

**Open Access** 

# Truth about Truth Detecting Techniques

# P. Chandra Sekharan\*

Honorary Professor of Forensic Sciences, Dr. Ambedkar Law University, Chennai, India

## Abstract

During the period from 2001 to 2010 police officials in India were lured by a team of pseudo-scientists, from the Forensic Laboratories in Bangalore and Ahmadabad to make use of narcoanalysis, polygraph test and brain fingerprinting to extract confessions from accused persons. All the three tests, preceded by a pre-test interview and interrogation, were conducted by the one and the same expert (psychologist) one after the other on the pretext that the earlier test suggests confirmation by the next.

The tragedy is that final confirmation is made by narcoanalysis the earliest to be rejected by all the civilized nations. This is because, only the report on narcoanalysis will be in the *form of narrative verbal statements of the subject (accused)* while the reports on the other tests are simply based on electrical responses or nonverbal body behaviours and attitudinal characteristics.

Keywords: Narcoanalysis; Polygraph; Brain fingerprinting; Truth drugs

#### Introduction

"Forensic Science has a wider role to play than simply that of laboratory handmaiden to the study of criminality. It should be seen to act as a watch dog on behalf of the community against all hazards and abuses that may threaten. It should act as an educator and stimulator of public opinion [1].

Professionally as being a forensic scientist for more than five decades, I had never been a laboratory handmaiden confined within the four corners of my laboratory. Of course it is better to have been such a one than to be a police handmaiden as many are these days! The above principle in me often drives me to react instantaneously- be they governmental affairs or societal problems-whenever I come across a wrong committed in society or a misinformation is spread viciously or a matter of public importance requires scientific explanation.

It was in one such instance during 2001, my attention was drawn to the fact that an organic chemist from Bangalore Forensic Science Laboratory (FSL) in association with his associate, a psychologist (lie detector technician) took a fancy for the abandoned narcoanalysis test and lured the Indian Police into the practice of using drugs to extract confessions from accused persons. The Bangalore FSL offered a combopackage of polygraph test, brain fingerprinting and narcoanalysis to the Indian Police and made them to believe that they can make breakthroughs in all their unsolved criminal cases.

As a result, police officials from all over India queued in the corridors of the Bangalore FSL to present before the psychologist the arrested individuals and the media especially the TV channels made 'big news' and vied with each other to telecast the 'narco-test videos' produced by FSL. The public watched these videos like horror movies. The popularity gained by the Bangalore FSL made the Ahmadabad FSL also to follow suit.

The 'package' includes facilities for the following truth detecting tests, namely, i) polygraph test, ii) brain fingerprinting test and iii) narcoanalysis. The three tests are to be preceded by a '*pre-test interview and interrogation*'. All the three tests as well as the interview were conducted by one and the same expert (non-medical psychologist) one after the other on the pretext that the earlier test suggests confirmation

by the next.

The tragedy is that final confirmation is made by narcoanalysis the earliest to be rejected by all the civilized nations. This is because, only the report on narcoanalysis will be in the *form of narrative verbal statements of the subject (accused)* while the reports on the other tests are simply based on electrical responses or nonverbal body behaviours and attitudinal characteristics.

The architects of these tests conveniently ignored the possibility of the result of one test prejudicing the findings in the subsequent tests, especially when conducted by the same individual that is again against principles of scientific investigation and ethics but claimed that they have developed revised anesthetic procedures and updated the techniques of handling individuals in the state of trance.

When I probed into the matter I found that there has been no peerreviewed research publication in any of the medical journals in support of their claim for their revised procedures. But the pseudo-scientists quoted the interaction between the drug and the GABA<sub>A</sub> receptor and claimed that 'it is the adaptation of forensic psychological techniques of handling individuals in the state of trance that brings out truths of crime', a tall claim indeed without any authentic publication and without the existence of any scientific method to establish first the state of trance.

#### Barbiturates and their action on the GABA<sub>A</sub> receptor

Barbiturates are a class of drugs that act on the  $GABA_A$  receptor in the brain and spinal cord. The  $GABA_A$  receptor is an inhibitory channel which decreases neuronal activity and the barbiturates enhance the inhibitory action of the  $GABA_A$  receptor. The barbiturate

\*Corresponding author: Dr. P. Chandra Sekharan, Honorary Professor of Forensic Sciences, Dr. Ambedkar Law University, Chennai, India, E-mail: pcsekharan2000@yahoo.com

Received November 20, 2012; Accepted December 27, 2012; Published December 29, 2012

Citation: Sekharan PC (2013) Truth about Truth Detecting Techniques. J Forensic Res S11: 002. doi:10.4172/2157-7145.S11-002

**Copyright:** © 2013 Sekharan PC. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

drugs as a class decrease higher cortical brain functioning. Psychiatrists hypothesize that because lying is more complex than telling the truth, suppression of the higher cortical functions may lead to the uncovering of the "truth" However, the reliability of confessions made under thiopental is dubious; the drug tends to make subjects chatty and cooperative with interrogators, but a practiced liar or someone who has a false story firmly established would still be quite able to lie while under the influence of the drug [2].

All the above are facts long-known to neuroscientists. Therefore the claim that the procedure, science and technology adopted now in narcoanalysis in the investigative mode will be different from those adopted in therapeutic mode is absurd. The procedure is the same. The outcome (revelations) will also be the same in both the modes. Pentothal Sodium cannot dance differently in the investigative mode [3].

#### Vicky Nanjappa's experiment

The claim that the newly mushroomed test centre in Bangalore possesses special facilities required for narcoanalysis is again a hoax. The facilities are already available in every hospital and medical college where anaesthetists and psychiatrists are available. This point was proved by Vicky Nanjappa, an inquisitive journalist of Vijay Times news paper, Bangalore who himself tested the veracity of narcoanalysis. When he approached the Bangalore centre to have a narcoanalysis test done on him, the centre refused to oblige him. Nanjappa, thereafter went to a psychiatrist of a renowned hospital in Bangalore and underwent the narcoanalysis test and revealed his experiences to the world. (Page 1 Vijay Times, Bangalore dated 25 September 2006). He commented that one should have a lot of courage to subject himself to this test knowing full well the risk and the side effects that are associated with the tests. After subjecting himself to the test, he declared that "Nothing can compel you to tell the truth, unless you want to do it yourself."

Nanjappa's revelations confirmed the conclusions arrived at earlier from the clinical and experimental studies conducted by many researchers, decades ago that even under the best conditions Pentothal Sodium will elicit only an output contaminated by deception, fantasy, garbled speech, etc". Nanjappa's experiments should be construed as a recent research study in Narcoanalysis. Thirty questions were designed and the same were posed to Nanjappa before the drug was administered and his answers for those questions were recorded in the presence of witnesses. Similarly the same questions were repeated to him after administering the drug and his answers were recorded again. Nanjappa's answers were indeed contaminated by deception and fantasy. Nanjappa during narcoanalysis revealed that *he loved Shah Rukh Khan's mum the most* while his recorded answer before he took the test was *he loved his mother the best*. (Shah Rukh Khan is the noted Indian cine actor).

Nanjappa's experiments had become an eye-opener to those few journalists who were blindly eulogizing the test as the cornucopia to solve all crimes and the few cadres of the Indian Police who have been bamboozling that the technique is very modern and that it can be done only in the Bangalore Centre. Also the claim of the Bangalore FSL that the success rate of narcoanalysis is 97 to 98 percent has no basis. While the interrogation of the psychologist is based only on the information furnished by the investigating police, with what other criteria the success rate can be measured? The test itself is much worse than a pseudoscientific attempt! The absurdity is at its peak when narcoanalysis test is used as a confirmatory test for the latest brain fingerprinting.

# The stand of medical profession

The Indian medical profession, though capable, shun the conduct of narcoanalysis because they are bound by the official code of medical ethics of the Medical Council of India:

"The physician shall not aid or abet torture nor shall he be a party to either infliction of mental or physical trauma or concealment of torture inflicted by some other person or agency in clear violation of human rights".

They are also answerable to the Tokyo declaration of the World Medical Association which reads:

1) The physician shall not countenance, condone or participate in the practice of torture or other forms of cruel, inhuman or degrading procedures, whatever the offence of which the victim of such procedures is suspected, accused or guilty and whatever the victim's beliefs or motives and in all situations including armed conflict and civil strife.

2) The physician shall not provide any premises, instruments, substance or knowledge to facilitate the practice of torture or other forms or cruel, inhuman or degrading treatment or to diminish the ability of the victim to resist such treatment".

American Medical Association also pronounces:

"Physicians must not conduct, directly participate in, or monitor an interrogation with intent to intervene, because this undermines the physician's role as a healer."

Obviously because of the above mandate, the non-medical psychologists were ruling the roost in India.

#### Narcoanalysis is nothing but torture

Jesani [4] has analyzed the ethical situation of those who venture to administer Pentothal sodium to the accused thus:

"Three arguments were heard in the defense of these doctors: First, the use of sodium pentothal was not torture because it did not cause pain. Second, it was done in the national interest. And third, there is no harm in using torture if it can save lives. The first argument wrongly limits the definition of torture to pain. Torture includes the use of methods intended to obliterate the personality of the victim or diminish physical or mental capacities, even if they do not cause physical pain or mental anguish. Sodium pentothal tops the list of methods using 'limited force' advocated by organizations such as the US Central Intelligence Agency (CIA) whose human rights record needs no introduction."

"Interestingly, even the CIA acknowledges that it is advocating torture. Utilitarian arguments about national interest and saving lives are well known. This assertion is not backed by evidence that such interest was served, that what doctors did really saved lives. However, even if there is evidence of national interest, could it be used to justify acting unethically? The elevation of national interest above human morality has always had disastrous consequences. For the medical profession in India, the writing is on the wall. The BMA followed up Dr. John Dawson's assertion by producing a handbook on human rights for doctors, demonstrating its commitment to help doctors educate themselves and be ethical. The question is: Does the profession in India care?" In a more recent article Jesani [5] further argues that, "Torture has made a renewed comeback in today's conflict-ridden world. However, sophisticated intelligence agencies know that torture is not only a violation of human rights; it also does not yield the desired results. A person who is being tortured usually admits to any crime attributed to him or her and gives information that the torturer would like to hear."

Police and other investigators depend on interrogation as a principal means of determining facts and resolving issues. It is a well accepted norm in civilized nations that for both ethical and pragmatic reasons no interrogator may take upon him the unilateral responsibility for using coercive methods. Concealing from the interrogator's superiors intent to resort to coercion, or its unapproved employment, does not protect them. It places them, in unconsidered jeopardy.

If we look at the history of police investigation, physical coercion [third degree practice] has been preferred to painstaking and timeconsuming inquiry in the belief that direct methods produce quick results. Sir [6], rationalizes a grisly example of "third degree" practices by the police of India: "It is far pleasanter to sit comfortably in the shade rubbing red pepper, in a poor devil's eyes than to go about in the sun hunting up evidence."

Reliance on interrogation, however, involves certain problems: ascertaining when a suspect or witness is telling the truth, evaluating memory, allowing for the physical and mental condition of a witness or suspect, and understanding the problems created by an individual's perspective. Interrogation methods and equipments have evolved in response to these problem areas. It is thus the psychological, psychophysical, and physical sciences have been used in police interrogation techniques. This eventually led to the mushrooming of these truth detecting techniques.

But we should know basic information about coercive techniques available for use in the interrogation situation. Coercive procedures are designed not only to exploit the resistant source's internal conflicts and induce him to wrestle with himself but also to bring a superior outside force to bear upon the subject's resistance. The following are the principal coercive techniques of interrogation: *arrest, detention, deprivation of sensory stimuli through solitary confinement or similar methods, threats and fear, debility, pain, heightened suggestibility and hypnosis, narcosis, and induced regression.* 

#### The use of truth drugs in interrogation

The use of so-called "truth" drugs in interrogation is similar to the accepted psychiatric practice of narcoanalysis, which is nothing but psychotherapy conducted while the patient is in a 'sleep-like state' induced by barbiturates or other drugs, especially as a means of releasing repressed feelings, thoughts, or memories. Its use in psychiatric practice is restricted to circumstances when there is a compelling, immediate need for a patient's responses. But the difference in the procedures adopted by the investigator lies in a totally different objective. The police investigator is concerned with empirical truth that may be used against the suspect, and therefore almost solely with **probative** truth: the usefulness of the suspect's revelations depends ultimately on their acceptance in evidence by a court of law.

The psychiatrist, on the other hand, using the same 'truth-drugs' in diagnosis and treatment of the mentally ill, is primarily concerned with *psychological* truth or psychological reality rather than empirical fact. A patient's aberrations are reality for him at the time they occur, and an accurate account of these fantasies and delusions, can be the key to recovery. 'They cannot be considered as reliable recollection of past events, according to psychiatrists.'

The terminology "*truth serum*" is itself a twofold misnomer. *Neither the drugs used in this technique are sera nor do they necessarily bring forth probative truth.* It is the media which continue to exploit the appeal of the term as it provides an exceedingly durable theme for the press and popular literature. The phrase "truth serum" appeared first in a news report of the experiments conducted on prisoners by Robert House, a Dallas obstetrician, in the *Los Angeles Record*, sometime in 1922. Robert House himself resisted the term for a while but eventually came to employ it regularly himself.

Scopolamine was the drug tried earlier for interrogation and because of a number of undesirable side effects it was disqualified as a "truth" drug. Barbiturates such as sodium amytal (anobarbital), Pentothal sodium (thiopental), and to a lesser extent seconal (seconbarbital are the drugs used in later years).

Pentothal Sodium is the drug resorted to by the Indian psychologists in narcoanalysis. The life-threatening adverse side effects of this drug are circulatory depression, respiratory depression with apnoea and anaphylaxis. Its effects on CNS may produce head ache, retrograde amnesia, emergence delirium, prolonged somnolence and recovery besides many other side effects.

The clinical and experimental studies conducted by many researchers have concluded that there is no such magic brew as the popular notion of truth serum exists. The barbiturates, by disrupting defensive patterns, may sometimes be helpful in interrogation, *but even under the best conditions they will elicit an output contaminated by deception, fantasy, garbled speech, etc.* A major vulnerability they produce in the subject is a tendency to believe he has revealed more than he has. Studies and reports dealing with the validity of material extracted from reluctant informants indicate that there is no drug which can force every informant to report all the information he has. Not only may *the inveterate criminal psychopath lie under the influence of drugs which have been tested, but the relatively normal and welladjusted individual may also successfully disguise factual data.* 

Studies also point out that several patients have revealed fantasies, fears, and delusions approaching delirium, much of which could readily be distinguished from reality. But sometimes there was no way for the examiner to distinguish truth from fantasy except by reference to other sources. One subject claimed to have a child that did not exist, another threatened to kill on sight a stepfather who had been dead a year before, and yet another confessed to participating in a robbery when in fact he had only purchased goods from the participants. Testimony concerning dates and specific places is untrustworthy and often contradictory because of the patient's loss of time-sense. His veracity in citing names and events proved questionable.

Because of his confusion about actual events and what he thought or feared had happened, the patient at times managed to conceal the truth unintentionally. As the subject revived, he would become aware that he was being questioned about his secrets and, depending upon his personality, his fear of discovery, or the degree of his disillusionment with the doctor, grow negativistic, hostile, or physically aggressive. Drugs disrupt established thought patterns, including the will to resist, but they do so indiscriminately and thus also interfere with the patterns of substantive information the interrogator seeks. Even under the conditions most favourable for the interrogator, output will be contaminated by fantasy, distortion, and untruth. Because of these world-wide opinions, narcoanalysis for interrogation has been dispensed with long back in all civilised nations.

# Hypnosis

Hypnosis has been another method of truth detection attempted earlier. Hypnosis, by definition, is a trancelike condition usually induced by another person, in which the subject is in a state of altered consciousness and responds, with certain limitations, to the suggestions of the hypnotist. Doctors use hypnosis in psychological applications to recover memories in the hope they can be used to treat whatever problems a patient has. But hypnosis can't recover the truth reliably.

Hypnosis that attempts to retrieve the truth may actually help convince you of something false, says the study conducted by Joseph Green of Ohio State University [7]. When the study was presented at the meeting of the American Psychological Association, proved what many doctors already believed that hypnosis can't help you recover "lost" memories. In fact, it tends to make people more confident in false memories. There are no reliable ways to recover memory," said Yapko [8], a clinical psychologist. "*Hypnosis is not some kind of truth detector*."

In 1970s, hundreds of police departments have hired hypnotists to enhance eyewitness testimony. The results showed that hypnosis increased the amount of information recalled, but the information was not always accurate.

Again, in the early to mid-1990s there were thousands of cases clogging courts based on recovered memories. Eventually it became apparent that many of these cases were *actually false memories created during hypnosis*. The influence of hypnosis in producing recall in investigation is not reliable. Besides, hypnosis will cause *irreversible psychological damage*. Even in instances where it appears that only good has been obtained by submitting to hypnosis, there is always the possibility of some deep-lying suggestion or psychic infection, introduced while the subject was in a passive state, which will manifest after many years, and then without revealing any obvious connection with the earlier experience of hypnotism.

#### **Polygraph Test**

The most dramatic gains in interrogation technology have come through the polygraph, or so-called lie detector. The polygraph monitors and records selected body changes that are affected by a person's emotional condition. The recorded changes are then studied, analyzed, and correlated in respect to specific questions or other stimuli. The first modern polygraph was constructed in 1921 by John A. Larson, a medical student at the University of California, working with a member of the local police department. Larson's instrument was capable of continuously recording blood pressure, pulse, and respiration; since it recorded these conditions simultaneously, it was called a polygraph.

A later development provided for the recording of the psycho galvanic skin reflex (electro dermal response), the flow of current between two different parts of the body. Research has continued on both the instrumentation and the psychological techniques necessary for its effective use by the police. Even though the polygraph has been formally and successfully used in police intelligence and security investigation since 1924, there is still no complete agreement by psychologists on its validity. Furthermore, the results of a polygraph test are not always judicially acceptable. The term "polygraph" would literally mean "many writings." The name refers to the manner in which selected physiological activities are simultaneously recorded. Polygraph examiners may use conventional instruments, sometimes referred to as analogue instruments, or computerized polygraph instruments. Again, *the name "polygraph test" is itself misleading*. The word "test" indicates an 'objective process of evaluation' based on facts; similar to a DNA or a blood test. Results obtained from a polygraph test are much less credible, since the device measures the *body's reaction to two different types of questions*. The two different types of questions are known as relevant and control questions. The examiner must compare responses from relevant guestions to those of control questions in order to form an opinion.

In order for a polygraph to work, *the examiner must establish a base line for a lie.* This is known as a control question. In order for this to occur, the polygraphist must trick the examinee into consciously lying to him. The polygraphist will ask a question he believes the examinee will lie about. The polygraphist will assume no one can answer this question honestly and whatever response is generated from asking this question will be *assumed* to be a lie. This assumption forms the basis of the polygraph examination.

The polygraphist will then ask a question for which the reaction is supposed to be measured. This is known as the relevant question. If the response to the relevant question reaches the level of an assumed lie, the person is considered deceptive. If it reaches the vicinity of the assumed lie, it is inconclusive. Thus there is scope for the polygraph examiner to manipulate the results.

#### How Polygraph Examinations are Manipulated?

The polygraph examination results can be entirely manipulated by the examiner. Every polygraph examiner will make a conscious decision to pass the examinee, fail the examinee, or conduct the polygraph professionally. The polygraphist realizes the vulnerability of the polygraph. The polygraphist knows that by sensitizing the examinee prior to the administration of the polygraph, he or she can manipulate the results.

The polygraph works by being able to detect the 'fight or flight' response of the human body. The ability of a polygraphist to manipulate this is ridiculously easy. The polygraphist will do this by sensitizing the examinee prior to the polygraph test. This can be accomplished in a variety of ways. Some of the more frequent ways are by demeaning, making accusatory statements, yelling, and/or making disbelieving gestures in front of the examinee, prior to the administration of the polygraph.

The polygraphist knows that if the entire pre-interview is not audio and video-recorded, he or she will have free reign in manipulating the test. The polygraphist knows the only physical evidence produced from the examination will be the charts. The polygraphist realizes that by manipulating the charts via the examinee, the polygraphist can decide what the result of the examination will be.

The polygraphist realizes that if the examination is called into question, a referee examiner who independently reviews the charts will come to the same conclusion, not realizing the charts were manufactured by the polygraphist. However, if the examination is recorded and the recordings & charts are immediately turned over to the examinee at the completion of the test, the polygraphist will be forced to conduct the test professionally, as he or she will be subject to an independent audit. Since the pre-interview is not recorded, the polygraphist will innocently look at the examinee when the examination is questioned and say something similar to, "The charts don't lie for whatever reason you responded to those questions."

The polygraphist knows that inflicting stimulation onto the examinee on a relevant question will cause the examinee to become sensitized in that area. Technically, this is called "jacking them up."

In some cases the polygraphist will inflict stimulation onto both relevant and/or control questions. To the examinee, there is no difference between the control and relevant questions; they believe each question is of equal importance. Therefore, strategically placed stimulation on a control question will cause cross-over contamination of the relevant question.

The dirty little secret behind the polygraph is that the "test" depends on trickery, not science. You're not supposed to know that while the polygraph operator admonishes the examinee to answer all questions truthfully, warning that the slightest hint of deception will be detected, he secretly assumes that denials in response to certain questions called "control" questions will be less than truthful. An example of a commonly used control question is, "Did you ever lie to get out of trouble?" The polygraphist steers the examinee into a denial by warning, for example, that anyone who would do so is the same kind of person who would commit the kind of behaviour that is under investigation and then lie about it. But secretly, it is assumed that everyone has lied to get out of trouble.

The polygraph pens don't do a special dance when a person lies. The polygraphist scores the test by comparing physiological responses to these probable-lie control questions with reactions to relevant questions such as, "Did you ever use an illegal drug?" is the commonly asked in pre-employment screening. If the reactions to the control questions are greater, the examinee passes; if they are greater in relevant questions, he fails. If responses to both "control" and relevant questions are about the same, the result is deemed inconclusive. The test also includes irrelevant questions such as, "Are the lights on in this room?" The polygraphist falsely explains that such questions provide a "baseline for truth," because the true answer is obvious. But in reality, they are not scored at all! They merely serve as buffers between pairs of relevant and "control" questions.

'Absolutely there is no difference between a polygraphist who manipulates examinations, and a law enforcement officer who plants contraband on a suspect. In both cases, evidence is being manufactured. The only difference is the law enforcement officer has committed a crime, and the polygraphist just made money'.

The simplistic methodology used in polygraph testing has no grounding in the scientific method: it is no more scientific than astrology or tarot cards. Government agencies value it because people who don't realize it's a fraud sometimes make damaging admissions. But as a result of reliance on this voodoo science, the truthful are often falsely branded as liars while the deceptive pass through.

Perversely, the "test" *is inherently biased against the truthful*, because the more honestly one answers the "control" questions, and as a consequence feels less stress when answering them, the more likely one is to fail. Conversely, *liars can beat the test* by covertly augmenting their physiological reactions to the "control" questions. This can be done, for example, by doing mental arithmetic, thinking exciting thoughts, altering one's breathing pattern, constricting the anal sphincter muscle, or simply biting the side of the tongue. Truthful persons can also use

these techniques to protect themselves against the risk of a false positive outcome. Although polygraphists frequently claim they can detect such countermeasures, no polygraphist has ever demonstrated any ability to do so, and peer-reviewed research suggests that they can't.

# Anti-polygraph Organizations

There are several anti-polygraph organizations in U. S. campaigning against polygraph tests. According to them, "the polygraph is a highly inaccurate device that is not capable of true lie detection. With minimal effort, the polygraph results are easily manipulated by either the polygraphist or examinee, thus defeating the very purpose the polygraph is supposed to serve. CNN reported in June of 1999 that, "Since the invention of the polygraph in 1921, intelligence officials can't cite one high-level spy who's been tripped up by the so-called lie detector test."

In a 1983 [6] Federal study of polygraph accuracy, the author of the study, Leonard Saxe, stated the following about the polygraph, "It doesn't work. It's not accurate, and can lead to what are called false positives, finding people untruthful when in fact they are truthful, and the opposite." The anti-polygraph organizations address issues-the polygraph industry does not want people to know-issues concerned with the inherent inaccuracy of the polygraph, the abominable behaviour of some examiners and the fact there is no universal minimum standards for polygraph examination room, there are no witnesses. It is just like the door closing on the woodshed. It is time to bring polygraph out of the woodshed and into the main stream.'

There are many unpalatable remarks made by many researchers and eminent persons about polygraph testing. Prof. Stephen E. Fienberg, Chairman, Committee to Review the Scientific Evidence on the Polygraph, National Academy of Sciences has commented that "Polygraph testing has been the gold standard, but it's obviously fool's gold."

"Polygraph is more art than science, and unless an admission is obtained, the final determination is frequently what we refer to as a scientific wild-ass guess (SWAG)" says retired CIA polygraphist John F. Sullivan. Opining about polygraph, the well known physicist David Dearborn of Lawrence Livermore National Laboratory says "If you choose to implement this astrology surrogate, and to treat us with such deep disrespect, do not confuse our contempt for arrogance". According to former CIA Director John M. Deutch, "[The CIA's] reliance on the polygraph is truly insane."

# **Brain Fingerprinting**

The technique developed in the early nineteen nineties by Lawrence [9]. Farewell, a former research associate in psychology in the Department of Psychiatry of Harvard Medical School, is claimed to be an alternative to polygraph test. In using the technology, a suspect is shown carefully selected words, phrases or images on a computer screen. They are things like a photo of a murder weapon or the model of car used in a crime. It is claimed that these things would only be recognized by the person who committed the crime. This is not true. These things would be recognized by all those who have knowledge about the crime.

Dr. Farwell visited India and made a presentation on 'Brain fingerprinting' developed by him, on March 27, 2004 at the National Seminar on 'Emerging Technologies in Forensic Science for Contemporary Crime Investigation' at Hyderabad. Whence I was asked to evaluate his technique by the Chief of Andra Pradesh Police Chief Mr Sukumaran [10], I made the following observations to Farwell:

1) The nomenclature 'Brain Fingerprints' (or brainwave fingerprinting) is itself a misnomer. The developer this technology, Lawrence A. Farewell, obviously tempted by the terminology 'DNA Fingerprinting', was more eager to see his work to be used in crime detection, has given this misleading nomenclature.

2) Fingerprints are the infallible means of personal identification based on finger ridge patterns. Fingerprint science is based on three established basic principles.

- a. A fingerprint is an *individual characteristic* which differs from finger to finger of even the same individual and no two fingers have yet been found to possess identical ridge characteristics.
- b. The fingerprint remains unchanged during an individual's *lifetime*.
- c. Fingerprints have general ridge patterns that permit them to be *systematically classified*.

None of these criteria can ever be established in the case of brainwaves. Fingerprints are used not only for human identification but also to identify criminals if they leave their fingerprint evidence in scenes of crime.

3) This technique cannot also be called as 'Brain Mapping' which is a technique to display EEG data. Brain mapping denotes the task of identifying the functions of different regions of the brain. Over about the last hundred years, scientists and physicians have gathered large amounts of information, or maps, of the brain regions generally involved in specific functions.

4) What Farwell claims about the 'brain fingerprinting' technology developed by him is that it is possible to identify the perpetrator of a crime accurately by measuring *brain-wave responses* to crime-relevant words or pictures presented on a computer screen. The brain-wave is based on the P300 complex, a series of well-known brainwave components that can be measured.

5) The problem is those similar brain waves responses are produced by all the witnesses as well who have knowledge about the crime.

6) In my opinion, Farwell's claim is far-fetched. Brain fingerprinting does not match evidence from a crime scene with evidence stored in the brain of the perpetrator.

7) It is totally wrong to compare brain fingerprinting to conventional fingerprinting in the sense fingerprints at the crime scene matches with the fingers of the perpetrator. Nor it can be compared with DNA fingerprinting which matches biological samples from the crime scene with the DNA in the body of the perpetrator'.

8) There is neither matching of any physical evidence nor comparison of any pattern in brain wave technique. Not even details of any evidence in the crime scene can be elicited. All this technique shows is that the person has certain memory encoded in his brain.

9) But there is no way to determine *if the memory is correct or from where it came.* Suppose a person 'A' is accused of killing 'B' in a restaurant which 'A' doesn't visit often, the test would try to show that 'A' had the memory of the restaurant. Perhaps 'A' was taken to the restaurant while he was under investigation, the test could come up positive, because 'A' was in the restaurant. 'A' might have memories

about the murder from reading about it in the news-paper or seeing it on TV or learning it from the questions of the police. Why only 'A'? All the witnesses to the crime would likely have the same recognition to specific details as the perpetrator.

Farwell replied that even the fingerprint experts in his country strongly objected to his using the terminology 'fingerprinting' to the technique he has developed. He has very graciously agreed that the other queries I have raised are indeed the limitations to his technique and further research has to be carried out to overcome these limitations. Farwell also added that investigators utilize skills they have gained throughout years of training to determine the stimuli and questions to be presented to the suspect. The stimuli selection process can be exhausting. "We examine all available sources to make sure the person doesn't know the details we're looking at," Farwell explained. In addition to this, the suspect is also interviewed before going through the process in order to ensure there is no previous knowledge of the details being used. In all fairness I concluded that the research in brain fingerprinting has not reached its finality.

The brain-wave is based on the P300 complex, a series of wellknown brainwave components that can be measured. Scientists first discovered in 1965 that P300 evoked potential can be elicited by both auditory and visual "oddball" stimuli. For example, a normal subject listening to the auditory tone series *beep, beep, beep, beep, boop* will exhibit a P300 signature on the oddball *boop* item. This P300 is a "brainwave" which is recorded electroencephalographically at the scalp. The scalp electric current is recorded as a transient positive ("P") charge that is produced approximately 300 milliseconds after stimulus onset. The horizontal scales represent time in milliseconds (ms).The vertical scales represent wave amplitude measured in micro volts (mV) of electrical potential. The positive charge results from positive ions being discharged from the pyramidal cells of cerebral cortex as local pyramidal cells hyperpolarize as they *deactivate* following their initial response to the oddball stimulus.

Many in the scientific community remain sceptical about this method. Emanuel Donchin, M. D., chair of the department of psychology at the University of South Florida, who was also the coinventor with Farwell, argues that the science behind the method is not the problem. Instead, the specific questions posed to the suspect are problematic. He argues that "the success of the technique depends on the construction of the stimuli and there is no analytic, systematic way of constructing the question. It depends on the subjectivity of the person. It is an art, not a science."

David Coursey, [11] the Executive Editor of 'Anchor Desk' says "If we want to test this (Technique), I have an idea, Let's not test it on U. S. citizens, but on people who want to travel to the U. S. Make brain fingerprinting (yes, it is a really bad name) a part of the visa application process. Require resident aliens to come in for testing, if you like. Since these people are asking to be our guests, this doesn't seem like too much to ask, does it? Based on that experience, we could then see what, if any, uses the technology has, as well as how potential abuse is best dealt with. There are ways around most of the obstacles, yet the idea is so science fiction-y that it may not get a fair hearing."

When such is the real position of brain fingerprinting, the psychologists attached to both the Bangalore and Ahmadabad FSL apply practically Farwell's technique in camouflaged names in actual cases. No big argument is necessary to discard brain fingerprinting as a Potemkin science. The Indian Johnnies, be they the Bangalore FSL group who designate their technique as 'brain-mapping' or the Gujarat FSL group who label their technique with an impressive terminology 'brain electrical oscillation signature profiling', make use of only the EEG machine to detect the scalp electrical signal output. The signal detected by the scalp electrode is predominated by the excitatory and inhibitory post synaptic potentials on dendrites and neuronal cell bodies, not the deeper axon action potentials. Thus EEG is a nonspecific indicator of cerebral function.

Any pathophysiological insult to the central nervous system can result in alterations in electrophysiology. EEG abnormalities are pronounced with acute injuries of the outer cortex. Disorders affecting deep brain structures or resulting in a chronic indolent loss of neurons may show little to no EE changes.

The neuroscientists compare EEG machine to a listener who is sitting outside a football stadium and who cannot see the activity inside but may make some reasonable guesses about the course of the game based on hearing the fluctuating roar of the crowd. This vantage point does not allow the listener to understand fully the details of the game or what individual conversations may be taking place between the coach and players. Similarly scalp electrode can detect the fluctuating tonic activity of millions of neurons allowing the electroencephalographer to make some broad assumptions about the functioning of the brain.

While this is the correct and latest assessment of EEG even in medical diagnosis, how can the non-medical psychologists claim to read reactions of the brain to pinpoint the guilty person? Another major discrepancy in brain fingerprinting is that the scalp electrode cannot make any distinction between the signals emanated from the brain of the perpetrator and that emanated from the brain of those who have knowledge about the crime.

The psychologists from both the FSLs made a tall claim that they have brought out the hidden secrets of the brain of the accused. The EEG machine cannot and does not bring out any hidden secret. It is totally unethical for the psychologists to get into the role of the interrogators and subject the accused to questioning. It would become a dangerous procedure if they are permitted to give a report based on their questioning while even the 'yes or no' involvement-report based on the brain responses itself is looked upon as unscientific.

#### Conclusion

The police are a disciplined force trained to uphold the law and

to enable democratic institutions to function lawfully. Police powers are confined by the provisions of the Constitution, the Police Act, the Criminal Procedure Code the Evidence Act and many other local and special laws which impose restrictions on the scope and method of exercise of that power. Forensic scientists should inspire the police with their scientific methods not to violate the norms. They will be accused of conspiring with them if they are a party in using the above psychological coercive methods.

The Supreme Court of India has now [12] banned the use of all the above truth detective techniques, thanks to the crusade undertaken by the author and a few other right thinking individuals; but with a rider that the accused can volunteer if he so desires. But the evidence cannot be used in courts. The narco-shop at the Bangalore FSL was unceremoniously closed even before the Supreme Court judgment was pronounced. However, the Ahmadabad FSL continues to conduct the truth detecting tests on the pretext that the accused comes forth with consent. Does the 'consent of the accused' constitute as an uncompromising commodity for the police?

#### References

- Sekharan PC (1985) Presidential Address to the First International Conference on Forensic Sciences, Madras, India.
- Kala AK (2007) Of ethically compromising positions and blatant lies about 'truth serum'. Indian J Psychiatry 49: 6-9.
- 3. Sekharan PC (2007) Untruth Serum, Combat Law.
- 4. Jesani A (2002) Medicine betrayed: Again and yet again. Indian J Med Ethics.
- Jesani A (2006) Medical professionals and interrogation: Lies about finding 'truth'. Indian J Med Ethics3: 4.
- Sir JFS (1883) History of the Criminal Law of England, Macmillan, London, United Kingdom.
- Green JP (1996) Cognitive-behavioural hypnotherapy for smoking cessation: A case study in a group setting, In Casebook of Clinical Hypnosis, Washington, DC: American Psychological Association.
- Yapok MD (2011) Trancework: An Introduction to the Practice of Clinical Hypnosis. (4thedn), Brunner-Routledge.
- 9. Lawrence A. Farwell in: Untruth Serum by P Chandra Sekharan.
- 10. Sukumaran (2008) The First Human Bomb authored by P. Chandra Sekharan, ALT Publications.
- 11. http://coursey.squarespace.com/about
- 12. Balakrishnan KG, Raveendran RV, Panchal JM (2010) Supreme Court of India, Selvi and ors vs State of Karnataka and anr.