in a scientific manner leads to think about the techniques of scientific investigation and methods of scientific interrogation too.

Especially in tracing out grave offences like bomb blasts, terrorist acts, strikes against national security, safety measures in maintaining the national institutions to be safe and so on. Without the application of science and technology for effective investigation and proper interrogation to find out the truth and criminal conspiracies hatched to commit grave offences. The science has so progressed that it can identify, compare and link with tiniest connecting clue found with the crime and its suspects.

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The recent records show about the result of eyewitnesses, evidence against a culprit have gone so far away and the eyewitnesses are becoming rare species, even if they are available they change their colour like chameleon. That is why the Hon'ble Supreme Court has taken the action against an eyewitness for her U-turn version in Gujarat riots cases by Zaheera Shaik. The Apex Court punished

for the false version of an eyewitness. But in some cases, the witnesses are bribed, threatened and won and favoured by the accused and even sometimes by the prosecution too just to obtain a favourable result. The best example of recent ruling of Hon'ble High Court of Delhi in BMW case where the court takes action against both sides of advocates of defence and prosecution. Thus, it is a high time to proceed in criminal investigation with a successful and true interrogation is possible only with the help and use of science and technology.

SCIENTIFIC INVESTIGATION OF CRIME

Investigations are being conducted in a scientific manner by using the modern methods of scientific technology. The use of science and technology in the administration of justice is inclusive and includes all the branches of science and its technology which are:

1. Physical Science
2. Chemical Science
3. Bio-medical Science
4. Engineering Science
5. Psychology and Forensic Science
6. Computer and Information Science and Technology

Psychology and Forensic Science

Forensic Science and Psychology have developed in its varied forms like:

1. Psychotropic drug analysis
2. Lie-detector test
3. Brain printing or brain mapping test
4. DNA profiling

Methods of Conducting Brain Mapping Test

The process of brain mapping is simple in nature of its procedure and practice. The sensors are strapped around the head in the form of a band on the subject attached to encephalograph. Then on a TV monitor or screen of a computer, numbers of pictures both relevant and irrelevant to crime are shown to the person. On seeing of the pictures by person involved in crime, then brain shows electrical activity to a particular related picture in which he is involved. If the brain shows no electrical activity when pictures are shown to a person that they are not related to or involved.

These brain activities are picked up by the sensors and recorded in a computer in a wave form. Even the electrical activity changes if the person recognizes or shown any similar object, scene of picture pertaining to the crime. If the person involved in a crime or if he is associated with the crime or participated in the crime then the brain shows electrical activity of said person and he recognizes the objects used in relevant to the crime and it can trace from the wave form. If the person is innocent and he has not committed or participated in crime then showing of pictures of objects, scenes, weapons, etc., to him/her, his brain will not stimulate any activity and no additional electrical activity will appear. No questions are put to the person nor will any statement of the person be recorded.

Importance of Brain Mapping Test

The importance of brain mapping test is to know the involvement of a person in a crime or not. As brain is a store house of the information of a person, and if the person involved in a particular crime, definitely he has the information about it stored in his brain. Then information in the brain can be traced and find out the involvement or innocence of a person. This technique of extraction of information can be perfected and made full proof as evidence as brain always records the events, occurrence perfectly and it is available in the brain and provides as clinching information in a criminal investigation.

Electroencephalography (EEG) is a technique used to detect and measure the electrical signals produced by the collective activity of neurons in the brain. This is achieved by placing electrodes on the scalp and face to capture the changes in electrical field potentials. When the brain responds to

particular sensory or cognitive events, it generates distinct brain wave patterns, known as event-related potentials (ERPs) [1]. In simpler terms, EEG is based on the observation that the brain exhibits specific wave patterns when a person experiences familiar stimuli [2].

In this test, individuals are presented with both relevant and irrelevant auditory or visual stimuli related to the facts being investigated. These stimuli are categorized as materials probe and neural probes. The main idea behind this technique is that guilty suspects will show a distinct brain response, known as the P300 wave, when exposed to the materials probes. The instruments record these brain wave components, and by analyzing the recorded data, the examiner can draw conclusions about the individual's familiarity with the crime-related information [3].

The published literature on this technique is still relatively scarce. The term "brain mapping" has not been formally integrated into the medical subheadings or terminology of medicine yet. On conducting a literature search in pub med by combining two medical subheadings terms events-related potentials P300 and forensic medicine yielded only 23 publications and another pub med search by combining two medical subheadings terms, brain mapping and forensic medicine yielded only 72 publications. On reviewing this published literature, it was found that results were inconclusive. The sample sizes were small. Majority of the studies were open label with poor methodology. Sample studied were from the normal population rather than forensic population. Each study has used a different protocol to interpret the data.

A fascinating study highlighted that using P300 amplitude as a recognition index for deception detection can be easily circumvented with uncomplicated countermeasures that individuals can quickly learn [4].

Numerous ongoing research studies are utilizing functional brain imaging in the field of brain mapping. However, the findings from these studies have not yielded conclusive results. As a result, researchers have advised against admitting functional brain images from brain mapping as evidence in the court of law [5].

The admissibility of a brain mapping test report in court would depend on its authenticity and probative value. Whether the brain mapping test is sufficiently developed to produce a reliable report that the court can trust will require further consideration. This assessment can be made when the supporting materials are presented before the court [6].

According to Section 173 (8), the permissibility of conducting a brain mapping test on the wife of the deceased was called into question. The doubt arose after the deceased's uncle sent a letter to the Human Rights Commission, accusing the wife of being involved in the murder. However, no additional evidence emerged to register a fresh crime against her, and she was neither accused nor involved as a witness in any other case. Consequently, the magistrate's decision to permit brain mapping and lie detection tests on her was deemed inappropriate [7].

The admissibility of the polygraph test as a lie detection test was not addressed by the Supreme Court in this case. This decision was made because there were enough other materials available to establish the conviction of accused number 2. Hence, the court did not delve into the question of whether the result of the polygraph test would be admissible in this particular case [8].

The administration of scientific tests such as Polygraph, Narco-Analysis, and Brain Mapping on the accused can be seen as a form of testimonial compulsion. Although these tests do not physically force the accused to speak, they essentially elicit testimonial responses that could be incriminating. The purpose of conducting these tests is to obtain crucial evidence against the accused that may not be attainable through conventional means of investigation [9].

Benefits of Brain Mapping Test

This test is a very useful tool for investigation and to ascertain truth in cases like white collar crimes, burglary and house thefts, murder and rape cases. The identification of weapons and objects used in commissioning of the offences can be traced with this test.

The other advantages of this test are easily available evidence with its technique, accurate, low cost, time effective, easily available and without much risk and pain or humiliation to the person who is subjected for interrogation of a crime by the investigation.

This test is a new form of a test, yet to receive its importance before it provides a breakthrough in scientific criminal investigation. But in long run if once it is recognized and accepted in its settled positions, it is likely to sweep the field of investigation of a crime like a thunder waves.

Neuroscience

The field of neuroscience involves the study of the brain and nervous system. In certain cases, criminals can be very difficult to crack, leading investigating teams to resort to unfair and illegal methods to gather evidence. Despite this, relying on scientific advancements can be beneficial. By working with experts, investigating officers can gain insights into the suspect's mind and uncover concealed information and evidence. Neuro law, which is based on brain science, aligns with the Indian constitution's provisions in Part IV-A. It emphasizes the fundamental duties of every citizen to promote scientific temper, humanism, inquiry, and reform in the pursuit of justice within the criminal justice system.

Neuroscience aims to understand the brain and mind, but the complexity of the human mind makes it challenging to fully comprehend. Neuroimaging involves recording brain images under various conditions, potentially relating to future behaviors and conditions. Techniques like computer-assisted tomography reveal the structure of the living brain, while positron emission tomography and magnetic resonance imaging study different brain functions. The search for effective interrogation aids has been a longstanding quest for obtaining authentic and truthful information. Scientific tools like narcoanalysis tests have emerged as a result of this pursuit. However, these tests raise concerns about their impact on basic human rights and their reliability, despite being grounded in scientific evidence.

Constitutionality of Brain Mapping

Section 53 of the Code of Criminal Procedure grants police the authority to medically examine an accused if there are reasonable grounds to believe that such examination would provide evidence regarding the commission of the offense. However, this must be done while adhering to the constitutional safeguard outlined in Article 20(3) of the Constitution, which protects individuals from being compelled to be witnesses against themselves. Courts have been tasked with deciding the constitutionality of medical and scientific tests on multiple occasions [10].

The court clarified that Article 20(3) is breached only when the accused shares personal knowledge of facts through oral or written statements. However, providing thumb impressions and similar physical evidence does not constitute 'personal testimony' because such impressions, even if the accused tries to conceal their true nature, retain their inherent character.

It is argued that brain mapping does not fully meet the criteria mentioned above because it differs from fingerprinting and handwriting tests in certain aspects. In brain mapping, the accused is providing personal knowledge of facts. The test does not extract information stored in the brain; rather, it observes the brain's response to specific information presented to it. Although these responses remain consistent for the same input, the accused is compelled to respond to that input. Unlike thumb impressions and handwriting, the brain's responses are not of an inherent nature.

The brain mapping test can be compared to compelling the accused to provide specific information under oath. In this test, the accused is put in a situation where they cannot lie and are presented with

certain information that they cannot help but respond to, even though the response is not in the form of written or oral statements. However, the response given in a brain mapping test can be considered a statement because it involves adopting certain pieces of information while omitting others through a positive response. Despite the concerns raised, some High Courts have upheld the constitutionality of the brain mapping test [11].

The latter part of the argument resembles the reasoning presented by Justice Das Gupta in his concurring opinion in the case of *Kathi Kalu Oghad*. According to him, evidence of specimen handwriting, thumb impressions, or other impressions become incriminating only when compared to certain other handwriting or impressions, leading to the establishment of identity between the two. On their own, these specimens do not incriminate the accused person or tend to do so. Therefore, when the accused provides these specimens, even though he may be furnishing evidence, it is not against him.

Limitations of Brain Mapping

Dr. Farwell recognizes that brain mapping may not be beneficial in certain circumstances. The test can solely determine the presence or absence of information, making it suitable only for establishing whether a person was at the crime scene. In cases where two suspects were present at the scene but the nature of the crime allows only one person to be the perpetrator, the test would not be applicable as both suspects would have the relevant information in their brains. Consequently, the test would not be able to differentiate between the witness and the actual perpetrator.

Likewise, the test's inability to reveal how the information entered the brain renders it unsuitable for situations where a person possesses all the information without being the perpetrator. For instance, if investigators disclosed all available information during the investigation, or if the public became increasingly aware of details over time due to extensive media coverage, the test would not be conclusive. However, Dr. Malini strongly disagrees with this argument, asserting that the response of the actual perpetrator would always differ from that of a mere witness.

Secondly, the test would not provide conclusive results if investigators lack sufficient information about the crime. In such cases, there would not be enough data against which the suspect's knowledge can be effectively tested.

Thirdly, the test would be inappropriate in cases where the suspect has a mental illness since their ability to process information may differ from that of a mentally healthy individual. Additionally, it might not be effective for habitual offenders. Moreover, if the subject is under the influence of certain drugs during the test, their memory could be impacted.

Fourthly moreover, the brain mapping test is a time-consuming process that demands a well-trained expert capable of conducting substantial detective work. Dr. Farwell believes that if brain mapping is to be extensively used, it will necessitate a change in the approach to crime investigation. A trained expert should be involved in the case from the beginning of the investigation to identify relevant information and keep it confidential until the test is conducted.

Fifthly, researchers have found that P300 serves as a reliable indicator of recognition but not a direct indicator of deception. For example, if a person denies knowledge of the murder weapon but still shows a P300 response, it does not necessarily mean they are lying. Instead, it suggests that the weapon holds significance or is recognizable to the individual for some reason. This recognition could be due to the person possessing a similar weapon or having extensive knowledge about guns in general.

Reliability of the Test

The courts have not yet addressed this matter, but certain factors cast doubt on the test's reliability. Primarily, the test relies on the accused's memory. However, memory is not a passive storage of fixed

images; rather, it is continuously recreated and reconstructed. Additionally, the memory of a crime may be absent due to various factors. The formation of memory during a crime remains insufficiently explored in existing literature. Further, there exists the possibility of "false memory" due to which a person can report a vivid memory that is actually quite false. Dr. Farwell admits these problems defends the test by drawing an analogy with witness accounts which in spite of being a function of memory enjoy considerable probative value.

CONCLUSION

It is submitted that even if the constitutionality of the brain mapping test is widely upheld by the courts, the test lacks the potential to be used on a very wide scale. It is being touted as a painless, convenient and effective test to establish the innocence of suspects at an early stage of the investigation itself. In other words, it is being sought to be used as a screening test. Such usage is beset with practical difficulties. The test requires highly trained experts. Hence there will be the cost of training them in large numbers. Also, unique stimuli have to be identified for each subject, which requires considerable investigation. The test is highly dangerous if the probes selected are wrong. The actual accused may pass the test while an innocent person may become embroiled in investigation. It can throw the investigators off the right track.

The test has been held to be reliable in terms of indicating whether the subject has certain information or not. But it is extremely unreliable because there is no way of knowing why the information is there in the person's brain. Hence, the test should not be made admissible as evidence. Even if it is made admissible, it should be allowed only in exceptional cases and not as a matter of routine, as is being done in India now. Here the experts are simply considering the witness accounts in determining the probes. It is submitted that this seriously compromises the reliability of the test because the investigation is not being done properly.

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