

## THE TREND OF MODERN SCIENTIFIC EVIDENCE: AN OVERVIEW

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### ABSTRACT

The basic principle of criminal justice system is to protect the innocent person from wrongful punishment and to punish the actual perpetrator of crime. The main objectives of the police investigation are to collect evidence and to provide answer to certain questions relating to crime. Criminal investigation is also employed in the search for and interrogation of material witness who is willing to give competent and relevant testimony against the suspect or offender and to present a true picture so as to leave no doubt in the minds of trial judge regarding the guilt or innocence of the accused. However, the right to privacy and the right to silence of the accused person may hamper in the effective administration of justice in the present legal system. Therefore there is a need to maintain balance between the state power to prevent criminal activity and to maintain law and order on the one hand and the right of the accused, on the other. The modern scientific investigation technique may help in the effective administration of justice and investigation officer may extract evidence from the accused person without violating the Constitutional and legal rights of the accused person. The use of modern scientific investigation techniques in criminal investigation depends upon the understanding of the characteristics of these techniques. The evidential value of these techniques rests upon proper employment of these techniques and on the interpretation of the result of the techniques by the expert.

**Key words:** *Criminal Justice system, Right to Privacy, Right to silence, Modern scientific investigation.*

### Introduction

Scientific evidence which is accepted by the courts of law and scientific community is known as forensic evidence. In criminal investigation use of Forensic Science is the need of modern time<sup>1</sup>. In India, the investigation of crime and prosecution of person having committed the crime are not up to the mark. Even in heinous crimes large number of criminals could not be prosecuted and a few percentage of trial ends in acquittal as a result of which number of criminals as well as crimes are increasing day by day. These acquittals are mainly due to obsolete techniques of investigation which leave many loopholes. Hence, modern scientific methods for investigation of crimes and connecting the criminals with the overacts are very much necessary in order to make effective the criminal justice system.

The term 'scientific evidence' is covered by India Evidence Act, 1872 commonly it is known as expert evidence. Fact or opinion evidence that purports to draw on

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specialized knowledge of a science or to rely on scientific principle for its evidentiary value is called 'scientific evidence' Under sec. 45 of Indian Evidence Act. an expert is a person of peculiar knowledge or skill in a particular subject and such knowledge or skill is not common to common men<sup>2</sup>.

The scientific evidence probabilises the assessment of participation and otherwise of the accused. Forensic evidence carefully gathers scientific information and produce in results of a fact or truth at or before trial. The purpose is to help the court for arriving at a correct decision and not to demonstrate technological advancement or scientific methods or techniques.

The scientific evidence plays a vital role in criminal investigation and in cases of paternity disputes, child swapping etc. The scientific evidence can sometimes outweigh the testimony on an eye-witness. The identification of a particular person can be established by advanced scientific technique of Forensic science.

The expert evidence and scientific evidence has become much useful in the identity of any person. These techniques are universally accepted and play a vital role in the criminal justice system. This scientific evidence also helps in proving the innocence of the accused person and also reduces the burden of the court to rely on the confessions. Recently, the use of scientific evidence as an investigation technique sufficiently analyzes the crime and evidence in a scientific way.

The various important scientific methods used for extracting evidence from an accused person are, among others:

DNA Finger Printing

Brain-Mapping

Narco-Analysis

Lie-Detector test

### **1. DNA Finger Printing**

DNA profiling and DNA fingerprinting is a powerful technology for personal identification with the exception of identical twins or clones. A person's DNA is same in every cell. DNA is basically a chain of small repeated sub-units found in the muscles of all human cells except red blood cell as well as sub cellular structure known as mitochondria.

DNA is a nucleic acid that contains the genetic instruction for the biological development of a cellular form of a life or virus. DNA is a longer polymer of nucleotides that encodes the sequence of amino acid residues in proteins, using the genetic code. DNA is responsible for the genetic propagation of most inherited traits. In humans, these traits range from hair colour to disease susceptibility. The

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<sup>2</sup> Indian Evidence Act, 1872

genetic information encoded by an organism's DNA is called its genome. During cell Division, DNA is replicated, and during reproduction is transmitted to off spring.

The DNA profiling is the process of testing to identify DNA patterns or type genetic fingerprinting, DNA testing and DNA profiling are techniques used to distinguish between individual of same species using only samples of their DNA. Its invention by sir Alec Jefferys at the University of Leicester was announced in 1982<sup>3</sup>.

DNA contains the genetic information, that is inherited by the offspring of an organism. This information is determined by the sequence of base pairs along its length. A strand of DNA contains genes, areas that regulated genes, and areas that either have no function, or a function yet unknown. Genes are the units of heredity and can be loosely viewed as the organism's 'cook book' or 'blue print'. DNA is after referred to as the molecule of heredity.

The technique of DNA profiling has been acknowledged as the greatest breakthrough in forensic science because of the sheer magnitude of its impact on science and law. In the United States of America, it is estimated that nearly 33% of suspects are exonerated and not brought in trial in spite of compelling evidence because of the supposedly decisive nature of DNA evidence. The power of the DNA evidence is claimed to be tremendous and as awareness about it spreads, detection and identification of persons could increase greatly.

DNA Fingerprinting is useful for identification of persons in case of rape, exchange of babies paternity disputes, immigration assassination, bombing, infanticide etc. DNA can be used not only to determine culprits but also to identify victims.

#### **Rules relating to collection, preservation and transportation of forensic sample for DNA profiling analysis<sup>4</sup>**

The proper selection, collection and submission of specimens for DNA profiling is of paramount importance if results are to be accurate and their subsequent interpretation is to be scientifically sound and therefore useful in the adjudication of forensic case. Evidence integrity begins with the first investigator at the crime scene. If evidence is mishandled during the initial stages of investigation, solving the case can be difficult.

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<sup>3</sup>Ishita Chatterjee, *Techo-legal Aspects of scientific evidence*, Central Law Publications, 2012, pp-55-65

<sup>4</sup>The office of the Deputy Director DNA centre, Madiwala, Bangalore,

The office of the Deputy Director DNA centre, Bangalore, however follows certain rules for collection of blood samples, tissue collection, and Bones and teeth for the purpose of DNA examination.

Relating to blood sample, it should always be drawn from the accused and victim in the front of Hon'ble Judicial Magistrate in Human Paternity Identification tests. Exhibits should be packed separately, duly attested by the Medical officer and Investigating officer, attested labels of M.O. and Investigating officer should be pasted on the exhibits.

Tissues, Bones and teeth also can be used for DNA in case of mutilated body parts, unidentified body, foetus etc.

Recently FTA cards are used for collection of blood sample. The advantage of FTA cards is that it can be preserved for years, but with the disadvantage that while taking sample on FTA card the M.O. has to be very careful so that it is not contaminated with the sweat or saliva of the person collecting the sample. In case it gets contaminate, it becomes very difficult to draw proper result. DNA examination is done through a software generated programme, Normally 16 locus or 16 pairs of chromosome is derived out of the test and it is analyzed by an expert.

DNA is scientifically proved examination and it gives 100% accurate results but results is based upon the expertise and analysis of an expert as well as it depends upon the collection of proper sample in proper manner of because there is every chance of it gets contaminated the accuracy of DNA test mostly depends upon collection and proper preservation as well as its analysis.

DNA evidence is very reliable evidence in case of paternity dispute, crime and other related cases. The crime investigating agency without much hardship may book the culprit with the help of DNA test and our law courts also considered this evidence as admissible in the court of Law.

Though there are some shortcomings such as lack of expertise, high cost machinery, lack of training regarding collection of samples, sample preservation, time consuming in cases where appropriate samples are not collected. However if these shortcomings could has been overcome, it might be recognized as one of the most effective tools of crime investigation.

In order to overcome this shortcoming, what is required is a legislation regarding DNA Fingerprinting and amendment in the Code of Criminal Procedure 1973 and Indian Evidence Act, 1872.

DNA evidence has passed the test of constitutional validity under Art.20 (3). Therefore there is no doubt about the validity and reliability of DNA evidence.

Instances also shows that the law enforcement agencies are very much successful in establishing guilty and proving innocence as well as also finding out the identity of dead, decomposed body of human being, animal, blood stained article etc. The samples collected has to undergo 5 tests in DNA Lab- those are

1. Pre test (Determination of sample)
2. Purification (other than blood sample)
3. Extraction of DNA sample
4. Examination of DNA (Basically 16 marker test)
5. Preservation of DNA sample in paper tissues.

DNA samples are generally coded and entry is made in a registered maintained by the Lab and decoded while analyzing and reporting it back to the investigating officer.

Now-a-days, in most of the crimes under investigation DNA is generally done and therefore, in order to make it uniformly acceptable proper legislation may be enacted. It may well replace the traditional method of crime investigation as it gives 100% accurate results mathematically though 99.9% statistically.

DNA finger printing is emerging as a vital tool for linking suspects to specific criminal act. Hence, taking and retention of DNA samples which are in the nature of physical evidence does not face constitutional hurdles in Indian context. The Supreme Court of India, in number of cases<sup>5</sup> declared the order directing DNA profiling by subordinate court as valid. The Supreme Court in India in *Selvi vs. state of Karnataka*<sup>6</sup> upheld the authority of a civil court to order a medical examination in exercise of the inherent powers vested in it by sec. 151 of C.P.C. though held that the same reasoning cannot be applied in the criminal context rather it was held that compelled extraction of blood samples in the course of a medical examination does not amount to a conduct that shocks the conscience and that the use of force as may be reasonably necessary is mandated by law and hence it meets the threshold of procedure established by law.

Besides DNA evidence, crime Investigating agency is also taking the help of forensic psychology in crime investigation. Investigating agencies takes the help of Forensic psychology in order to find out the truth hiding behind the mind of the person. Forensic psychology includes polygraph examination, Brain Electrical Oscillatism Signature Profile (BEOSP) which is commonly known as Brain Finger Printing or Brain Mapping and Narco-Analysis.

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<sup>5</sup>*GautomKundu v. state of W.B.* (1993)3 SCC 418, *Sharda v.Dharmpal* AIR 2003 SC 3450, *Bhabani Prasad Jain v. Convenor Secretary, Orissa State Commissioner for women* AIR 2010 SC 2851

<sup>6</sup> 2010 7 SCC 263

The accused, victims, complainant, suspect and any person related to the case may be referred for the psychological examination. These examinations are conducted with the help of computerized instrument and also by conventional method.

## **2. Brain Electrical Oscillation Signature Profile (BEOSP) or Brain-Mapping**

Brain Fingerprinting is a technique that measures recognition of familiar stimuli by measuring electrical brain wave responses to words, phrase or pictures that are presented in a computer screen.

Brain Fingerprinting was invented by Dr. Lawrence A. Farwell. The theory is that the suspects reaction to the details of an event or activity will reflect if the suspect had prior knowledge of the event or activity. This test uses the memory and Encoding Related Multifaceted Electroencephalographic Responses (MERMER) to detect familiarity reaction.

Brain Fingerprinting uses electrical brain responses to detect the presence or absence of information stored in the Brain. Because it depends only on information stored in the brain and cognitive brain responses, brain Fingerprinting does not depend on the emotions of the subject, nor is it affected by emotional responses.<sup>7</sup>

Direct participation in any activity involve preceptor sensory motor volitional components of individual resulting in the experience. Thus it is deep seated and has specific source memory in terms of time and space of occurrence of the event. Certain EEG changes are found to be associated with specific memory retrieving processes. It is found that when the Brain of an individual who has participated directly in an event is stimulated by a part of information of that event in which he or she has taken part, the Brain of the individual will respond differently from that of a person who has received the same information from secondary sources and has not participated directly in the event (non-experiential). The change, in the electrical activation in different parts of the Brain in direct participation resulting in the experience of the event is unique and different. Based on the principles of neuro-clinical psychology of memory and retrieval, an effort is made to develop a technique to investigate the crime.

Sequence of events as they have occurred are the base on which hypothesis is formed. Different scenarios are designed based on principles of encoding and retrieval of information. To test these hypotheses, event related items are used as probes designed in a consecutive and chronological manner to evoke the same psychological states as the perpetrator was in when the event occurred. Thus, each scenario will have different number of event related items. These scenarios are documented as audio probes or data bank, which is presented to the

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<sup>7</sup>SatyendraK.kaul, Mohd.H.Zaidi, Narco-Analysis, Brain Mapping, Hypnosis & Lie detector Tests in interrogation of suspect, Allahabad, Alia Law Agency, 2009, p124-126

subject/subjects through a computer monitored audio system in the brain Lab. The suspect in the Brain Lab with the electro cap on his head only listens to these probes when presented. There is no response or answer expected from him. While suspect is listening to those event related scenarios, activation of different areas of the Brain is recorded by an EEG-ERP system. The recorded EEG is treated for artifacts and eye movement correction. The readymade software is used to derive epoch files for each probe separately. Software also generates ready-made results based on statistical analysis. However, as it is to be analyzed in the actual crime case, epoch files are manually analyzed as activation present or absent in the different areas of the Brain and are compared with the software results before conclusions are drawn.

### **RECORDING AND ANALYSIS<sup>8</sup>**

The subject was seated in soundproof Lab. 32 channels recording of the electrical activity of the Brain was carried by placing 30 cephalic electrodes with reference to electrodes in the ear lobes, and 2 channels for recording eye movements.

Initially the base line recording was done with eye closed and eye opened. Then neutral probes were presented before presenting crime/event related probes in different scenarios to the subject and the EEG is acquired and analyzed. Electrical oscillation from the Brain were picked up using electrodes placed at standard position.. Electrical oscillations were acquired continuously with a band pass of 0.016-100 hz, without applying a notch filter. After continuous acquisition, epochs of 10,000 milliseconds were derived, time locked to each probe of which 3000 milliseconds were before presentation (Pre stimulus) of the probe, followed by 7000 milliseconds from the start of the probe.

Analysis is carried out by software programme for left and right hemisphere electrodes separately and computed with different statistical analysis. After computing the baseline changes further analysis is carried out accrues the mean baseline segments of activity and the result of examinee. After computing the baseline changes, further analysis is carried out across the mean baseline components and segments of activity indiscriminately over the next 700 milliseconds. Only those changes, which are significance at 0.001 level of confidentiality (a change representing 2 standard deviation, change from baseline mean) are considered as significant changes.

The changes in the power profile in each segment are classified into EK (Experiential Knowledge), EM (Emotional Responses), NR (Negative Response), encoding present and primary processing present. All probes are processed, unless the subject has not attended to it. Changes in the different frequency bands have different meanings in terms of cognitive processing.

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<sup>8</sup> Preamble to the BEOSP, Directorate of Forensic Science, Gujarat.

The Brain-Mapping technique is a non-invasive technique. The Brain Mapping is the method of retrieving experiential knowledge, information related to crime only, from the memory by measuring bio-electrical activities of the brain.

The visual, verbal and the other forms of information about the event are encoded in the Brain while the experiential knowledge is acquired. This knowledge is episodic in nature. The experiential knowledge about the crime would appear only if person has actively participated. Such experiential knowledge would be absent in the brain of innocents.

Therefore, any information elicited by such scientific method may help the law enforcement agency in proper identification of accused person or innocent person. The issue of self-incrimination, though raised in this area, but may be irrelevant where subject commented to it or willing to undergo the test. As a non-invasive process, no physical force is used and the person is not to give any statement as like any answer to the queries of interrogation officer. This technique if properly used and result have been analyzed properly may stand in the higher footing of credibility and reliability. Information given during the process, where it is found relevant, shall be making admissible relating to the guilt or innocence of the accused. It has a great evidential value and can be compared with fingerprinting evidence. It may give better clue to the investigating officer relating to crime and involvement of person than any other process of investigation without infringing the right of an accused person but only with the condition that the analysis of the result of the test must be done properly and with expertise.

### **3. Narco-Analysis Technique**

Another modern scientific investigation technique which is frequently used by the investigating officer is Narco-Analysis. Narco-Analysis is known as truth serum or drug hypnosis, also known as combination of hypnosis and narcosis. It is basically memory recovering technique, a method that makes human thought and communication manageable, an art of eliciting intimate details by stimulating the recall of suppressed memory through interview in a gentle and persuasive manner. It is scientific, precise and humane in its approach when handled by the skilled experts<sup>9</sup>.

#### **General Technique**

Sodium Pentothal injection is given intravenously with the person always in the recumbent position. A 5% solution of drug is used. And the drug is injected slowly in an antecubital vein, not more than one gram/grain per minute. The injection is processed until the person appears relaxed and in a state of good conduct, which is usually determined when the person's speech becomes slurred. As the injection proceeds, the person is asked some irrelevant and impersonal questions, which tend to reassure him then a leading to a better rapport. At the same time the

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<sup>9</sup>Preamble to Narco-Analysis, published by Directorate of Forensic Science, Gujarat



examiner by examining the slurred speech which helps in establishing the depth of semi narcotic state. The questioning of the examinee begins which he appears to be flushed, slurring of speech, by observing nystagmus by testing examinee's eye muscles with his finger. The amount of drug needed to produce the desired state varies from person to person. Hence, the needle is left in the vein while testing and if the effects of the drug wear off, an additional amount can again be introduced slowly. If too much drugs are given, the person becomes somnolent and falls into a deep sleep in which no interviewing procedure can be ensured. The safety of this drug in general use has been demonstrated for many years in many patients<sup>10</sup>.

Recent researches towards the development of new and effective drugs are based on the linkages between the bio-molecule responsible for a particular bio-activity and the drug<sup>11</sup>.

The 'truth serum' is the solutions of the drug 'Thio pentothal sodium' in Dextrose. Thiopentothal sodium is a thio barbiturate derivative i.e. 5 ethyl, 5 (1methyl-butyl), 2-thio barbiturate.

In order to carry the examination, there must be a request from the investigating officer. The consent of the individual is another essential element of the test. A team of experts comprising of Anaesthetist, Psychiatrist and Forensic / clinical psychologist and supporting staff conduct Narco-analysis at operation theatre or in a hospital<sup>12</sup>.

There are three stages for the test. These are:

- Pre-test interview
- Narco-interview
- Post test interview

In the pre-test interview, the subject is asked to narrate the situation relating to the crime. Its aim is to obtain maximum information and generally to find out as to what extent the suspect may be useful and whether there is any advantage to make in-depth interrogation or not.

The second step is narco interview. Intravenous access is established to administer the drug, appropriate dosage of drug is to be administered to maintain the subject in trance state as decided by the psychiatrist, anaesthetist team. The Forensic Psychologist / psychiatrist establish rapport with the subject informally and encourage him to speak out freely. As the subject reaches the trance, the interview is geared to see that the subject freely, voluntarily shows eagerness to reveal

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<sup>10</sup>Supra note 11.

<sup>11</sup>Dr.B.M.Mohan, 'Proactive and Preventive forensic'

<sup>12</sup> Supra note,11

information. He is encouraged and counseled to reveal completely to achieve the complete state of relaxation, peace and freedom from any negative emotions. Before discontinuing the administration of drug, the session is rounded up with positive suggestions and is allowed to sleep off. The entire procedure is video-graphed. Post interview is carried out when the subject wakes up on his own. He will be once again examined for physical and mental fitness before discharge with necessary clinical advice. Whenever possible, follow up is done on the subsequent day with one more session mainly to ensure mental fitness clinically and for concluding the whole procedure from a therapeutic angle.

In Post Test Interview, it is tested whether he is able to convey his feelings and emotions. He is asked relevant questions and his orientation as to time, place and person is examined.

The Narco-analysis, though used as a technique of investigation but there are various arguments for and against the technique.

Narco analysis has been banned in the most advanced democratic countries. In 1989 the New Jersey Supreme Court in *state V. Pitts* prohibited the use of Narco-analysis. UNO Declaration, 1980 also prohibits doctors to use such methods on arrested person as it adversely affects his physical and mental status<sup>13</sup>.

The Narco Analysis test has been conducted in India in many high profile cases among others. Those cases are on the Godhra incidents accused person, Abdul Karim Telgi, prime accused of stamp paper scam, on Nithari Serial Killers of Nithari, Noida (U.P.), Abu Salem a suspect of Bombay blast case, aide of Veerappan etc.

In USA in the wake of 9/11 event there has been debate on the legality of use of 'truth serum'. The former director of CIA and FBI urged the use of truth serum and urged the pentagon to administer truth serum to Taliban and Al-Queda prisoners if necessary, so long as the information is used for the protection of the country and not to prosecute.<sup>14</sup>

In USA it is now accepted and truth serum is now recognized as investigation technique. But there is divergence of opinions about its admissibility.

In India, Narco-analysis is under the scrutiny of the court. In Narco-analysis test, generally permission from the jurisdictional court is essential and another essential

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<sup>13</sup>Prof. J D Sarma, Narco Analysis, A critical Evaluation, The Indian Police Journal, April-June, 2011, Vol. VIII No2 p46, published by Bureau of Police Research & Development, Ministry of Home Affairs, Govt. of India, New Delhi.

<sup>14</sup>Supra note, 13.

condition is the consent of the subject which is to be recorded by the Magistrate. If these procedures are followed properly then the test can be conducted.

Another important aspect is that the entire interview is video-graphed. These procedures ensure absence of compulsion in eliciting truth.

In India, we do not have any legislation as well as provision which provides for Narco-analysis. It is a tool of investigation and therefore Section 156(1) of Criminal Procedure Code may empower a police officer to conduct Narco-analysis for the purpose of collection of evidence.

There are instances where Narco-analysis led to the revelation of people involved in crime and amount received from various agencies for the release of Dr. Rajkumar, where such money kept, cases where conspiracy is revealed, revealed about people involved, bribe given, involvement of high ranking police officials, politicians in Telgi case, in Godhra case involvement of ISI Function etc. In such cases information leading to the discovery of money kept hidden and recoveries of weapon, recoveries of documents etc.

In this connection another tool of scientific investigation which is now-a-day commonly used is polygraph test.

#### **4. Polygraph Test or Lie - Detector Test**

Polygraph Testing is a series of psychological tests. These tests are done to assess the truthfulness or deception in the statements of an individual for the purpose of investigation of a crime.

In polygraph changes in blood pressure, pulse rate, respiration, muscle movement, perspiration are recorded, when a person lies it triggers an emotional reaction which ultimately results in physical reaction which is noted and recorded by examiner. As the questions become diverse the reactions fluctuate which are recorded and the lie is detected. An expert and skilled examiner will make assessment of following procedures.

Assessment of examinee's emotional state.

Medical fitness of the examinee.

To identify overly responsive capabilities of examinee control questions be asked.

To assess responsive capabilities of examinee controlled questions be asked;

To do factual analysis of case information; and

To do pre test interview and detailed review of questions.

A polygraph test lasts for one to three hours. But in certain circumstances longer period may be taken depending on the purpose of examination.

### **Polygraph test stages**

Generally polygraph test is conducted in three stages:

The pre-test interview

The chart collection and examination proper and

The Post test interview

During pre-test interview, subject comment is taken and the subject is also told about his or her right. The examiner tells about the polygraph technique to the subject and the queries are made from the subject in details about the incident for which test is conducted.

The pneumograph, the sphygmomanometer and electrode are placed on the subject during or at the conclusion of pre test interview and after the completion of interview. The second stage is actual test. During actual test relevant, irrelevant and deceptive questions are asked. The subject has to reply them in 'yes' or 'no'. Questions are prepared on the basis of police report, crime scene and investigation. There is a gap of 10-15 seconds between two questions, so that responses of the last question may be eliminated and psychological response comes closer to the baseline. Time of beginning of examination, question asked and when examination ends is all recorded by the examiner. Then 'stimulation test' is carried out. Stimulation test is designed to convince the subject about the accuracy of polygraph examination.

Four types of questions are asked to the subject, they are relevant, control, irrelevant and concealed information or guilty knowledge question. Control and irrelevant questions are asked for the purpose of comparison, so irrelevant question and control questions helps very much in detecting deception. The variation in breath, respiration, heartbeat, salivary, anxiety is recorded during the interview and 10-15 seconds has been given to the suspect if variation is recorded so as to make him stable, unless it will affect the entire process.

The third stage is that the result of the test is discussed with the subject in order to analyze about deception if attempted in response to any question. The result is given by analyzing the chart recorded by the expert/examiner on the basis of the response such as negative response, deceptive response and no response. In India software generated polygraph techniques are though available but in most of cases conventional method is used and responses are manually analysed.

Polygraph or lie detector examination has its own standard but there are numerous variations of testing procedure. A series of set questions are asked and change in psychological response is analysed to know the truthfulness or deception in the answers. It does not directly detect whether the person is speaking truth or is deceiving but the examiner carefully analyses the patterns of arousal responses and

note the basis of variety of individual which is inferred. This inference is called diagnosis or truthfulness or deception.

In India polygraph test is conducted in many of the cases and it is used not only to establish guilt of the accused but also to prove innocence. However, it is conducted not only where there is a requisition from police officer but any person may personally proceed for the test to establish his innocence.

In the absence of any legal provisions polygraph test is conducted by following own protocol developed by the Forensic Science laboratories. This technique was first developed during 18<sup>th</sup> century. Use of polygraph was first judicially noticed in Fryevs United States<sup>15</sup>. But at present the polygraph test results are not admissible in court of most of the countries.

Polygraph technique is considered not as a reliable technique because it depends upon the psychological changes of the subject and the examiner who conducted the test must be free from any kind of prejudice relating to the subject. Again a hardcore offender may control himself and thus may give false response to the question. The expertise and experience of the examiner is another factor of its reliability.

There are number of cases pending for polygraph examination (GujratForensic Science Laboratory Polygraph Dept.). Polygraph evidence may be used not only to test the veracity of witness, but also as corroborative evidence. Besides, presence of clinical psychiatrist as well as well-equipped instrument to detect physiological responses is very much necessary. If properly analyzed, it may give clues to the investigating agencies about the involvement of the subject in the crime.

## **CONCLUSION**

Modern scientific investigation techniques include forensic psychology, Neuroscience and forensic physiology. These techniques though it is said to replace conventional 'third degree method' but is not widely accepted in the judicial proceeding due to some inherent, procedural authoritative drawback.

The authoritative decision of the Supreme Court further imposes some restriction on the use of these techniques in criminal investigation.<sup>16</sup>

These scientific investigation techniques such as BEOSP, Narco analysis, polygraph and DNA finger printing are differs from one another and it has distinctive features.

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<sup>15</sup>293 F.2d.1013(DCCir.1923)

<sup>16</sup>*Selvivs State of Karnataka*,2010 7 SCC 263.

In the same way their evidential value depends upon the accuracy and validity of procedure of the cost as well as accurate analysis.

These methods of investigation differ from traditional methods of investigation in the sense that these are conducted with the help of expert within definition of Section 45 of India Evidence Act, 1872. This evidence is relevant within the meaning of Section 45 of the Act. Much reliance can be placed on the evidence of expert than any evidence given by the accused during investigation of the case and produced by the investigation officer.

Therefore, the techniques having high evidentiary value must be adopted by making necessary and relevant amendment in the statutes such as Indian Evidence Act, 1872 as well as Code of Criminal Procedure, 1973. Again, it can be suggested that some uniform procedure must be adopted in order to ensure the validity of the procedures, and if necessary, substantive law must be enacted in order to conduct Brain Mapping and DNA finger printing.

As regards Narco-analysis test, though it is used rarely but some substantive procedure is to be enacted to conduct the test, so that its results can be used in detection of crime and criminals however in absence of any uniform substantive and procedural mandate, these methods remain in doubt and perhaps, therefore they are not extensively used in India although they might prove to be better scientific tools of investigation.